

検索期間：2006～2009年

区分 a に分類された文献とその理由

ヒトに対する毒性

Short summary of relevant and reliable articles from category a) with / without restrictions)

3031 Toxicokinetics of glyphosate and its metabolite aminomethyl phosphonic acid in rats .

Author	Anadon A; Martinez-Larranaga M R; Martinez M A; Castellano V J; Martinez M; Martin M T; Nozal M J; Bernal J L
Source	Toxicology letters, (2009 Oct 08) Vol. 190, No. 1, pp. 91-5. Electronic Publication Date: 14 Jul 2009
Title	Toxicokinetics of glyphosate and its metabolite aminomethyl phosphonic acid in rats .
Unique ID	3031

Short Summary with assessment and conclusion:

The publication is providing additional information on blood plasma concentrations of glyphosate and AMPA, as well as elimination after oral and i.v. application of glyphosate.

Rats were divided into two groups of 80 animals each, one group (Group 1) received a single oral gavage administration of 400 mg/kg bw glyphosate and the other group (Group 2) received a single i.v. injection of 100 mg/kg bw glyphosate.

Intravenous injection is more rapidly excreted than oral simply because of lag time for gastro intestinal tract absorption and entry into the blood stream. That reported, half-lives for i.v (0.345 and 9.99 hours for α and β phases respectively) versus oral (4.17 and 14.38 hours for α and β phases respectively) are all very rapid elimination kinetics, emphasizing the low duration of any systemic exposure to glyphosate, irrespective of the route.

Study report meets basic scientific principles, and is comparable to actual kinetics guidelines (large number of test animals used, standard deviations and mass balance not reported).

Short summary of relevant and reliable articles from category a) with / without restrictions)

140 Agricultural pesticide use and pancreatic cancer risk in the Agricultural Health Study Cohort.

Author	Andreotti, Gabriella (Correspondence); Freeman, Laura E. Beane; Coble, Joseph; Silverman, Debra T.; Alavanja, Michael C. R.
Source	International Journal of Cancer, (15 May 2009) Vol. 124, No. 10, pp. 2495-2500. Refs: 25 ISSN: 0020-7136; E-ISSN: 1097-0215 CODEN: IJCNW
Title	Agricultural pesticide use and pancreatic cancer risk in the Agricultural Health Study Cohort.
Unique ID	140

Short Summary with assessment and conclusion:

This was a case-control study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised licensed private and commercial pesticide applicators and their spouses. The health outcome of interest was incident pancreatic cancer, and was captured from population-based state cancer registries; it was defined as codes C25.0 – C25.9 in the International Classification of Diseases 10th Revision (ICD-10). The exposure of interest was glyphosate use, and was captured by self-administered questionnaire; exposure status was classified in two different ways: ever vs. never exposure, and number of exposure days. Data for 93 pancreatic cancer cases and 82,503 controls were analyzed using logistic regression. The reported an odds ratio (OR) and 95% confidence interval (CI) of 1.1 (0.6, 1.7) for participants who self-reported to have ever used glyphosate compared to those who self-reported to have never used it. Age group, cigarette smoking, diabetes, and applicator type were adjusted for in this analysis. The reported OR and 95% CI for participants with ≤ 184 days of exposure compared to those who self-reported to have never used it was 1.9 (0.9, 3.8). The OR and 95% CI for participants with ≥ 185 days compared to those who self-reported to have never used it was 1.2 (0.6, 2.6). The reported value for p-trend was 0.85. Age group, cigarette smoking, and diabetes were adjusted for in this analysis. These results suggest that there is not a statistically significant difference in pancreatic cancer incidence among exposure groups at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2196 Pesticide exposure as risk factor for non-Hodgkin lymphoma including histopathological subgroup analysis.

Author	Eriksson Mikael; Hardell Lennart; Carlberg Michael; Akerman Mans
Source	International journal of cancer, (2008 Oct 01) Vol. 123, No. 7, pp. 1657-63.
Title	Pesticide exposure as risk factor for non-Hodgkin lymphoma including histopathological subgroup analysis.
Unique ID	2196

Short Summary with assessment and conclusion:

This was a case control study conducted in Sweden. The study population comprised consecutive patients aged 18-74 years with newly diagnosed Non-Hodgkin lymphoma (NHL), and population controls selected from the same health service region. The health outcome of interest was NHL and its subtypes; diagnosis was confirmed by a pathologist. The exposure of interest was self-reported exposure or non-exposure to glyphosate, and number of days exposed; it was self-reported via questionnaire and, in some cases, interview. Data from 910 NHL cases and 1,016 controls were analyzed using logistic regression. The reported OR and 95% CI for participants exposed to glyphosate compared to those not exposed was 2.02 (1.10, 3.71). The reported OR and 95% CI for participants with 10 or fewer exposure days compared to those not exposed was 1.69 (0.70, 4.07), and the reported OR and 95% CI for participants with more than 10 exposure days compared to those not exposed was 2.36 (1.04, 5.37). When comparing participants with self-reported exposure and those with self-reported non-exposure reported ORs and 95% CIs were 1.87 (0.998, 3.51) for B-cell lymphomas, 3.35 (1.42, 7.89) for lymphocytic lymphoma/B-CLL (SLL/CLL), 1.89 (0.62, 5.79) for follicular, grade I-III (FL), 1.22 (0.44, 3.35) for diffuse large B-cell lymphoma (DLBCL), 1.63 (0.53, 4.96) for other specified B-cell lymphoma, 1.47 (0.33, 6.61) for unspecified B-cell lymphoma, 2.29 (0.51, 10.4) for T-cell lymphomas, and 5.63 (1.44, 22.0) for unspecified non-Hodgkin lymphoma. Controls were frequency matched on 10 year age and sex; analyses were adjusted for year of diagnosis for cases and of enrollment in controls. These results suggest that there is a statistically significant difference in odds of glyphosate exposure between NHL and non-NHL cases at the 0.05 significance level. Results were statistically significant for participants with more than 10 exposure days, but not for those with 10 or fewer compared to those who were non-exposed. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2209 Pesticides and adult respiratory outcomes in the agricultural health study.

Author	Hoppin, Jane A.; Umbach, David M.; London, Stephanie J.; Lynch, Charles F.; Alavanja, Michael C. R.; Sandler, Dale P.
Source	Ann. N. Y. Acad. Sci., Volume 1076, Issue Living in a Chemical World, Page 343-354, Publication Year 2006
Title	Pesticides and adult respiratory outcomes in the agricultural health study.
Unique ID	2209

Short Summary with assessment and conclusion:

This was a cross-sectional study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised private and commercial pesticide applicators and their spouses. The health outcome of interest was self-reported wheeze, and was captured by self-administered questionnaire; it was defined as having had at least one reported episode of wheezing or whistling in the chest in the past 12 months. The exposure of interest was self-reported glyphosate use in the year before enrollment, and was captured by self-administered questionnaire. Data from 17,920 farmers and 2,255 commercial applicators were analyzed using logistic regression. Reported ORs and 95% CIs comparing participants with self-reported glyphosate use and those without were 1.05 (0.94, 1.17) among farmers, and 1.14 (0.83, 1.57) among commercial applicators. Analyses were adjusted for age, BMI, smoking, asthma/atopy, and previous use of pesticide. Analyses among commercial applicators also adjusted for chlorimuron-ethyl, and those among farmers also adjusted for state. These results suggest that there is no statistically significant difference in odds of self-reported glyphosate use and wheeze among either farmers or commercial applicators at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Additionally, outcome classification was based on self-report. Misclassification of either exposure, outcome, or both is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

2206 Pesticide use and colorectal cancer risk in the Agricultural Health Study.

Author	Lee, Won Jin; Sandler, Dale P.; Blair, Aaron; Samanic, Claudine; Cross, Amanda J.; Alavanja, Michael C. R.
Source	Int. J. Cancer, Volume 121, Issue 2, Page 339-346, Publication Year 2007
Title	Pesticide use and colorectal cancer risk in the Agricultural Health Study.
Unique ID	2206

Short Summary with assessment and conclusion:

This was a case-control study conducted in the Agricultural Health Study cohort in Iowa and North Carolina, USA. The study population comprised certified pesticide applicators and their spouses. The health outcome of interest was incident colorectal cancer, and was captured from a cancer registry. The exposure of interest was self-reported ever or never exposure to glyphosate, and was captured by questionnaire. Data for 305 colorectal cancer cases, and 56,508 non-cases were analyzed using unconditional multivariate logistic regression. The reported ORs and 95% CIs were 1.2 (0.9, 1.6) for colorectal cancer, 1.0 (0.7, 1.5) for colon cancer, and 1.6 (0.9, 2.9) for rectum cancer. Analyses were adjusted for age, state of residence, smoking history, and total pesticide application days for any pesticide. These results suggest that there is no statistically significant difference between odds of glyphosate exposure between cases and non-cases of colorectal cancer, colon cancer, or rectum cancer at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Misclassification of exposure is possible in this study.

Short summary of relevant and reliable articles from category a) with / without restrictions)

1697 In utero pesticide exposure and childhood morbidity.

Author	Weselak, Mandy; Arbuckle, Tye E.; Wigle, Donald T.; Krewski, Daniel
Source	Environmental Research, (JAN 2007) Vol. 103, No. 1, pp. 79-86.
Title	In utero pesticide exposure and childhood morbidity.
Unique ID	1697

Short Summary with assessment and conclusion:

This was a retrospective cohort study conducted in Canada as part of the Ontario Farm Family Health Study (OFFHS). The study population comprised children of married couples, or couples living as married, who lived year-round on a farm with reported agricultural product sales of at least \$50,000 in 1986. Wives were aged 44 years or younger. The health outcomes of interest were chronic bronchitis or cough, asthma, hayfever or allergies in children, and was captured via questionnaire; it was defined as self-reported physician diagnosis. The exposure of interest was reported farm use of glyphosate during pregnancy, and was self-reported via questionnaire. Data from 3,405 children were analyzed using logistic regression and generalized estimating equations. The reported adjusted ORs and 95% CIs for children with reported glyphosate use during pregnancy compared to those without was 0.71 (0.21, 2.35) for persistent cough or bronchitis, 0.82 (0.35, 1.90) for asthma, and 0.98 (0.46, 2.10) for hayfever or allergies. Analyses for persistent cough or bronchitis were adjusted for child's age at time of questionnaire, father's age at conception, income, breast feeding, and mother's age at conception. Analyses for asthma were adjusted for child's age at time of questionnaire, and father's education level. Analyses for hayfever or allergies were adjusted for child's age at time of questionnaire, father's age at conception, mother's age at conception, and father's education level. These results suggest that there is not a statistically significant difference in odds of persistent cough or bronchitis, asthma, or hayfever or allergies among exposure groups at the 0.05 significance level. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because exposure classification was based on self-reported glyphosate use, an indirect method by which to estimate exposure status of study participants. No biological evidence is provided to support exposure classification of study participants. Additionally, outcome classification was based on self-report of physician diagnosis. Misclassification of either exposure, outcome, or both is possible in this study.

検索期間：2006～2009年年

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

Short summary of relevant and reliable articles from category a) with / without restrictions)

100 Acute and chronic toxicity of glyphosate compounds to glochidia and juveniles of *Lampsilis siliquoidea* (Unionidae).

Author	Bringolf Robert B; Cope W Gregory; Mosher Shad; Barnhart M Chris; Shea Damian
Source	Environmental toxicology and chemistry, (2007 Oct) Vol. 26, No. 10, pp. 2094-100.
Title	Acute and chronic toxicity of glyphosate compounds to glochidia and juveniles of <i>Lampsilis siliquoidea</i> (Unionidae).
Unique ID	100

Short Summary with assessment and conclusion:

The article describes acute and chronic toxicity tests with different forms of glyphosate and different glyphosate formulations on juveniles and glochidia of the freshwater mussel *Lampsilis siliquoidea*. Acute 48 EC50 values for the different glyphosate forms (4.6 - 200 mg/L) and glyphosate formulations (2.9 - 148 mg/L) are reported, which are partially considered relevant for risk assessment. As no raw data are provided, the test doses used for the acute test are not reported and the analytical methods are not clearly described, the article is regarded reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

413 Combination effects of herbicides on plants and algae: do species and test systems matter?

Author	Cedergreen, Nina; Kudsk, Per; Mathiasen, Solvejg K.; Streibig, Jens C.
Source	Pest Management Science (2007), 63(3), 282-295
Title	Combination effects of herbicides on plants and algae: do species and test systems matter?
Unique ID	413

Short Summary with assessment and conclusion:

In this study, the toxicity of technical grade glyphosate (95%) on the terrestrial plants *Tripleurospermum inodorum* ($ED_{50} = 18 \pm 1$ g a.s./ha) and *Stellaria media* ($ED_{50} = 16 \pm 3$ g a.s./ha), the aquatic plant *Lemna minor* ($EC_{50} = 17.2 \pm 1.1$ mg a.s./ha) and the alga *Pseudokirchneriella subcapitata* ($EC_{50} = 55.1 \pm 2.5$ mg a.s./ha) was calculated. As no analytical verifications were conducted for any of the tests with either terrestrial or aquatic species, some important methodological details are insufficiently reported and no raw data are available to verify ED/EC₅₀ values, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

3012 Toxicity and effects of a glyphosate -based herbicide on the Neotropical fish Prochilodus lineatus.

Author	Langiano Vivian Do Carmo; Martinez Claudia B R
Source	Comparative biochemistry and physiology. Toxicology and pharmacology : CBP, (2008 Mar) Vol. 147, No. 2, pp. 222-31. Electronic Publication Date: 26 Sep 2007
Title	Toxicity and effects of a glyphosate -based herbicide on the Neotropical fish Prochilodus lineatus.
Unique ID	3012

Short Summary with assessment and conclusion:

In this article acute and sub-lethal endpoints for the neotropical fish Prochilodus lineatus after exposure to the glyphosate formulation Roundup® are reported. The determined 96 h LC50 of 13.69 mg/L is considered relevant for risk assessment. As the test concentrations were not analytically verified, no raw data are presented and no confidence intervals are given for the 96 h LC50, the article is considered as reliable with restrictions (NOTE: probably not relevant because of the formulation used).

Short summary of relevant and reliable articles from category a) with / without restrictions)

3016 Toxicity evaluation of three pesticides on non-target aquatic and soil organisms: commercial formulation versus active ingredient.

Author	Pereira Joana L; Antunes Sara C; Castro Bruno B; Marques Catarina R; Goncalves Ana M M; Goncalves Fernando; Pereira Ruth
Source	Ecotoxicology (London, England), (2009 May) Vol. 18, No. 4, pp. 455-63. Electronic Publication Date: 10 Feb 2009
Title	Toxicity evaluation of three pesticides on non-target aquatic and soil organisms: commercial formulation versus active ingredient.
Unique ID	3016

Short Summary with assessment and conclusion:

In this article, acute endpoints for *Daphnia magna* and the green algae *Pseudokirchneriella subcapitata* after exposure to the glyphosate formulation Spasor® or the active substance glyphosate are reported, i.e. 307 mg/L (> 2000 mg/L) for *Daphnia magna* and 71 mg/L (129 mg/L) for *P. subcapitata*. As the test concentrations were not analytically verified and no raw data are presented, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

3084 Understanding the net effects of pesticides on amphibian trematode infections.

Author	Rohr Jason R; Raffel Thomas R; Sessions Stanley K; Hudson Peter J
Source	Ecological applications : a publication of the Ecological Society of America, (2008 Oct) Vol. 18, No. 7, pp. 1743-53.
Title	Understanding the net effects of pesticides on amphibian trematode infections.
Unique ID	3084

Short Summary with assessment and conclusion:

This study showed no significant effects of technical grade glyphosate (98%) on all the species involved in an amphibian trematode infection (i.e. the trematode *Echinostoma trivolvis* and its first and second intermediate hosts, the snail *Planorbella trivolvis* and tadpoles of the green frog *Rana clamitans*) when applied at 3.7 mg/L separately. A general NOEC of 3.7 mg/L can therefore be established. As some general methodological information is lacking and the tested individuals for all species were taken from natural sources with unknown previous history of chemical exposure/applications, which could make up the glyphosate effects, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

1124 Evaluating the Effects of Forestry Herbicides on Fish Development Using Rapid Phenotypic Screens

Author	Stehr, Carla M; Linbo, Tiffany L; Baldwin, David H; Scholz, Nathaniel L; Incardona, John P
Source	North American Journal of Fisheries Management [N. Am. J. Fish. Manage.]. Vol. 29, no. 4, pp. 975-984. Aug 2009. ISSN: 0275-5947 E-ISSN: 1548-8675 DOI: 10.1577/M08-173.1 Published by: American Fisheries Society, 5410 Grosvenor Ln. Bethesda MD 20814-2199 U
Title	Evaluating the Effects of Forestry Herbicides on Fish Development Using Rapid Phenotypic Screens
Unique ID	1124

Short Summary with assessment and conclusion:

In this article the developmental effects (anatomy, morphology, body length, touch response) of glyphosate on zebra fish embryos after 5 days of exposure were assessed. No significant effects were observed at the highest test concentration of 100 mg/L. As the test concentrations were not analytically verified and the raw data are not presented, the article is considered reliable with restrictions.

Short summary of relevant and reliable articles from category a) with / without restrictions)

834 Effect of glyphosate on growth of four freshwater species of phytoplankton: a microplate bioassay.

Author	Vendrell E; Ferraz D Gomez De Barreda; Sabater C; Carrasco J M
Source	Bulletin of environmental contamination and toxicology, (2009 May) Vol. 82, No. 5, pp. 538-42. Electronic Publication Date: 6 Mar 2009
Title	Effect of glyphosate on growth of four freshwater species of phytoplankton: a microplate bioassay.
Unique ID	834

Short Summary with assessment and conclusion:

In this article the effect of technical glyphosate (97.5%) on the growth of four freshwater algae species was tested in a 72 hour exposure test. EC50 values based on area under the growth curve are reported, which ranged between 24.5 and 41.7 mg/L. As the test concentrations were not analytically verified and no raw data are presented, the article is considered reliable with restrictions.

検索期間：2010～2019年

区分 a に分類された文献とその理由

環境動態

1. Information on the study

Data point:	KCA 7.1.3.1.1
Report author	Albers, C. et al.
Report year	2019
Report title	Soil Domain and Liquid Manure Affect Pesticide Sorption in Macroporous Clay Till
Document No	Journal of Environmental Quality (2019), Vol. 48, No. 1, pp. 147
Guidelines followed in study	OECD 106
Deviations from current test guideline	1 mM CaCl ₂ solution (standard: 10 mM solution), at 10°C (standard: 20 – 25°C); 4 concentrations (standard: 5), no explicit measurements of concentrations in the solid phase, i.e. no real mass balances available
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/ Supportive only (the study does not meet the validity criteria as required according the OECD 106 guideline)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the sorption behavior of glyphosate to different soil domains from two agricultural soils in Denmark. The set-up of the experiment was based on the OECD 106 guideline but with some deviations: The study was conducted with 1 mM CaCl₂ solution (standard: 10 mM solution), at 10°C (standard: 20 – 25°C); with 4 concentrations (standard: 5), no concentrations in the solid phase were explicitly measured, i.e. no real mass balances available. The study is therefore classified as reliable with restrictions (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.2.1.1
Report author	Ersilia Alexa, Renata Sumalan, Monica Negrea, Mihaela Bragea, Mariana-Atena Poiana, Isidora Radulov and Aurel Lazureanu
Report year	2010
Report title	Studies on the biodegradation capacity ¹⁴ C-labelled glyphosate in vine plantation soils
Document No	Journal of Food, Agriculture & Environment (2010) Vol.8 (3&4): 1193-1
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Experimental conditions not sufficiently described to assess validity, relevant endpoint not reported (DT50))

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a degradation experiment with glyphosate on an European agricultural soil in the laboratory. Only the mineralization of the substance is reported. Further data like mass balances, residues in soil and a half-life are not reported. The validity of the study cannot be evaluated due to missing information.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.2.1.1
Report author	Abdul Jabbar Al-Rajab and Michel Schiavon
Report year	2010
Report title	Degradation of ¹⁴ C-glyphosate and aminomethylphosphonic acid (AMPA) in three agricultural soils
Document No	Journal of environmental sciences (China), (2010) Vol. 22, No. 9, pp. 1374-80
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	No (no quantitative results of glyphosate & AMPA reported)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a soil degradation experiment with glyphosate in three agricultural soils from the EU. The study conditions are sufficiently described. However some deficiencies were identified: the test vessels were air-tight and did not allow for air exchange; no information whether the applied test solution was mixed with the soil; ¹⁴CO₂ was passively (and potentially not quantitatively) collected; soil moisture was too high (80% of soil retention capacity); for analytical method no LoD/LoQ provided; no radioactive material balance can be established; identification of glyphosate and AMPA was done only in aqueous extracts and no quantitative results are reported, thus not reliable quantification possible; no individual analytical results reported (mainly graphical plots); calculation method of DT50 not reported.

The study is therefore classified as not reliable (Category 3).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Abdul Jabbar, Al-Rajab, Othman M. Hakami
Report year	2014
Report title	BEHAVIOR OF THE NON-SELECTIVE HERBICIDE GLYPHOSATE IN AGRICULTURAL SOIL
Document No	American Journal of Environmental Science 10 (2): 94-101, 2014
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (some deviations from study guidelines, not all necessary data reported to derive comprehensive DT50 values, preferential flow in the soil column)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the dissipation and leaching behavior of glyphosate and its metabolite AMPA in three French soils. The soil dissipation experiments were conducted with ¹⁴C-labelled glyphosate and show few deviations from the relevant OECD guideline. However, no detailed values on the measurements per time point are reported for all soils.

The outdoor leaching experiments were conducted with 35-cm long undisturbed columns from the three different soils. ¹⁴C-labelled glyphosate was applied. Preferential flow was identified as the main reason for the fast detection of glyphosate in the leachate.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(solvent, vehicle) where relevant.	
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.1.4.3
Report author	Aronsson, H; Stenberg, M; Ulen, B
Report year	2011
Report title	Leaching of N, P and glyphosate from two soils after herbicide treatment and incorporation of a ryegrass catch crop
Document No	Soil use and management (2011), Volume 27, Number 1, pp. 54-68
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (experiment not sufficiently described to evaluate the validity of the results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a long-term leaching experiment in Sweden on agricultural soils with glyphosate. The method is not sufficiently described to evaluate the validity of the results. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Sohaib Aslam, Akhtar Iqbal, Marjolaine Deschamps, Sylvie Recous, Patricia Garniera and Pierre Benoita
Report year	2015
Report title	Effect of rainfall regimes and mulch decomposition on the dissipation and leaching of S-metolachlor and glyphosate: a soil column experiment
Document No	Pest Management Science 2015; 71: 278–291
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (INRA)
Acceptability/Reliability:	Yes/Supportive only (provided information does not allow final check for validity against current guidelines)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes two soil column leaching tests with glyphosate and S-metolachlor on French soils. Not enough information is available to check the validity against current guidelines. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Assalin Marcia R; De Moraes Sandra G; Queiroz Sonia C N; Ferracini Vera L; Duran Nelson
Report year	2010
Report title	Studies on degradation of glyphosate by several oxidative chemical processes: Ozonation, photolysis and heterogeneous photocatalysis
Document No	Journal of Environmental Science and Health Part B (2010) 45, 89–94
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Supportive only (results reported mainly as graphical plots)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes the removal of glyphosate by ozonation and photocatalysis (Ti/UV) process in water. The results are mainly shown as graphical plots. Thus, not enough details were reported to evaluate the validity of the results. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Celia P.M. Bento, Dirk Goossens, Mahrooz Rezaei, Michel Riksen, Hans G.J. Mol, Coen J. Ritsema, Violette Geissen
Report year	2017
Report title	Glyphosate and AMPA distribution in wind-eroded sediment derived from loess soil
Document No	Environmental Pollution 220 (2017) 1079 -1089
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the glyphosate and AMPA distribution in wind-eroded sediment derived from a Belgian loess soil. The distribution of the substances as dust via air and their dissipation and formation behavior is evaluated. Correlations to different soil parameters are presented.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.1.2.1.1, KCA 7.1.2.1.2, KCA 7.1.3.1, KCA 7.1.4.2
Report author	Bergstrom, Lars; Borjesson, Elisabet; Stenstrom, John
Report year	2011
Report title	Laboratory and Lysimeter Studies of Glyphosate and Aminomethylphosphonic Acid in a Sand and a Clay Soil
Document No	Journal of environmental quality (2011), Vol 40, No 1, pp. 98-108
Guidelines followed in study	OECD 106 Guideline
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not all validity criteria of the studies were met)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a lysimeters experiment including derivation of sorption parameters and degradation data for glyphosate and AMPA in two Swedish agricultural soils. Chemical purity of the test substances is not reported, no mass balances or tabulated results per sample point are provided.

Lysimeter experiment: Not all required information is reported to check the validity of the study. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

Sorption experiment: The experiment was conducted according the OECD 106 guideline for glyphosate. Not all required information is provided to check the validity of the study (see above, additionally LoD not sensitive enough).

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

Degradation experiment: The soil degradation of glyphosate and AMPA was considered. Not all required information is provided to check the validity of the study (see above, additionally mass of soil < 50 g).

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
specified in EC Regulation (EU) No 283/2013	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5
Report author	Birch H; Mikkelsen P S; Jensen J K; Lutzhoft H-C Holten
Report year	2011
Report title	Micropollutants in stormwater runoff and combined sewer overflow in the Copenhagen area, Denmark
Document No	Water science and technology (2011) Vol. 64, No. 2, pp. 485-93.
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities (Eurofins Miljø A/S)
Acceptability/Reliability:	Yes/Supportive only (Catchments were classified as mainly non-agricultural)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a monitoring experiment considering storm water from different catchments in the Copenhagen area. Glyphosate was measured in the study, but the catchments are classified as mainly non-agricultural.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Botta F. et al.
Report year	2012
Report title	Phyt'Eaux Cités: Application and validation of a programme to reduce surface water contamination with urban pesticides
Document No	Chemosphere 86 (2012) 166–176
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no agricultural area considered)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes monitoring data (surface water) for glyphosate among other pesticides for an urban area in France. No agricultural area is considered. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Boucherie, C.; Lecarpentier, C.; Fauchon, N.; Djafer, M.; Heim, V.
Report year	2010
Report title	"Ozone" and "GAC filtration" synergy for removal of emerging micropollutants in a drinking water treatment plant?
Document No	Water Science and Technology: Water Supply (2010), Volume 10, Number 5, pp. 860-868
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities (Veolia Water)
Acceptability/Reliability:	Yes/Supportive only (no breakdown products occurring during ozonation are reported)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the removal of glyphosate and AMPA among other substances from spiked drinking water with a combined ozonation – deozonation - filtration approach. Glyphosate and AMPA were reported to be removed resulting in non-detectable amounts. However, no information about potential break-down products are provided.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (Monitoring)
Report author	Bruchet, A. et al.
Report year	2011
Report title	Natural attenuation of priority and emerging contaminants during river bank filtration and artificial recharge
Document No	European Journal of Water Quality 42 (2011) 123-133
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at an officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a monitoring experiment with glyphosate and AMPA among different other substances from Seine river and a drinking water production area downstream of the Paris urban area. The study is well described, the analytical methods used are sufficient.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5
Report author	Busetto, M et al.
Report year	2010
Report title	Survey of herbicide glyphosate and degradation product aminomethyl phosphonic acid in waterways of Monza-Brionza province
Document No	Il bollettino 2010/4
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes the monitoring results for glyphosate and AMPA from the Lombardy region in Italy. The information relies on official monitoring data of the authorities.

The article is therefore classified as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5 %), bulk density, water retention, microbial biomass (~1 % of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.4.3
Report author	Candela Lucila; Caballero Juan; Ronen Daniel
Report year	2010
Report title	Glyphosate transport through weathered granite soils under irrigated and non-irrigated conditions-Barcelona, Spain
Document No	The Science of the total environment, (2010), Vol. 408, No. 12, pp. 2509-16.
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Experimental conditions not sufficiently described to evaluate validity of the results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a leaching experiment with glyphosate in an agricultural area in Spain. Leaching over a period of several months in spring and in autumn was observed under irrigated and un-irrigated conditions. Glyphosate and AMPA were found in deeper soil layers as expected from the calculations based on a tracer experiment. However, only assumptions for reasons of deeper leaching were provided, and based on the provided information (i.e. soil structure etc.) no profound explanation can be established. Duration of the study is in addition not long enough to evaluate the leaching behavior for a long-time perspective. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	A. Cassigneul, P. Benoit, V. Bergheaud, V. Dumeny, V. Etiévant, Y. Goubard, A. Maylin, E. Justes, L. Alletto
Report year	2016
Report title	Fate of glyphosate and degradates in cover crop residues and underlying soil: A laboratory study
Document No	Science of the Total Environment 545–546 (2016) 582–590
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (Not all information reported to check validity of experiment against current guidelines, not all parameters reported to evaluate kinetic behavior)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the degradation and sorption of Glyphosate to soil considering cover crops. The study is well described and provides potential endpoints for degradation and sorption. However, the available information does not allow to check the validity against current guidelines, and not enough parameters are provided to evaluate the kinetic behavior. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Coupe, R. H. et al.
Report year	2012
Report title	Fate and transport of glyphosate and aminomethylphosphonic acid in surface waters of agricultural basins
Document No	Society of Chemical Industry (wileyonlinelibrary.com) DOI 10.1002/ps.2212
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (for French site; irregular, event-driven sampling)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports concentration measurements for glyphosate and AMPA residues in stream waters in USA and France. Specific analytical method were used and the limits of reporting were stated. For France, only runoff events with volumes greater than 8 m³ were monitored between March and October.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	R. Dairon et al.
Report year	2017
Report title	Long-term impact of reduced tillage on water and pesticide flow in a drained context
Document No	Environ Sci Pollut Res (2017) 24:6866-6877
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no guidelines followed, no final endpoint provided, no specific values for glyphosate are provided)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the different drainage behavior of glyphosate among other pesticides in a tilled and a non-tilled field from a long-term perspective in the EU. No specific information about glyphosate concentrations are provided and no endpoint specific for the exposure assessment are reported. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	SILWAN DAOUK, DOMINIQUE GRANDJEAN, NATHALIE CHEVRE, LUIZ F. DE ALENCASTRO and HANS-RUDOLF PFEIFER
Report year	2013
Report title	The herbicide glyphosate and its metabolite AMPA in the Lavaux vineyard area, western Switzerland: Proof of widespread export to surface waters. Part I: Method validation in different water matrices
Document No	Journal of Environmental Science and Health, Part B (2013) 48, 717–724
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The main focus of the study is the validation of an analytical method in different water matrices. The measured values for glyphosate and AMPA from natural sites can be used for monitoring purposes. They represent a vineyard area in Switzerland.
The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	SILWAN DAOUK, LUIZ F. DE ALENCASTRO and HANS-RUDOLF PFEIFER
Report year	2013
Report title	The herbicide glyphosate and its metabolite AMPA in the Lavaux vineyard area, western Switzerland: Proof of widespread export to surface waters. Part II: The role of infiltration and surface runoff
Document No	Journal of Environmental Science and Health, Part B (2013) 48, 725–736
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (not sufficient parameters reported to check validity of study)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the mobility of glyphosate and AMPA in soil after application of the parent to a vineyard soil in Switzerland. The loss to surface waters via surface runoff and throughflows in soils with subsequent exfiltration to surface waters was considered. The reported parameters do not allow to finally check the validity of the study.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	N. Desmet, K. Touchant, P. Seuntjens, T. Tang, J. Bronders
Report year	2016
Report title	A hybrid monitoring and modelling approach to assess the contribution of sources of glyphosate and AMPA in large river catchments
Document No	Science of the Total Environment 573 (2016) 1580–1588
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (The portion of glyphosate originating from application in agricultural land use is not assessed)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports a hybrid monitoring and modelling approach to evaluate different sources of glyphosate and AMPA in the Meuse River in the Netherlands and their decay in the waterbody. Waste-water treatment plants and tributaries were considered as entry routes of the substances. The experiment does not consider or model explicitly the contribution of agricultural application of the substances.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Di Guardo, A and Finizio, A.
Report year	2016
Report title	A moni-modelling approach to manage groundwater risk to pesticide leaching at regional scale
Document No	Science of the Total Environment 545–546 (2016) 200–209
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Supportive only (modelling approach, no new data generated)

2 Assessment and conclusion

Assessment and conclusion by applicant:

The article presents an approach for combining groundwater monitoring data from national authorities with vulnerability modelling. No experimental or monitoring data were generated. The article is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Di Guardo, A. and Finizio, A.
Report year	2018
Report title	A new methodology to identify surface water bodies at risk by using pesticide monitoring data: The glyphosate case study in Lombardy Region (Italy)
Document No	<i>Science of the Total Environment 610–611 (2018) 421–429</i>
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Supportive only (modelling approach, no new data generated)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article presents an approach for combining surface water monitoring data from national authorities with GIS analysis to identify contamination levels and implement pesticide risk mitigation measures for surface water bodies. No experimental or monitoring data were generated. The article is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.3.1.1
Report author	Jeanne Dollinger, Cecile Dages, Marc Voltz
Report year	2015
Report title	Glyphosate sorption to soils and sediments predicted by pedotransfer functions
Document No	Environ Chern Leu (20 15) 13:293-307
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (no new experimental data is presented)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article estimates pedotransfer functions for the adsorption of glyphosate to soil based on based on review of existing literature data. No new experimental data is presented.
The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.3.1.1
Report author	Dollinger, J. et al.
Report year	2018
Report title	Contrasting soil property patterns between ditch bed and neighbouring field profiles evidence the need of specific approaches when assessing water and pesticide fate in farmed landscapes
Document No	Geoderma 309 (2018) 50–59
Guidelines followed in study	OECD 106
Deviations from current test guideline	study not sufficiently described to check validity of the results
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (study not sufficiently described to check validity of the results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the properties of a soil from a ditch in an agricultural area in the south of France. Mainly, the hydraulic parameters of the different soil layers of the ditch and the surrounding banks are considered and modelled and tracer experiments with bromide are presented. Sorption experiments with glyphosate were conducted and Freundlich sorption coefficients for the different soil horizons are reported. However, not sufficient data to check validity of the experiment are reported (mass balances, chemical properties of test substance, solution agent, analytical information (method, LOD, LOQ), temperature, considered concentrations, stability of the test item). No actually measured concentrations in the field are reported.

The study is therefore classified as reliable with restrictions (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
10. Assessment of the statistical power of the assay is possible with reported data.	No
11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
17. Data on precipitation is recorded	No
18. The temperature was in the range between 20-25°C and the moisture was reported	No
19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
22. Radiolabel characterization: purity, specific activity, location of label	No
23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Gasperi, J.; Sebastian, C.; Ruban, V.; Delamain, M.; Percot, S.; Wiest, L.; Mirande, C.; Caupos, E.; Demare, D.; Kessoo, M.; Saad, M.; Schwartz, J.; Dubois, P.; Fratta, C.; Wolff, H.; Moilleron, R.; Chebbo, G.; Cren,
Report year	2014
Report title	Micropollutants in urban stormwater: occurrence, concentrations, and atmospheric contributions for a wide range of contaminants in three French sites
Document No	Environmental Science and Pollution Research (2014) 21:5267- 5281
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no consideration of agricultural areas)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the results from a monitoring exercise for micropollutants in the stormwater of three French urban catchment areas. Among other substances, the concentration of glyphosate was considered and reported. The results provide a comprehensive overview on the occurrence of glyphosate in the stormwater of urban areas. However, the focus is not on agricultural area. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(solvent, vehicle) where relevant.	
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.2.1.1
Report author	Ghafoor A.; Jarvis N J; Thierfelder T; Stenstrom J.
Report year	2011
Report title	Measurements and modeling of pesticide persistence in soil at the catchment scale
Document No	The Science of the total environment (2011) Vol. 409, No. 10, pp. 1900-8.
Guidelines followed in study	OECD 106 Guidance
Deviations from current test guideline	Not sufficient information provided to check validity
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not all information provided to check validity of the results, no results reported for adsorption experiment)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes degradation and sorption experiments with glyphosate among other substances on several Swedish agricultural soils. The analytical methods used in both experiments are not explained in detail, no LoD or LoQ are provided. For the sorption experiment, no results are provided. No mass balances and measurement per sample date are provided for both experiments. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes / No (for sorption)
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.1.4.1.1
Report author	Gjettermann, B; Styczen, M; Koch, C B; Hansen, S; Petersen, C T
Report year	2011
Report title	Evaluation of Sampling Strategies for Pesticides in a Macroporous Sandy Loam Soil
Document No	Soil & sediment contamination (2011), Vol 20, No 5-8, pp. 986-994
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not sufficient information available to check validity of the results, scope of the study is not on leaching of glyphosate itself but on evaluating the usage of a dye to improve sampling strategies)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a leaching experiment on soil columns with a dye and glyphosate and pendimethalin. Some important information about study conditions are missing: agricultural use of the soil, whether conditions (temp.), soil parameters, details on analytics and on substance identification

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.4.1.1
Report author	Gjettermann, B; Petersen, C T; Hansen, S; Koch, C Bender; Styczen, M
Report year	2011
Report title	Kinetics of Glyphosate Desorption from Mobilized Soil Particles
Document No	Soil Science Society of America journal (2011), Vol 75, No 2, pp. 434-443
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Study not sufficiently described to check validity of results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a leaching experiment with glyphosate in soil columns. The desorption of glyphosate from soil particles and its effect on interpretation of leaching experiments was in the focus of the study. Not all necessary information was reported to check the validity of the results (no mass balances, study set-up not clearly described, no sufficient information on soil properties and soil origin, test item not sufficiently described, Temperature not provided). The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	ANA MARIA GÓMEZ ORTIZ, ELENA OKADA, FRANCISCO BEDMAR, and JOSÉ LUIS COSTA
Report year	2017
Report title	SORPTION AND DESORPTION OF GLYPHOSATE IN MOLLISOLS AND ULTISOLS SOILS OF ARGENTINA
Document No	Environmental Toxicology and Chemistry, Vol. 36, No. 10, pp. 2587–2592, 2017
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (Soils were from outside EU (Argentina))

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a adsorption / desorption experiment with glyphosate on three different agricultural soils from Argentina. The soils do not reflect current EU conditions. Furthermore, no labelled test item was used and no mass balances were provided.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (monitoring data)
Report author	Gregoire, C.; Payraudeau, S.; Domange, N. Editor(s): Chiron, S.
Report year	2010
Report title	Use and fate of 17 pesticides applied on a vineyard catchment
Document No	International Journal of Environmental Analytical Chemistry (2010), Volume 90, Number 3/6, pp. 406-420
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, analyses of samples conducted by officially recognised testing facility (Pasteur Institute of Lille (France))
Acceptability/Reliability:	Yes/ reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The report describes a monitoring study in a French vineyard catchment where glyphosate and AMPA among other pesticides were measured in the outflow of the catchment. Information on pesticide application amounts are provided as well as mean and max values of the measured concentrations on a yearly basis.

The study was seen as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	reported data.	
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Hamann, E. et al.
Report year	2016
Report title	The fate of organic micropollutants during long-term/long-distance river bank filtration
Document No	Science of the Total Environment (2016), Vol.545-546, pp. 629
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes a modelling approach to describe long-term/long-distance river bank filtration for 29 compounds including AMPA. There are no new experimental data generated but the modeling approach gives relevant and reliable information on the behavior of AMPA at drinking water abstraction points. The study is therefore classified reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (monitoring data)
Report author	Hanke Irene; Wittmer Irene; Bischofberger Simone; Stamm Christian; Singer Heinz
Report year	2010
Report title	Relevance of urban glyphosate use for surface water quality
Document No	Chemosphere (2010), Vol. 81, No. 3, pp. 422-9.
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted by officially recognised testing facility (Eawag, Swiss Federal Institute of Aquatic Science and Technology)
Acceptability/Reliability:	Yes/ reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a monitoring experiment in Switzerland covering a catchment with urban and agricultural land use. Glyphosate and its metabolite AMPA were analyzed. A comparison between the contribution of agricultural use and urban use to the overall load was conducted. Due to a specific definition of sub-catchment areas and their evaluation, a specific conclusion for the agricultural area can be given. Analytical approaches were sufficiently described. The study is therefore considered as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	EU data requirement No.
Report author	Hedegaard, M. J. and Albrechtsen, H.-J.
Report year	2014
Report title	Microbial pesticide removal in rapid sand filters for drinking water treatment - Potential and kinetics
Document No	Water Research 48 (2014) 71-81
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (no detailed analytics, no detailed results for glyphosate reported)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes experiments on the removal potential of glyphosate in rapid sand filters at Danish waterworks. The experiments are well described. However, no details on analytical methods are given. Further, sampling times and individual results are only reported for bentazone in graphical plots. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	endpoint, and/or is useful as supporting information	
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	CORINE J. HOUTMAN, ROB TEN BROEK, KEVIN DE JONG, BART PIETERSE, and JAN KROESBERGEN
Report year	2013
Report title	A Multicomponent Snapshot of Pharmaceuticals and Pesticides and in the River Meuse Basin
Document No	Environmental Toxicology and Chemistry, Vol. 32, No. 11, pp. 2449–2459
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the results of a monitoring exercise at the river Meuse in the Netherlands, where a couple of pharmaceuticals and pesticides were measured to evaluate the status of the Meuse. It is highlighted that glyphosate shows the highest concentration of pesticides among all methods

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (Monitoring Data)
Report author	Huntscha, S. et al.
Report year	2018
Report title	Seasonal Dynamics of Glyphosate and AMPA in Lake Greifensee: Rapid Microbial Degradation in the Epilimnion During Summer
Document No	Environ. Sci. Technol. 2018, 52, 4641-4649
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the concentrations of glyphosate and AMPA in a lake in Switzerland representing a catchment with high portion of agricultural land use.

The study was seen as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Imfeld G. et al.
Report year	2013
Report title	Transport and attenuation of dissolved glyphosate and AMPA in a stormwater wetland
Document No	Chemosphere 90 (2013) 1333–1339
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (results of concentration measurements only presented as graphical plots)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article reports concentration measurements for glyphosate and AMPA residues in an artificial stormwater wetland in France receiving runoff from a vineyard catchment with respect to the hydrological and hydrochemical conditions. Specific analytical methods were used and the limits of quantification were stated. However, no individual results of concentration measurements are reported (only as graphical plots).

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(concentration)/ collected samples, stability of glyphosate in test media documented	Yes
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Jodeh S., Attallah M., Haddad M., Hadda T. B., Salghi R., Jodeh D., Warad I.
Report year	2014
Report title	Fate and Mobility of Glyphosate Leachate in Palestinian Soil Using Soil Column
Document No	Journal of Materials and Environmental Sciences (6) (2014) 2008-2016
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Used soil does not reflect EU conditions (soil, climate))

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a column leaching study with non-labelled glyphosate and a Palestinian agricultural soil. Some essential information necessary for a validity of the study is not reported (e.g. mass balances)

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Joensson et al.
Report year	2013
Report title	Removal and degradation of glyphosate in water treatment: a review
Document No	Journal of Water Supply: Research and Technology-AQUA/62.7/2013
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes different methods used in drinking water treatment plants with regard to the degradation of glyphosate and AMPA.

The study was seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Ramdas G. Kanissery, Allana Welsh, and Gerald K. Sims
Report year	2015
Report title	Effect of Soil Aeration and Phosphate Addition on the Microbial Bioavailability of Carbon-14-Glyphosate
Document No	Journal of Environmental Quality (2015), Vol. 44, No. 1, pp. 137
Guidelines followed in study	USEPA guidelines for adsorption studies (USEPA, 2008)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the data requirement Adsorption/Desorption of the parent Yes/Supportive only (slight differences to EU guidelines, no EU soils, insufficient reporting of results for kinetic evaluation accord. current guidelines) for the data requirement degradation in soil

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the sorption and degradation behavior of glyphosate in three different US soils under consideration of aerobic and anaerobic conditions and the addition of phosphates. The sorption experiment is well described according to the USEPA guidelines, sufficient parameter are reported.

The study was therefore seen as fully reliable to the data requirement Adsorption/Desorption of the parent (Category 1).

The degradation experiment was conducted in a microcosm with insufficient description of results for calculating degradation or dissipation endpoints according current guidelines.

The study is therefore classified as relevant to the data requirement degradation in soil but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	Yes
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5
Report author	Karanasios, E. et al.
Report year	2018
Report title	Monitoring of glyphosate and AMPA in soil samples from two olive cultivation areas in Greece: aspects related to spray operators activities
Document No	Environ Monit Assess (2018) 190, 6, 1
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports monitoring data for glyphosate and AMPA in Greek agricultural soils.

The study was seen as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

	plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Kegel Schoonenberg F; Rietman B M; Verliefde A R D
Report year	2010
Report title	Reverse osmosis followed by activated carbon filtration for efficient removal of organic micropollutants from river bank filtrate
Document No	Water science and technology (2010) Vol. 61, No. 10, pp. 2603-10
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (substance properties and analytical methods are insufficiently described)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the removal of glyphosate among other substances from drinking water by reverse osmosis followed by activated carbon filtration. The substance properties and analytical methods are insufficiently described. The examined method focus on conservative filtration methods, no degradation products or processes are described.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.4.3
Report author	Kjaer Jeanne; Ernsten Vibeke; Jacobsen Ole H; Hansen Nis; de Jonge Lis Wollesen; Olsen Preben
Report year	2011
Report title	Transport modes and pathways of the strongly sorbing pesticides glyphosate and pendimethalin through structured drained soils
Document No	Chemosphere, (2011) Vol. 84, No. 4, pp. 471-9
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities (Geological Survey of Denmark and Greenland)
Acceptability/Reliability:	Yes/Supportive only (Substance properties not sufficiently described, no evaluation of the residues in soil layers after finalization of the study was conducted, duration of the study too short)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a leaching experiment with glyphosate and pendimethalin in a Danish agricultural soil over eight months. The substance properties are sufficiently reported. With regard to the data requirement, the study is too short for a comprehensive evaluation of the leaching behavior. In addition, no residues were determined in different soil layers after finalization of the study.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (monitoring data)
Report author	Lamprea, K; Ruban, V
Report year	2011
Report title	Pollutant concentrations and fluxes in both stormwater and wastewater at the outlet of two urban watersheds in Nantes (France)
Document No	Urban Water Journal (2011), Vol. 8, no. 4, pp. 219-231
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities (IDAC and IANESCO-CHIMIE Laboratory)
Acceptability/Reliability:	Yes/Supportive only (Focus is on urban areas, no agricultural land use is reported)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a monitoring campaign in an urban area in the region of Nantes / France. Among others, glyphosate is measured. However, agricultural land use does not contribute significantly to the measured concentrations as the study area is described as an urban area. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Mats Larsbo, Maria Sandin, Nick Jarvis, Ararso Etana, Jenny Kreuger
Report year	2016
Report title	Surface Runoff of Pesticides from a Clay Loam Field in Sweden
Document No	Journal of Environmental Quality 45:1367–1374
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a runoff experiment on a field site in Sweden with realistic cultivation conditions. The runoff of glyphosate and AMPA was measured over a period of 3 years. The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Lefrancq Marie; Jadas-Hécart Alain; La Jeunesse Isabelle; Landry David; Payraudeau Sylvain
Report year	2017
Report title	High frequency monitoring of pesticides in runoff water to improve understanding of their transport and environmental impacts
Document No	Science of the Total Environment 587–588 (2017) 75–86
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the results from a runoff experiment in a French vineyard with different pesticides with a high-frequency setup. Data on glyphosate and AMPA were measured and reported.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Unspecified
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Uncertain
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Lerch R.N.; Lin C.H.; Goynes, K.W.; Kremer, R.J. and S.H. Anderson
Report year	2017
Report title	Vegetative Buffer Strips for Reducing Herbicide Transport in Runoff: Effects of Buffer Width, Vegetation, and Season
Document No	Journal of the American Water Resources Association (JAWRA) 53(3):667-683.
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No EU agricultural conditions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a runoff experiment to evaluate the effectiveness of vegetative buffer strips in USA.

The study is classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	yes
	10. Assessment of the statistical power of the assay is possible	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	with reported data.	
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Litz N T; Weigert A; Krause B; Heise S; Grutzmacher G
Report year	2011
Report title	Comparative studies on the retardation and reduction of glyphosate during subsurface passage
Document No	Water research (2011), Vol. 45, No. 10, pp. 3047-54
Guidelines followed in study	None (for filter experiments)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted by officially recognised testing facilities (German UBA, German KompetenzZentrum Wasser)
Acceptability/Reliability:	Yes/ reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes experiments on subsurface passage of river water using so-called enclosures and semi-technical scale vertical slow sand filters (SSFs) to investigate the behavior of glyphosate and AMPA during bank filtration for drinking water supply. The filter experiments were supported by batch adsorption and degradation experiments with the filter material. The main filter experiments and the analytical methods are well described and reported with sufficient details. The article is therefore considered as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (monitoring data)
Report author	Maillard E; Payraudeau S; Faivre E; Gregoire C; Gangloff S; Imfeld G
Report year	2011
Report title	Removal of pesticide mixtures in a stormwater wetland collecting runoff from a vineyard catchment
Document No	The Science of the total environment (2011), Vol. 409, No. 11, pp. 2317-24
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities (Pasteur Institute of Lille (France))
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a runoff experiment in a vineyard of the Alsatian area in France. The study is well described and documented.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	NO
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Elodie Maillard and Gwenael Imfeld
Report year	2014
Report title	Pesticide Mass Budget in a Stormwater Wetland
Document No	Environmental Science & Technology 2014, 48, 8603–8611
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No relevant endpoint)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the pesticide loss and input in a stormwater wetland in an agricultural region in France. Several pesticides were analyzed, among them glyphosate and AMPA. Analytical methods were poorly described in the article, but were provided in the supporting information.

The study is classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Flavio Malaguerra, Hans-Jørgen Albrechtsen, Lærke Thorling Philip John Binning
Report year	2012
Report title	Pesticides in water supply wells in Zealand, Denmark: A statistical analysis
Document No	Science of the Total Environment 414 (2012) 433–444
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no presentation of measured values, only of statistical correlation of concentrations with different well properties)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the statistical correlation of the occurrence of some pesticides, incl. glyphosate in groundwater wells with different characteristics of the wells (e.g. geology, geographic information, depth etc.). No measured values are reported.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Flavio Malaguerra, Hans-Jørgen Albrechtsen, Philip John Binning
Report year	2013
Report title	Assessment of the contamination of drinking water supply wells by pesticides from surface water resources using a finite element reactive transport model and global sensitivity analysis techniques
Document No	Journal of Hydrology 476 (2013) 321–331
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No measured values, only modelling results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reflects a computation model simulation for the contamination of drinking water wells with glyphosate and AMPA via filtration from surface waters. Generalized soil parameters were considered that reflect European agricultural soil characteristics. The derived results represents modelling results, no measured values.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Manassero A; Passalia C; Negro A C; Cassano A E; Zalazar C S
Report year	2010
Report title	Glyphosate degradation in water employing the H ₂ O ₂ /UVC process
Document No	Water research, (2010 Jul) Vol. 44, No. 13, pp. 3875-82
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/ reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the degradation of glyphosate under H₂O₂/UVC processes and the generation of breakdown products. The experiment is well described. A degradation pathway is proposed. The study is therefore considered as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	EU data requirement No.
Report author	Martin, J. et al.
Report year	2013
Report title	Sugar Cane, Herbicides And water Pollution in Reunion Island: Achievements and Perspectives at the End of the First Decade of monitoring
Document No	Conference paper: 22nd Conference of COLUMA. International Days on Weed Control, Dijon, France, December 10-12, 2013 pp.641-651 ref.13
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (limited representativeness of herbicide application to sugar cane on Reunion Island)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article summarizes the results of monitoring pesticides in groundwater and surface water conducted by the responsible authorities of Reunion Island. As the data were generated by authorities, it is assumed to be quality assured (even though no details on sample collection and analytical methods are reported). Application of herbicides to sugar cane on Reunion Island is considered only limited representative for European conditions.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5
Report author	Masiol, M. et al.
Report year	2018
Report title	Herbicides in river water across the northeastern Italy: occurrence and spatial patterns of glyphosate, aminomethylphosphonic acid, and glufosinate ammonium
Document No	Environmental Science and Pollution Research (2018) 25:24368-24378
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports measurements of glyphosate and AMPA in surface waters in Northern Italy.

The study was seen as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes

E-Fate:**Reliability criteria for the detailed assessment of full-text documents**

11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
17. Data on precipitation is recorded	No
18. The temperature was in the range between 20-25°C and the moisture was reported	No
19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
22. Radiolabel characterization: purity, specific activity, location of label	No
23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Sarah-Louise McManus, Karl G. Richards, Jim Grant, Anthony Mannix, Catherine E. Coxon
Report year	2014
Report title	Pesticide occurrence in groundwater and the physical characteristics in association with these detections in Ireland
Document No	Environmental Monit Assess (2014) 186:7819–7836
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (EPA Ireland)
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the evaluation of a two-years national groundwater monitoring campaign in Ireland.

The study was seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (monitoring data)
Report author	Meyer, Berenike; Pailler, Jean-Yannick; Guignard, Cedric; Hoffmann, Lucien; Krein, Andreas
Report year	2011
Report title	Concentrations of dissolved herbicides and pharmaceuticals in a small river in Luxembourg
Document No	Environmental Monitoring and Assessment, (2011) Vol. 180, No. 1-4, pp. 127-146
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted by officially recognised testing facility (Department of Environment and Agro-Biotechnologies (EVA))
Acceptability/Reliability:	Yes/ reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The reports describes a monitoring study in an agricultural area in Luxembourg. The study design and the analytical methods are well described.

The study is therefore considered as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Mária Mörtl, Gyöngyi Németh, Judit Juracsek, Béla Darvas, Lisa Kamp, Fernando Rubio, András Székács
Report year	2013
Report title	Determination of glyphosate residues in Hungarian water samples by immunoassay
Document No	Microchemical Journal 107 (2013) 143–151
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (Central Food Research Institute)
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a monitoring study where immunoassay analytical method was used. Several findings in different compartments (surface waters, ground water) were reported. The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Charles Mottes, Magalie Lesueur Jannoyer, Marianne Le Bail, Mathilde Guene, Celine Carles, Eric Malezieux
Report year	2017
Report title	Relationships between past and present pesticide applications and pollution at a watershed outlet: The case of a horticultural catchment in Martinique, French West Indies
Document No	Chemosphere (2017), Vol. 184, pp. 762
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (Laboratoire Departemental d'Analyses de la Drome)
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the monitoring of glyphosate among several pesticides in a horticultural catchment in Martinique, French West India (part of the EU).

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for "Reliable" articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	in test media documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No (but EU)
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Sirajum Munira, Annemieke Farenhorst, Don Flaten, Cynthia Grant
Report year	2016
Report title	Phosphate fertilizer impacts on glyphosate sorption by soil
Document No	Chemosphere 153 (2016) 471-477
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no European climate and soil conditions, validity check for study could not finalized)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a sorption experiment with glyphosate on a Canadian agricultural soil considering different treatments with phosphate fertilizer. Some information on soil and study design are not reported (soil characteristics, mass balances, amount of soil), so no final validity check is possible. The temperature of the experiment was set to 5°C.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Sirajum Munira & Annemieke Farenhorst
Report year	2017
Report title	Sorption and desorption of glyphosate, MCPA and tetracycline and their mixtures in soil as influenced by phosphate
Document No	Journal of Environmental Science and Health, Part B 2017, VOL. 52, NO. 12, pp. 887
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	Temperature: 5°C, 0.01 M KCl
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (not valid against current guidelines)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes an OECD 106 experiment with glyphosate on a Canadian soil considering the influence of phosphate additions. The study shows some deviations from the validity criteria for EU guidelines (Temperature, usage of 0.01 M KCl instead of 0.01 M CaCl₂). The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Sirajum Munira, Annemieke Farenhorst, Wole Akinremi
Report year	2018
Report title	Phosphate and glyphosate sorption in soils following long-term phosphate applications
Document No	Geoderma 313 (2018) 146–153
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No all validity criteria met for OECD 106, e.g. Temperature)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a sorption experiment with phosphate and glyphosate to Canadian agricultural soils. Some validation criteria of the underlying OECD 106 study protocol were not met, or not sufficient information is reported.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Marco Napoli et al.
Report year	2015
Report title	Leaching of Glyphosate and Aminomethylphosphonic Acid through Silty Clay Soil Columns under Outdoor Conditions
Document No	Journal of Environmental Quality 44:1667–1673 (2015)
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not sufficiently described to check validity against current guideline)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a lysimeters study with glyphosate using three lysimeters from the Chianti region in Italy. The study is well described, however, there is some information missing to check the validity of the study against current guidelines. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Marco Napoli, Anna Dalla Marta, Camillo A. Zanchi, and Simone Orlandini
Report year	2016
Report title	Transport of Glyphosate and Aminomethylphosphonic Acid under Two Soil Management Practices in an Italian Vineyard
Document No	Journal of Environmental Quality 45:1713-1721 (2016)
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a runoff experiment with glyphosate in a vineyard in Italy. The runoff was measured for glyphosate and AMPA residues.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.2.1.1
Report author	Nguyen, Nghia. K., et al.
Report year	2013
Report title	Soil properties governing biodegradation of the herbicide glyphosate in agricultural soils
Document No	24th Asian Pacific Weed Science Society pg 312-324
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Reliable with restrictions (no sufficient data for evaluation of degradation behaviour reported, only mineralization after 32 days)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the dissipation of glyphosate in agricultural soils in Europe. While a lot of experimental details are reported, the data are insufficient for kinetic evaluation since tests were run for 32 days in maximum only and determination of mineralization only, i.e. no detailed analysis for active substance and metabolites. The study is therefore classified as reliable with restrictions (Category 2).

1. Information on the study

Data point:	
Report author	Trine Norgaard et al.
Report year	2014
Report title	Leaching of Glyphosate and Aminomethylphosphonic Acid from an Agricultural Field over a Twelve-Year Period
Document No	Vadose Zone J. doi:10.2136/vzj2014.05.0054
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (insufficient information to check validity against current guidelines)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a field leaching study with glyphosate on an agricultural field in Denmark. Not sufficient information is provided to check the validity of the study against current guidelines. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Norgaard, Trine; de Jonge, Lis; Moldrup, Per; Olsen, Preben; Johnsen, Anders
Report year	2015
Report title	Can Simple Soil Parameters Explain Field-Scale Variations in Glyphosate-, Bromoxyniloctanoate-, Diflufenican-, and Bentazone Mineralization?
Document No	Water, Air, & Soil Pollution (2015) 226: 262
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (not sufficient data provided to check validity against current guidelines)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the results from an aerobic soil mineralization experiment with glyphosate (among other pesticides) in the lab. In parallel the leaching behavior of the substances in the field where the soils used in the mineralization experiment come from, was investigated. The provided data does not allow to check the validity of the study against current guidelines. Furthermore, no data on glyphosate content per sampling data and no half-lives were provided, i.e. no endpoint is available.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	of glyphosate (or a glyphosate metabolite)	
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	for kinetic fit.	
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Elodie Passeport, Benjamin Richard, Cédric Chaumont, Christelle Margoum, Lucie Liger, Jean-Joël Gril, Julien Tournebize
Report year	2014
Report title	Dynamics and mitigation of six pesticides in a “Wet” forest buffer zone
Document No	Environmental Science and Pollution Research (2014) 21:4883–4894
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not all parameters are reported to check validity of the study)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the mitigation of glyphosate among other pesticides by a wet forest buffer zone in France.

The study is classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	No
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Jens Petersen et al.
Report year	2012
Report title	Sampling of herbicides in streams during flood events
Document No	J. Environ. Monit., 2012, 14, 3284
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No relevant endpoint)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes an experiment in a Danish agricultural area, where glyphosate concentrations were measured during stream flood events. The development of concentrations levels after precipitation events were investigated. Different analytical methods were described. The study is classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Poiger Thomas, Buerge, Ignaz, Bächli, Astrid, Müller Markus, Balmer Marianne
Report year	2017
Report title	Occurrence of the herbicide glyphosate and its metabolite AMPA in surface waters in Switzerland determined with on-line solid phase extraction LC-MS/MS
Document No	Environmental Science and Pollution Research (2017) 24:1588–1596
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (Agroscope)
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the derivation of a simplified procedure for the determination of glyphosate and AMPA in water samples. More than 1000 samples from ground and surface waters, and from treated wastewaters in Switzerland were tested with this method and the results are reported. The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	E. Ariel Rampoldi, Susana Hang, and Enrique Barriuso
Report year	2014
Report title	Carbon-14-Glyphosate Behavior in Relationship to Pedoclimatic Conditions and Crop Sequence
Document No	Journal of Environmental Quality 43:558–567 (2014)
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No EU conditions, missing information for validity check)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the sorption and degradation behavior of ¹⁴C-labelled glyphosate in different agricultural soils from Argentina. Sorption parameters and mineralization of the substance are reported. However, essential parameters are not described, or there are some deviations from current guidelines. In addition, the pedo-climatic conditions do not correspond to EU conditions. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes
	9. An endpoint can be derived. Findings do deliver a	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Carmel T Ramwell, Melanie Kah and Paul D Johnson
Report year	2014
Report title	Contribution of household herbicide usage to glyphosate and its degradate aminomethylphosphonic acid in surface water drains
Document No	Society of Chemical Industry (wileyonlinelibrary.com) DOI 10.1002/ps.3724
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No agricultural area, insufficient description of the experiment)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the contribution of the household usage of glyphosate to concentrations of the active and AMPA in surface water drains. The set-up of the experiment excluded agricultural use. The sample site was an urban area in the UK. Some information missing, e.g. sample storage. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5 (Monitoring Data)
Report author	Raviera, S. et al.
Report year	2019
Report title	Monitoring of Glyphosate, Glufosinate-ammonium, and (Aminomethyl) phosphonic acid in ambient air of Provence-Alpes-Côte-d'Azur Region, France
Document No	Atmospheric Environment 204 (2019) 102-109
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the results of a monitoring exercise of glyphosate and AMPA in the air of 4 different sites in the south-east of France.

The study was seen as reliable (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Brice Reoyo-Prats, Dominique Aubert, Christophe Menniti, Wolfgang Ludwig, Jennifer Sola, Mireille Pujo-Pay, Pascal Conand, Olivier Verneau, Carmen Palacios a,b,*
Report year	2017
Report title	Multicontamination phenomena occur more often than expected in Mediterranean coastal watercourses: Study case of the Têt River (France)
Document No	B. Reoyo-Prats et al. / Science of the Total Environment 579 (2017) 10–21
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Contribution of agricultural use of pesticides is not clearly definable)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the contamination scheme of a Mediterranean river with different pollutant, among others glyphosate and AMPA. The considered approach identified that high concentrations peaks are caused by specific weather conditions, e.g. heavy rainfall after a dry period with consecutive overflow of WWTP, and other sources. The experiment does not focus explicitly on agricultural conditions.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	relevant.	
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Annette E. Rosenbom, Preben Olsen, Finn Plauborg, Ruth Grant, Rene K. Juhler, Walter Brüsch, Jeanne Kjær
Report year	2015
Report title	Pesticide leaching through sandy and loamy fields e Long-term lessons learnt from the Danish Pesticide Leaching Assessment Programme
Document No	Environmental Pollution 201 (2015) 75 - 90
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes results from the Danish pesticide leaching program. Analytics are not well described but there is a statement of careful selection and strong quality control of the laboratories. The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (water treatment)
Report author	Ruel, S.M. et al.
Report year	2011
Report title	On-site evaluation of the removal of 100 micro-pollutants through advanced wastewater treatment processes for reuse applications
Document No	Water Science & Technology (2011), Vol. 63, No.11, pp.2486
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the efficiency of different wastewater treatment processes to remove glyphosate and AMPA among other substances from wastewater for reuse application. Different processes are described and their specific efficiency is reported.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (Water treatment)
Report author	Ruel, S.M. et al.
Report year	2012
Report title	Occurrence and fate of relevant substances in wastewater treatment plants regarding Water Framework Directive and future legislations
Document No	Water Science & Technology (2012), Vol. 65, No.7, pp. 1179
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted at officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no drinking water addressed, analytical methods poorly described, no information about breakdown processes and products provided)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the occurrence of glyphosate and AMPA among other substances in different wastewater treatment plants in France. The analytical methods are poorly described. No information is provided about breakdown processes and products.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Pierre Sabatiera, Jérôme Poulenard, Bernard Fanget, Jean-Louis Reyss, Anne-Lise Develle, Bruno Wilhelm, Estelle Ployon, Cécile Pignol, Emmanuel Naffrechoux, Jean-Marcel Dorioz, Bernard Montuelle, and Fabien Arnaud
Report year	2014
Report title	Long-term relationships among pesticide applications, mobility, and soil erosion in a vineyard watershed
Document No	PNAS vol. 111 no. 44, pp. 15647
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study evaluates the long-term relationship among pesticide applications, mobility and soil erosion in a French vineyard watershed. The sediment of an adjacent lake were investigated and compared with available information on historical usage of pesticides. It is concluded that the increasing use of glyphosate initiate the remobilization of banned remnant pesticides (e.g. DDT). The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	in test media documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	CA 7.5
Report author	Josep Sanchís & Lina Kantiani & Marta Llorca & Fernando Rubio & Antoni Ginebreda & Josep Fraile & Teresa Garrido & Marinella Farré
Report year	2012
Report title	Determination of glyphosate in groundwater samples using an ultrasensitive immunoassay and confirmation by on-line solid-phase extraction followed by liquid chromatography coupled to tandem mass spectrometry
Document No	Anal Bioanal Chem (2012) 402:2335–2345
Data point:	CA 7.5
Report author	Josep Sanchís & Lina Kantiani & Marta Llorca & Fernando Rubio & Antoni Ginebreda & Josep Fraile & Teresa Garrido & Marinella Farré
Report year	2012
Report title	Erratum to: Determination of glyphosate in groundwater samples using an ultrasensitive immunoassay and confirmation by on-line solid-phase extraction followed by liquid chromatography coupled to tandem mass spectrometry
Document No	Anal Bioanal Chem (2012) 404:617
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Yes
Acceptability/Reliability:	Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study presents an analytical method to determine glyphosate in groundwater samples from Catalonia / Spain. Glyphosate findings in the respective groundwater samples are presented. Methods and results are well described. Maximum concentration of glyphosate measured at 2560 ng/L in 2010. The article is considered reliable.

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
specified in EC Regulation (EU) No 283/2013	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Verena C. Schreiner, Eduard Szöcs, Avit Kumar Bhowmik, Martina G. Vijver, Ralf B. Schäfer
Report year	2016
Report title	Pesticide mixtures in streams of several European countries and the USA
Document No	Science of the Total Environment 573 (2016) 680–689
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study summarizes monitoring results of pesticides in some EU Member States and the USA. Glyphosate measurements were derived from databases from Germany, France, the Netherlands and the USA and were reported and evaluated.

The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (Water treatment)
Report author	Shen, Y. et al.
Report year	2011
Report title	Ozonation of Herbicide Glyphosate
Document No	Acta Scientiae Circumstantiae,31(8): 1647-1652
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Reliable with restrictions (low sensitivity of the analytical method, unlabelled test item)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes the degradation of unlabeled glyphosate during ozonation in water with different initial concentrations and different pH values. The degradation products resulting from the ozonation process are described as well. The analytical method is not very sensitive (LOQ 0.1 mg/L for glyphosate).

The study is therefore classified as reliable with restrictions (Category 2)

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5 %), bulk density, water retention, microbial biomass (~1 % of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Pauline Sidoli, Nicole Baran, Rafael Angulo-Jaramillo
Report year	2016
Report title	Glyphosate and AMPA adsorption in soils: laboratory experiments and pedotransfer rules
Document No	Environmental Science and Pollution Research (2016) 23:5733-5742
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not all parameters reported to check the validity criteria for the study)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes and sorption experiment with glyphosate on 17 soils from France. The OECD 106 guideline was considered. However, not all parameters were reported to check the validity of the study.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	information	
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.5 (Monitoring data)
Report author	Silva, V. et al.
Report year	2018
Report title	Distribution of glyphosate and aminomethylphosphonic acid (AMPA) in agricultural topsoils of the European Union
Document No	Science of the total environment (2018) 15:1352
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (JRC, ESTAT)
Acceptability/Reliability:	Yes/Supportive only (extrapolated values for EU)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the result from a field experiment with consecutive GIS analysis to estimate the distribution of glyphosate and AMPA in European topsoils. The study should give a basis for the understanding of glyphosate loss from soils via wind and water erosion, i.e. experimental information from the sample sites were extrapolated to the EU area. A detailed and tabulated overview on the results is given in the supporting information.

The study is classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	plots and confidence intervals)	
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5 %), bulk density, water retention, microbial biomass (~1 % of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.3.1.1, KCA 7.1.3.1.2
Report author	Skeff, W. et al.
Report year	2018
Report title	Adsorption behaviors of glyphosate, glufosinate, aminomethylphosphonic acid, and 2-aminoethylphosphonic acid on three typical Baltic Sea sediments
Document No	Marine Chemistry 198 (2018) 1–9
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (no agricultural conditions, not sufficient data to check validity of the results)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the sorption of glyphosate and AMPA to sediments of the Baltic Sea. The described sediments are not relevant for agricultural land use. Some information is missing to check the validity of the experiment (no mass balances, test items not sufficiently described).

The study is therefore classified as reliable with restrictions (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate:**Reliability criteria for the detailed assessment of full-text documents**

10. Assessment of the statistical power of the assay is possible with reported data.	No
11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
17. Data on precipitation is recorded	No
18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
22. Radiolabel characterization: purity, specific activity, location of label	No
23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Marianne Stenrød
Report year	2015
Report title	Long-term trends of pesticides in Norwegian agricultural streams and potential future challenges in northern climate
Document No	Acta Agriculturae Scandinavica, Section B - Soil & Plant Science, 2015 Vol. 65, No. Supplement 2, 199–216
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (Bioforsk)
Acceptability/Reliability:	Yes/Supportive only (no focus on glyphosate, only few information reported)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The studies evaluates data from Norwegian monitoring programs for pesticides to identify trends and future challenges for the Norwegian agriculture. For glyphosate, deficiencies in the monitoring methods were reported and only few information on the active ingredient is reported. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	KCA 7.1.1.1.1
Report author	Sun et al.
Report year	2019
Report title	Degradation of glyphosate and bioavailability of phosphorus derived from glyphosate in a soil-water system
Document No	Water Research 163 (2019) 114840
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	None
Acceptability/Reliability:	Reliable with restrictions (some validity criteria of the OECD 307 guideline not met, no information about the used soil, no tabulated values available)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes a soil degradation experiment with glyphosate, where also AMPA was identified as metabolite. The main focus of the article is the transformation of glyphosate-derived phosphorous. In general, the methods and results are well described but the relevant experiment (incubation with 1 µmol/g non-labelled glyphosate for 175 d) shows some deviations from the OECD 307 study guideline: soil properties are not reported, exact soil water content during incubation is unclear, the mass of soil incubated is not clearly stated (1 g soil was used for extraction). Further, concentrations of glyphosate and AMPA are only presented in figures, not as tabulated values. DT₅₀ values according to SFO were calculated for glyphosate and AMPA (based on max. concentration) but details on fits and statistics are not provided.

The article is therefore considered as reliable with restrictions (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	No
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5 %), bulk density, water retention, microbial biomass (~1 % of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	KCA 7.5 (Monitoring data)
Report author	Székács, A. et al.
Report year	2014
Report title	Monitoring and biological evaluation of surface water and soil micropollutants in Hungary
Document No	Carpathian Journal of Earth and Environmental Sciences, August 2014, Vol. 9, No. 3, p. 47 - 60
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/ reliable with restrictions (No comprehensive list of glyphosate findings presented, no relationship between sampling site (and compartment) and glyphosate findings possible)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports measurements of glyphosate among other pesticides, organic pollutants, heavy metals and other microelements in soils, surface waters and groundwater bodies in Hungary. The effect of the found concentrations of the different substance on *D. magna* was investigated. The reported glyphosate findings cannot be assigned to the respective sampling site. Furthermore, no comprehensive list of glyphosate findings is presented.

The study is therefore classified as reliable with restrictions (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(solvent, vehicle) where relevant.	
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5 %), bulk density, water retention, microbial biomass (~1 % of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	András Székács, Mária Mörtl, and Béla Darvas
Report year	2015
Report title	Monitoring Pesticide Residues in Surface and Ground Water in Hungary: Surveys in 1990–2015
Document No	Journal of chemistry (2015), Article ID 717948
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities (Agro-Environmental Research Institute, National Agricultural Research and Innovation Centre)
Acceptability/Reliability:	Yes/Supportive only (No details on glyphosate measurements in the monitoring program are reported.)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports monitoring results for pesticide residues in surface and groundwater in Hungary. For Glyphosate a specific analytical method was used as with the methods used for other substances, no reliable LOD's were achieved. Only limited information on the results for glyphosate were reported.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Ting Tang, Wesley Boënné, Nele Desmet, Piet Seuntjens, Jan Bronders, Ann van Griensven
Report year	2015
Report title	Quantification and characterization of glyphosate use and loss in a residential area
Document No	Science of the Total Environment 517 (2015) 207–214
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (No agricultural area considered, only households)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a modelling exercise to quantify and characterize the loss of glyphosate in a residential area to surface waters in Belgium. No agricultural area was considered.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Hector R. Tévez, Maria dos Santos Afonso
Report year	2015
Report title	pH dependence of Glyphosate adsorption on soil horizons
Document No	Boletín de la Sociedad Geológica Mexicana Vol 67, Num. 3 , 2015, P. 509-516
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (the soil used for the experiment does not reflect European conditions (climate and soil characterization))

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the adsorption of non-labelled glyphosate on an agricultural soil from Argentina. The pH-dependency was evaluated in addition. The soil and climate conditions do not reflect European conditions. However, the soil characterization and the results for adsorption, Freundlich isotherm and pH dependency are well described.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	No
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Gorana Rampazzo Todorovic, Nicola Rampazzo, Axel Mentler, Winfried E.H. Blum, Alexander Eder, and Peter Strauss
Report year	2014
Report title	Influence of soil tillage and erosion on the dispersion of glyphosate and aminomethylphosphonic acid in agricultural soils
Document No	International Agrophysics, 2014, 28, 93-100
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (study design not sufficiently described to relate results to real field conditions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the runoff behavior of glyphosate and AMPA in two field experiments in two different European agricultural soils with artificial rainfall. No details are provided on the used precipitation conditions (amount, intensity).

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Barbro Ulen, Gunborg Alex, Jenny Kreuger, Annika Svanback & Ararso Etana
Report year	2012
Report title	Particulate-facilitated leaching of glyphosate and phosphorus from a marine clay soil via tile drains
Document No	Acta Agriculturae Scandinavica Section B - Soil and Plant Science, 2012; 62: Supplement 2, 241-251
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (Not enough information provided to check validity)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a field leaching experiment with glyphosate in Sweden on an agriculturally used soil. Not information is provided to check the validity of the study against current standards. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media	

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	(concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	Yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	Yes
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	Yes
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Barbro M Ulen, Mats Larsbo, Jenny K Kreuger and Annika Svanback
Report year	2014
Report title	Spatial variation in herbicide leaching from a marine clay soil via subsurface drains
Document No	Pest Management Science (2014), Vol. 70, No. 3, pp. 405
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (essential parameters to derive endpoint missing)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes a leaching experiment from a Swedish marine clay soil with agricultural land use. Glyphosate among other herbicides was considered in analysis. The study provides supportive information but not all parameters to derive endpoints are reported.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	No
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	C. Vialle, C. Sablayrolles, J. Silvestre, L. Monier, S. Jacob, M.-C. Huau, M. Montrejaud-Vignoles
Report year	2013
Report title	Pesticides in roof runoff: Study of a rural site and a suburban site
Document No	Journal of Environmental Management 120 (2013) 48 - 54
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (Not focusing directly on agriculture, not enough parameter reported for validity check)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the concentrations of glyphosate and AMPA among some other hundreds of substances in the roof runoff from two experimental sites in France, one in a rural area, the other one in a suburban area. The sources for pesticide contamination of the roof runoff was identified as entry from the surrounding agriculturally used fields.

The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate	No

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	in test media documented	
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	No
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	No
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Shizong Wang, Bettina Seiwert, Matthias Kastner, Anja Miltner, Andreas Schaffer, Thorsten Reemtsma, Qi Yang, Karolina M. Nowak
Report year	2016
Report title	(Bio)degradation of glyphosate in water-sediment microcosms - A stable isotope co-labeling approach
Document No	Water Research 99 (2016) 91-100
Guidelines followed in study	OECD guideline 308
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/fully reliable for the respective data requirement

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the results from a water-sediment dissipation experiment with ¹³C-¹⁵N-labelled-glyphosate, conducted according to OECD guideline 308. The system was taken from a German small water body in an area with agricultural land use. The validity criteria of OECD 308 were met. A detailed overview on the different degradation products of glyphosate in water-sediment systems and a degradation pathway are discussed. Tabulated values for the different measurements to calculate degradation kinetics are provided in the supplementary data that were attached to the summary. The authors did not calculate any degradation or dissipation half-times, however, the presented data would allow the derivation of these values by an additional calculation step. The study was therefore seen as fully reliable to the data requirement (Category 1).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	Yes
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	Yes
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	Yes
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	Yes
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

1. Information on the study

Data point:	
Report author	Sally Zgheib, Regis Moilleron, Ghassan Chebbo
Report year	2012
Report title	Priority pollutants in urban stormwater: Part 1 – Case of separate storm sewers
Document No	Water research 46 (2012) 6683-6692
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Supportive only (Information on pollution in urban areas, no agricultural)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports the contamination of stormwater with organic and mineral pollutants in the urban region of Paris. Among other substances, glyphosate and AMPA were measured and identified. The detected concentrations derive from atmospheric deposition and surface runoff from the urban environment, i.e. agricultural uses are not in the focus. The study is therefore classified as relevant to the data requirement but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	No
	2. Previous exposure to other chemicals is documented (where relevant).	No
	3. The test substance is dissolved in water or non-toxic solvent	No
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	No
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	No
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	No
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	No
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	No
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	No
	17. Data on precipitation is recorded	No
	18. The temperature was in the range between 20-25°C and the moisture was reported	No
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	No
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	No

1. Information on the study

Data point:	
Report author	Alena Zhelezova & Harald Cederlund & John Stenström
Report year	2017
Report title	Effect of Biochar Amendment and Ageing on Adsorption and Degradation of Two Herbicides
Document No	Water Air Soil Pollut (2017) 228: 216
Guidelines followed in study	OECD 106 (2000)
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Supportive only (not all validity criteria reported for the sorption experiment, no guideline followed, no endpoint can be derived according to current guidance for the degradation experiment)

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes the adsorption and degradation behavior of two pesticides in two different agricultural soils from Northern Europe after amendment of a biochar at different portions. Data on adsorption and degradation were evaluated for Glyphosate as well for the original soils without biochar amendment. The study design is well described and the adsorption parameters are sufficiently reported. The adsorption experiments was conducted according to the OECD guideline 106. However, not all validity criteria could be cross-checked as they are not reported. For the evaluation of the degradation behavior of Glyphosate, no information on the use of a specific guideline was reported. The results were only evaluated against Single First Order kinetics with partly poor fits. No information of the Glyphosate findings for the samples at different time points are reported, i.e. no additional kinetic evaluation is possible with the presented data. The study is therefore classified as relevant to the data requirements but only as supplementary information (Category 2).

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
General criteria for reliability considered for all data requirements indicated by the corresponding EU data points as specified in EC Regulation (EU) No 283/2013	1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines met.	Yes
	2. Previous exposure to other chemicals is documented (where relevant).	Yes
	3. The test substance is dissolved in water or non-toxic solvent	Yes
	4. Glyphosate, when the test substance, is sufficiently documented - identity of the test material reported (i.e. purity, source, content, storage conditions)	Yes
	5. Only glyphosate is the tested substance (excluding mixture), and information on application of glyphosate is described	Yes
	6. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite)	Yes

E-Fate: Reliability criteria for the detailed assessment of full-text documents

Data requirements (indicated by the corresponding EU data point)	Criteria for “Reliable” articles	Criteria met? Yes / No / Uncertain
	7. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes
	8. Analytical verifications performed in test media (concentration)/ collected samples, stability of glyphosate in test media documented	No
	9. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information	Yes
	10. Assessment of the statistical power of the assay is possible with reported data.	Yes
	11. If statistical methodology was applied for findings reported, then the data analysis applied is clearly reported (e.g., checking the plots and confidence intervals)	Yes
	12. Field locations relevant/comparable to European conditions. Soils not completely matching the OECD criteria but from Europe or to some extent representative for the European Agriculture.	Yes
	13. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon)	yes
	14. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass	Yes
	15. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year	No
	16. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	Yes
	17. Data on precipitation is recorded	Yes
	18. The temperature was in the range between 20-25°C and the moisture was reported	Yes
	19. The presence of glyphosate identified in samples collected from groundwater, soil, surface waters, sediments or air from European areas	Yes
	20. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate	Yes
	21. Analytical methods clearly described and adequate Statement of specificity and sensitivity of the analytical methods is included	No
	22. Radiolabel characterization: purity, specific activity, location of label	Yes
	23. If degradation kinetics are included: expect to see data tables provided, model description. Statistical parameters for kinetic fit.	No
	24. Glyphosate monitoring data: description of matrix analysed, and analytical methods fully described as above.	No
	25. For environmental fate studies: clear description of application rate and relevance to approved uses.	Yes

検索期間：2010～2019年

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

1. Information on the study

Data point:	KCA 8.2.1
Report author	Antunes, A. M. <i>et al.</i>
Report year	2017
Report title	Gender-specific histopathological response in guppies <i>Poecilia reticulata</i> exposed to glyphosate or its metabolite aminomethylphosphonic acid
Document No	Journal of applied toxicology, 2017; 37:1098-1107
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The acute 96 hour-LC₅₀ values for male and female guppies *P. reticulata* after exposure to glyphosate were 68.78 mg/L and 70.87 mg/L, respectively. The acute 96 hour-LC₅₀ values for AMPA for male and female guppies were 180 mg/L and 164.3 mg/L, respectively.

In the material and methods part some important is missing. No information on preparation of test solution and application is given. Source and composition of media are unclear. Furthermore, there was no analytical verification of test concentrations reported. The study is considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.2.8
Report author	Daam M.A <i>et al.</i>
Report year	2019
Report title	Lethal toxicity of the herbicides acetochlor, ametryn, glyphosate and metribuzin to tropical frog larvae
Document No	Ecotoxicology (2019) 28:707–715
Guidelines followed in study	OECD (2015) Test No. 241: the larval amphibian growth and development assay ASTM (2013) Standard guide for conducting the frog embryo teratogenesis assay-Xenopus (FETAX). ASTM E1439-12
Deviations from current test guideline	Not reported
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study investigated the acute toxicity of glyphosate to larvae of *Physalaemus cuvieri* and *Hypsiboas pardalis*. The LC₅₀ for *Physalaemus cuvieri* and *Hypsiboas pardali* was determined to be 115 mg a.s./L and 106 mg a.s./L, respectively.

The study was conducted according to portions of OECD 241. However, validity criteria were not reported. It is unknown if the larvae were exposed to any other chemicals as no analysis of watershed water was provided. There was no analytical verification of test concentrations reported. The study is considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.2.2.1
Report author	Rodrigues L. B. <i>et al.</i>
Report year	2019
Report title	Impact of the glyphosate-based commercial herbicide, its components and its metabolite AMPA on non-target aquatic organisms
Document No	Mutat Res Gen Tox En 842 (2019) 94-101
Guidelines followed in study	OECD 236
Deviations from current test guideline	Not reported
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The acute toxicity of technical glyphosate and its metabolite aminomethylphosphonic acid (AMPA) to zebrafish embryos was investigated.

Glyphosate and AMPA caused no acute toxic effect ($LC_{50-96\text{ h}} > 100\text{ mg/L}$) in zebrafish.

The study was stated to have been conducted according to OECD guideline 236, but there is no information on hatching rates in the treatment and control groups, so exposure of the embryo without a potential barrier function of the chorion cannot be confirmed.

Concerning the validity of the study, four of the six validity criteria from the test guideline are mentioned in the paper (fertilization rate of embryo batches used was $>90\%$, survival in the negative control group was $> 90\%$, temperature was maintained at $26 \pm 1^\circ\text{C}$ and dissolved oxygen was at an acceptable level 8ppm). There is no information presented on the performance of the positive control group (3, 4-dichloroaniline) and no information provided on the hatching rates in the negative control group at 96 hours, which for the control group should exceed 80%. As these information are not presented and the fact that there was no analytical verification of test concentrations reported, this study considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.2.1 / KCP 10.2.1
Report author	Gabriel U. U. <i>et al.</i>
Report year	2010
Report title	Toxicity of roundup (a glyphosate product) to fingerlings of <i>Clarias gariepinus</i>
Document No	Animal Research International (2010) 7(2):1184-1193
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effects of Roundup containing 360 g/l glyphosate (equivalent to 480g/L isopropylamine salt) were tested in an acute test with *C. gariepinus* fingerlings. The 96 hour-LC₉₀ was determined to be 19.91 mg prod./L.

There is no analytical verification of test concentrations reported and thus the reliability of the endpoint is questionable. The appearance of mucus accumulation on the skin and gills and skin pigmentation recorded in fish in the holding / stock vessels is a clear indicator of stress. Therefore, the condition of the fish used in the test is questionable. The study was not conducted in accordance with a recognised test guideline and was not performed under conditions of GLP. Furthermore, the purity of the formulation roundup is not clearly given as the specification in the full text contains some typing errors. The study is considered reliable with restrictions.

1. Information on the study

Data point:	KCA 8.2.1
Report author	Gholami Syedkolaei S.J. <i>et al.</i> (Seyed Jalil Gholami)
Report year	2013
Report title	Toxicity evaluation of Malathion, Carbaryl and Glyphosate in common carp fingerlings (<i>Cyprinus carpio</i> , Linnaeus, 1758).
Document No	Journal of Veterinary Research (2013), Volume 68, Number 3, pp. 257-267
Guidelines followed in study	OECD 203
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities.
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The acute 96 hours- LC_{50} for common carp fingerlings was determined to be 6.75 mg/L by static exposure to glyphosate at 5 test concentrations between 5.5 and 9.5 mg/L.

The test was conducted according to OECD 203, but validity criteria are missing. No information on the test item such as purity is given. The results for the control are not stated. Furthermore, there was no analytical verification of test concentrations reported. The study is considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.2.2 / KCA 8.2.5
Report author	Levine S.L. <i>et al.</i>
Report year	2015
Report title	Aminomethylphosphonic acid has low chronic toxicity to <i>Daphnia magna</i> and <i>Pimephales promelas</i>
Document No	Environmental Toxicology and Chemistry (2015), Vol. 34, No. 6, pp. 1382-1389
Guidelines followed in study	OECD 211, OECD 210
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

Chronic toxicity tests of the glyphosate environmental metabolite aminomethylphosphonic acid (AMPA) were performed with fathead minnow (*Pimephales promelas*) and *Daphnia magna*. During a 21-d exposure period under semi-static test conditions the effects on survival, growth, and reproduction of the cladoceran *Daphnia magna* were determined resulting in a no-observed-effect concentration (NOEC) of 15 mg AMPA/L. During a 33-d exposure period under continuous renewal test conditions the effects on time to hatch, hatching success, posthatch growth and survival of the fish *Pimephales promelas* were assessed resulting in an NOAEC of 12 mg AMPA/L, the highest tested concentration. Test methodology followed the procedure outlined in the OECD 210 test guideline for *P. promelas*. For the chronic test on *Daphnia magna* the OECD 211 guideline is mentioned in the full text.

The study is well documented and all relevant information, e.g. information on the test item, test design, application method and implementation of the study, is available. In addition, a chemical analysis of test solutions was performed. All information for evaluation of the study is given. The study is considered as reliable.

1. Information on the study

Data point:	KCA 8.2.1
Report author	Schweizer M. <i>et al.</i>
Report year	2019
Report title	How glyphosate and its associated acidity affect early development in zebrafish (<i>Danio rerio</i>)
Document No	PeerJ, (2019) Vol. 7, pp. e7094
Guidelines followed in study	OECD Guideline 236
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

For Zebrafish (*Danio rerio*) embryos acutely exposed to glyphosate at concentrations between 1.69 and 1690.7 mg glyphosate/L (10 µM to 10 mM) for 96 hours post fertilization (hpf) the LC₁₀ and LC₅₀ values (96 hpf) were calculated to be 65.1 mg a.s./L (385 µM) and 98.4 mg a.s./L (582 µM), respectively (in unbuffered glyphosate medium). Regarding heart rates the EC₁₀ was 7.27 mg a.s./L (43 µM). Concerning hatching rate, 96 hpf -EC₁₀ and EC₅₀ values were 26.2 mg a.s./L (155 µM) and 37.9 (224 µM), respectively. For developmental delays at 24 hpf the EC₁₀ was 21.3 mg a.s./L (126 µM). The test was conducted according to OECD 236 test guideline.

Concerning the validity criteria in the OECD 236, despite the stated > 80% mortality in the positive control (>30% required) there are no details presented to confirm the level of mortality. The fertilisation rate of the batch of eggs used was not reported. Finally, acute endpoints based on developmental delay and heart rate are not relevant to an EU level risk assessment for Annex I renewal purposes.

The test design is adequately described, however, there was no analytical verification of test concentrations reported. The study is considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.3.1.3 / KCP 10.3.1.5
Report author	Thompson H. M. <i>et al.</i>
Report year	2014
Report title	Evaluating Exposure and Potential Effects on Honeybee Brood (<i>Apis mellifera</i>) Development Using Glyphosate as an Example
Document No	Integr Environ Assess Manag (2014), 10: 463-470
Guidelines followed in study	Oomen et al. 1992
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The Oomen et al. (1992) approach was used to quantify at residues in relevant matrices (pollen, nectar, and larvae) following application of glyphosate at 2.88 kg a.e./ha (400 L water/ha) to flowering *Phacelia tenacetifolia* in large glasshouses. Then brood feeding tests following the Oomen approach, were conducted by feeding 1 L treated sucrose solution at 75 / 150 and 301 mg glyphosate a.e./L directly to honeybee colonies.

The study is adequately described and all information to evaluate the study are available. At the time the study was conducted, there were no field level test guidelines adopted for use in the EU. The test did follow a recognised approach and is considered fit for purpose. The study is considered as reliable.

1. Information on the study

Data point:	KCA 8.2.7
Report author	Tian Y. <i>et al.</i>
Report year	2015
Report title	Growth inhibition of two herbicides on <i>Spirodela polyrhiza</i>
Document No	Nongyao kexue yu guanli (Pesticide Science and Administration), 2015, Vol. 36 (issue 3), pp. 61-65
Guidelines followed in study	OECD 221
Deviations from current test guideline	Not reported
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effects of glyphosate to the aquatic macrophyte *Spirodela polyrhiza* was tested in a semi-static exposure of 7 days at concentrations between 8.4 and 20.902 mg/L. The 7 day-EC₅₀ value was determined to be 12.817 mg/L.

This study was conducted to guideline but not to GLP. The test concentrations were not analytically verified and thus the exact exposure concentrations of the aquatic macrophyte are unknown. Therefore, the study should be considered as reliable with restrictions.

1. Information on the study

Data point:	KCA 8.4.1 / KCA 8.4.2.1 / KCA 8.5
Report author	von Mérey G. <i>et al.</i>
Report year	2016
Report title	Glyphosate and aminomethylphosphonic acid chronic risk assessment for soil biota
Document No	Environmental Toxicology and Chemistry (2016), Vol. 35, No. 11, pp. 2742-2752
Guidelines followed in study	OECD 222; OECD 226; OECD 232; OECD 216
Deviations from current test guideline	Earthworm cocoons were not counted, in accordance with OECD 222.
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The aim of the paper was to evaluate potential effects of Glyphosate, Glyphosate salt and AMPA on earthworm, soil mites, springtails and soil micro-organisms.

The studies have been conducted according to recognised guidelines and validity criteria were presented. Test substance information, test organism origin, study designs and toxicity effects were adequately described. The study is considered reliable.

検索期間：2010～2019年

区分 a に分類された文献とその理由

ヒトに対する毒性

1. Information on the study

Data point:	CA 5.4
Report author	Adler-Flindt S. <i>et al.</i>
Report year	2019
Report title	Comparative cytotoxicity of plant protection products and their active ingredients
Document No	Toxicology in Vitro (2019) Vol. 54, 354-366
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

It was the intention of this study to evaluate the GHS classification of pesticide formulations for acute toxicity based on calculated LD₅₀ values using the CLP calculation method (CM). Because of the considerable inaccuracy of this method the *in vitro* cytotoxicity of 10 pesticide formulations was compared against that of the active ingredient using mouse (3T3) and human (hFF) fibroblasts. In this exercise the IC₅₀ for glyphosate isopropylamine salt was found to be 954.8 ± 117.1 µg/mL for 3T3 cells and 1211 ± 885.7 µg/mL for hFF cells and the IC₅₀ for MON 52276 was 313.2 ± 29.3 µg/mL for 3T3 cells and 361.6 ± 612 µg/mL for hFF cells. The difference in cytotoxicity (expressed as the AUC of the % viability vs concentration curve) between glyphosate and MON 52276 could be regarded as minor.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate isopropylamine salt used was not sufficiently characterized and the standard deviation of the IC₅₀ of glyphosate (1211 ± 885.7 µg/mL) and MON 52276 (361.6 ± 612 µg/mL) for human fibroblasts is too large.

Reliability criteria for *in vitro* toxicology studies

Publication: Adler-Flindt <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Glyphosate isopropylamine salt, purity not reported. Source: Monsanto Agrar Deutschland GmbH, Düsseldorf, Germany.
Only glyphosate acid or one of its salts is the tested	N	MON 52276

substance		(RoundUP LB Plus, 360 g/L A.I.). Source : Monsanto Agrar Deutschland GmbH, Düsseldorf, Germany. Other pesticides and their formulations were tested as well.
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Mouse (3T3) and human (hFF) fibroblasts.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y (for local contact)	Test concentrations up to 1000 µg/mL which is beyond the systemic physiological range but not when applied dermally.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	Saccharin was used as the negative control and 5-FU as the positive control.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	IC ₅₀ were calculated.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate isopropylamine salt used was not sufficiently characterized and the standard deviation of the IC ₅₀ of glyphosate (1211 ± 885.7 µg/mL) and MON 52276 (361.6 ± 612 µg/mL) for human fibroblasts is too large.		

1. Information on the study

Data point:	CA 5.5
Report author	Andreotti, G. et al.
Report year	2018
Report title	Glyphosate Use and Cancer Incidence in the Agricultural Health Study
Document No	Journal of the National Cancer Institute (2018), Vol. 110, No. 5, pp. 509-516
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The AHS is an ongoing prospective cohort study of glyphosate and other pesticides. It was initiated in 1993 and has been ongoing for more than 25 years. Researchers from the US National Cancer Institute and other government agencies initiated the AHS as a prospective cohort study to eliminate the possibility of case-recall bias – an intractable potential bias in case control studies that rely on self-reported exposure information. Crump (Risk Analysis DOI:10.1111/risa.13440) has recently illustrated that the results from the glyphosate case-control studies align closely with what would be expected from case recall bias.

In addition to obviating concerns about case-recall bias, the Andreotti et al. publication is noteworthy on several counts. First, the frequency of glyphosate use by participants (median = 48 days, IQR 20 to 166 days) vastly exceeds that in the glyphosate case-control studies. In those studies the most frequent days of use category is > 10 days (Eriksson M, et al. Int J Cancer. 2008; 123:1657-1663), while most of the case control studies' primary analyses were based on 1 day or more of use in a lifetime. Second, the participants in the AHS were licensed pesticide applicators who were considered by the authors to be very capable to report pesticide use accurately compared with other study populations. Third, the analyses by Andreotti et al. controlled for a multitude of personal factors and for other pesticides in addition to incorporating a wide range of sensitivity and lagged analyses (allowing for up to 20+ years induction-latency). No other study has evaluated the relationship between glyphosate use and cancers as extensively. The AHS is, by far, the most informative and relevant study epidemiologic study for glyphosate to date.

Accordingly, given the AHS results for NHL among those with extensive glyphosate use (n = 111 exposed cases, RR = 0.9, 95% CI 0.6 – 1.2), it is unlikely that the positive associations for glyphosate and NHL in some case control studies are valid. As follow-up of the AHS cohort continues, it remains to be seen whether subsequent results will identify relationships between individual cancers and glyphosate use that are relevant for risk evaluations.

Reliability Criteria: Epidemiology studies

Publication: Andreotti G. <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Study Design		
Adequate study design given study objectives	Yes	
Appropriate study population to address potential glyphosate-related health outcomes	Yes	Most appropriate population studied to date. Highest frequency of glyphosate use by far.
Exposure studied		
Exposure to formulations with glyphosate as a.i.	Yes	
Exposure to formulations with other a.i.	Yes	
Exposure to other farm exposures	Yes	
Study Conduct/analysis		
Adequate description of study population	Yes	
Adequate description of exposure circumstances	Yes	
Comparable participation by groups being compared	Yes	
Information provided by proxy respondents	No	
Adequate statistical analysis	Yes	Very comprehensive
Adequate consideration of personal confounding factors	Yes	Very comprehensive
Adequate consideration of potentially confounding exposures	Yes	Very comprehensive
Overall assessment		
Reliable without restrictions	Yes	Most reliable epidemiology study for glyphosate users versus non-users.
Reliable with restrictions	Yes	Certain analyses are limited: dose is not known, only frequency of use. So, “dose response” analyses must be interpreted cautiously.
Not reliable	No	

1. Information on the study

Data point:	CA 5.5
Report author	Biserni M. <i>et al.</i>
Report year	2019
Report title	Quizalofop-p-ethyl induces adipogenesis in 3T3-L1 Adipocytes
Document No	Toxicological Sciences (2019), Vol. 170(2), 452–461
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion**Assessment and conclusion by applicant:**

In this study glyphosate, among other pesticide active ingredients, was investigated for its effect on lipid accumulation in differentiated adipocytes *in vitro* at concentrations ranging from 0.1 to 1000 µM. The results indicated that at the concentrations tested glyphosate scored negative for lipid accumulation. This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions.

Reliability criteria for *in vitro* toxicology studies

Publication: Biserni <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of $\geq 96\%$. Source: Sigma-Aldrich, Gillingham, UK
Only glyphosate acid or one of its salts is the tested substance	N	Other pesticide active ingredients were tested as well.
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Concentration range <i>in vitro</i> from 0.1 to 1000 μM .
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	Glyphosate was not tested in all tests described.
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	No effect of glyphosate over the entire concentration range tested.
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions.		

1. Information on the study

Data point:	CA 5.7
Report author	Chorfa A. <i>et al.</i>
Report year	2013
Report title	Specific pesticide-dependent increases in α -synuclein levels in human neuroblastoma (SH-SY5Y) and melanoma (SK-MEL-2) cell lines.
Document No	Toxicological sciences: (2013) Vol. 133, No. 2, pp. 289-97.
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective was to precisely assess changes in α -syn levels in human neuroblastoma (SH-SY5Y) and melanoma (SK-MEL-2) cell lines following acute exposure to glyphosate using Western blot and flow cytometry. The study was conducted using an *in vitro* test system. Glyphosate did not have any impact on the endpoints measured in this study. This is not a guideline study, nor did this study evaluate an endpoint used in risk assessment. Therefore, this study is not usable for quantitative human health risk assessment or hazard assessment.

This publication is considered reliable with restrictions (no positive control was included and only 2 test concentrations were used) but is not relevant for the risk assessment of glyphosate.

Reliability criteria for *in vitro* toxicology studies

Publication: Chorfa <i>et al.</i> , 2013	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 99.5%. Source: Sigma-Aldrich.
Only glyphosate acid or one of its salts is the tested substance	N	Also other pesticides tested (rotenone, paraquat, maneb).
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Human neuroblastoma (SH-SY5Y) and melanoma (SK-MEL-

		2) cell lines.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0, 3, and 9 µM.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive controls used.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate isopropylamine salt used was not sufficiently characterized and the standard deviation of the IC ₅₀ of glyphosate (1211 ± 885.7 ug/mL) and MON 52276 (361.6 ± 612 µg/mL) for human fibroblasts is too large.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Connolly A. et al.
Report year	2017
Report title	Exposure assessment using human biomonitoring for glyphosate and fluroxypyr users in amenity horticulture
Document No	International Journal of Hygiene and Environmental Health (2017) Vol. 220, 1064–1073
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Biological monitoring has previously been used in studies evaluating occupational exposures to pesticides in both the agricultural and horticultural sectors. The aim of this study was to characterise the occupational exposures in amenity horticultural workers using a biomonitoring method for glyphosate in urine. The geometric mean of the urinary glyphosate concentrations in the post-work samples of all exposure groups combined was found to be 0.66 µg/L. When the relationship between urinary concentrations of glyphosate and systemic dose as established by Acquavella et al. (Acquavella et al. (2004) Environmental Health Perspectives, 112(3), 321-326) is taken into consideration, the daily systemic dose for the workers in this study is estimated to be 0.000021 mg/kg bw/day. The corresponding daily oral external dose is about 0.0001 mg/kg bw/day when an oral bioavailability of 20% is taken into account. This is 5,000 times lower than the ADI of 0.5 mg/kg bw/day.

This publication is considered relevant for glyphosate risk assessment and reliable without restrictions because it complies with all the reliability criteria of an exposure study.

Reliability criteria for exposure studies

Publication: Connolly <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.		
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.		
Exposure to formulations with glyphosate combined with other a.i.		

Publication: Connolly <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Exposure to various formulations of pesticides	Y	
Study		
Study design clearly described	Y	
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with all the reliability criteria of an exposure study.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Connolly A. <i>et al.</i>
Report year	2018
Report title	Characterising glyphosate exposures among amenity horticulturists using multiple spot urine samples
Document No	International journal of Hygiene and Environmental Health (2018) Vol. 221, 1012-1022
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the exposure of amenity horticulturalists to glyphosate was assessed. Three similar exposure groups (SEGs) were considered for the application of various glyphosate based herbicides: one using a manual knapsack, one using a pressurized handheld lance and one using a controlled droplet applicator. Urine samples were taken pre-task, post-task and the morning after the task and analyzed for glyphosate using and LC-MS/MS method with an LOQ of 0.5 µg/L. Glyphosate concentrations were found to be less than the LOQ in 27% of the urinary samples, of which 38% were pre-task samples and 38% were following morning void samples. Two of the 29 work tasks had peak samples with urinary glyphosate concentrations below the LOQ, both belonging to the manual knapsack SEG. The geometric means of the glyphosate concentrations measured in urine samples of the combined glyphosate SEGs were 0.68 µg/L for pre-task samples, 1.17 µg/L for post-task samples and 0.83 µg/L for following morning void samples. 100% of the workers wore gloves, 90% a Tyvec suit and 97% RPE.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because more detail could have been provided on the validation of the analytical method. Also the number of participants per exposure scenario was rather limited.

Reliability criteria of exposure studies

Publication: Connolly <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Y	
Exposure to formulations with glyphosate combined with other a.i.	N	
Exposure to various formulations of pesticides	N	

Publication: Connolly <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study		
Study design clearly described	Y	
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y?	Not complete.
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because more detail could have been provided on the validation of the analytical method. Also the number of participants per exposure scenario was rather limited.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Connolly A. <i>et al.</i>
Report year	2018
Report title	Glyphosate in Irish adults – A pilot study in 2017
Document No	Environmental Research 165 (2018) 235-236
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study is newly submitted for purpose of review. A biomonitoring survey involving the collection and analysis of 20 ml spot urine samples from 50 Irish adults on non-occupational setting was conducted. The LC-MC/MS analyses of urinary samples revealed that 10 out of 50 samples analysed (i.e. 20%) contained detectable levels of glyphosate (0.80 – 1.35 µg/L). The low proportion of detectable glyphosate levels could be due to lower localised use of pesticides, having a small sample size or the higher analytical detection limit used in this study (0.5 µg/L).

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good exposure study.

Reliability criteria of exposure studies

Publication: Connolly <i>et al.</i> , 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	?	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Y	
Exposure to formulations with glyphosate combined with other a.i.	Y	
Exposure to various formulations of pesticides	Y	
Study		
Study design clearly described	Y	
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	First morning urine void sample.
Analytical method described in detail	Y	To some extent, ref. to other paper.
Validation of analytical method reported	Y	To some extent, ref. to other paper.
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good exposure study.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Connolly A. <i>et al.</i>
Report year	2019
Report title	Evaluating glyphosate exposure routes and their contribution to total body burden: a study among amenity horticulturalists
Document No	Annals of Work Exposures and Health, 2019, 63 (2), 133–147
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study is newly submitted for purpose of review. The total uptake of glyphosate was assessed in parallel with dermal and inadvertent exposure routes, using urine, wipes and glove samples collected from 20 workers across 29 work tasks. The average hand surface area measurements were assigned according to published US EPA guidance. Geometric mean (GM) glyphosate concentrations of 0.01, 0.04 and 0.05 µg/cm² were obtained on wipes from the workers' perioral region and left and right hands, respectively. For disposable and reusable gloves, respectively, GM glyphosate concentrations of 0.43 and 7.99 µg/cm² were detected. The combined hand and perioral region glyphosate concentrations explained 40% of the variance in the urinary (µg/L) biomonitoring data. Data show the dermal exposure is the prominent route of exposure in comparison to inadvertent ingestion, but inadvertent ingestion may contribute to overall body burden. The study also identified potential exposure to non-pesticide users in the workplace and para-occupational exposures.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good exposure study.

Reliability criteria of exposure studies

Publication: Connolly <i>et al.</i> , 2019.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Y	
Exposure to formulations with glyphosate combined with other a.i.	Y	
Exposure to various formulations of pesticides	Y	
Study		
Study design clearly described	Y	
Population investigated sufficiently described	Y	

Reliability criteria of exposure studies

Publication: Connolly <i>et al.</i> , 2019.	Criteria met? Y/N/?	Comments
Guideline-specific		
Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good exposure study.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Connolly A. <i>et al.</i>
Report year	2019
Report title	Exploring the half-life of glyphosate in human urine samples
Document No	International Journal of Hygiene and Environmental Health (2019) Vol. 222, 205-210
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Analytical data for glyphosate obtained from spot urine samples collected during a glyphosate exposure study (Connolly *et al.*, International journal of Hygiene and Environmental Health (2018), Vol. 221, 1012-1022) were used to estimate the human biological half-life of glyphosate. To that end only work tasks with at least two spot urine samples collected after the peak exposure were included for excretion profile analysis. Glyphosate concentrations were log transformed and the slope of the glyphosate urine concentration by the time duration (time passed from the start time) was calculated for each task. When the results were restricted to sample sets which showed very strong relationships ($R^2 > 0.90$), the estimated half-life average (range) was 4.5 (1.5 - 7) hours and 7.5 (4.75 - 9.25) hours for unadjusted and creatinine corrected values, respectively. UER calculated samples showed moderate to strong relationship ($R^2 = 0.60-0.95$), with an estimated half-life average (range) of 7.25 (3 and 9.50) hours. This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions in view of the limitations of the study such as the lack of standardization (pesticide products used, quantity of pesticides applied per task, different application methods and different sampling times). The small sample size prevented the use of more elaborate statistical tests to identify differences due to sex or age. The pharmacokinetic analysis revealed first order kinetics but due to the collection of urine samples over a limited period of time (19-26 hours) multi-phasic kinetics may not have been identified.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions in view of the limitations of the study such as the lack of standardization (pesticide products used, quantity of pesticides applied per task, different application methods and different sampling times). The small sample size prevented the use of more elaborate statistical tests to identify differences due to sex or age. The pharmacokinetic analysis revealed first order kinetics but due to the collection of urine samples over a limited period of time (19-26 hours) multi-phasic kinetics may not have been identified.

Reliability criteria of exposure studies

	Criteria met? Y/N/?	Comments
Publication: Connolly <i>et al.</i> , 2019		
Guideline-specific		
Study in accordance to valid internationally accepted	N	

Publication: Connolly <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
testing guidelines/practices.		
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	Urine monitoring data from a glyphosate exposure study were used to study the urinary excretion kinetics of glyphosate. There are limitations in the study approach.
Test substance		
Exposure to formulations with only glyphosate as a.i.	Y	
Exposure to formulations with glyphosate combined with other a.i.	N	
Exposure to various formulations of pesticides	N	
Study		
Study design clearly described	N	Based on the glyphosate exposure study.
Population investigated sufficiently described	N	Based on the glyphosate exposure study.
Exposure circumstances sufficiently described	N	Based on the glyphosate exposure study.
Sampling scheme sufficiently documented	Y	Based on the glyphosate exposure study.
Analytical method described in detail	Y	
Validation of analytical method reported	Y?	Could be more elaborate.
Monitoring results reported	Y	
Statistical analysis	Y	
Pharmacokinetic analysis	Y	To some extent, supposing first order one-compartment pharmacokinetics.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions in view of the limitations of the study such as the lack of standardization (pesticide products used, quantity of pesticides applied per task, different application methods and different sampling times). The small sample size prevented the use of more elaborate statistical tests to identify differences due to sex or age. The pharmacokinetic analysis revealed first order kinetics but due to the collection of urine samples over a limited period of time (19-26 hours) multi-phasic kinetics may not have been identified.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Conrad U. <i>et al.</i>
Report year	2017
Report title	Glyphosate in German adults – Time trend (2001 to 2015) of human exposure to a widely used herbicide
Document No	International Journal of Hygiene and Environmental Health 220 (2017) 8-16
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The internal exposure levels of glyphosate and its main metabolite AMPA were analysed using the general German population urinary samples collected during a period covering 2001 – 2015 with similar sample sizes and sex distributions. Retrospective GC-MS-MS analyses revealed that 31.8% of analysed samples contained detectable level of glyphosate. For AMPA this was the case for 40.1% samples analysed. A peak of detectable glyphosate level was observed in 2012 (57.5%) and 2013 (56.4%), followed by a decrease in 2014 (32.5%) and 2015 (40.0%), which may be due to changes in glyphosate application in agricultural practice. Urinary glyphosate levels tended to be higher in males. Overall, the urinary level of AMPA showed a similar trend as glyphosate, with a statistically significantly correlation.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good monitoring study.

Reliability criteria of exposure studies

Publication: Conrad <i>et al.</i> 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	Retrospective population monitoring study of glyphosate and AMPA in urine.
Test substance		
Exposure to formulations with only glyphosate as a.i.	NA	Exposure to glyphosate and AMPA mainly through the diet.
Exposure to formulations with glyphosate combined with other a.i.	NA	
Exposure to various formulations of pesticides	NA	
Study		

Reliability criteria of exposure studies

Publication: Conrad <i>et al.</i> 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study design clearly described	Y	
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	Y	General population.
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good monitoring study.		

1. Information on the study

Data point:	CA 5.5
Report author	Crump K.
Report year	2019
Report title	The potential effects of recall bias and selection bias on the epidemiological evidence for the carcinogenicity
Document No	Risk Anal. (2020); 40(4):696-704
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

It is well known that recall bias is a potentially important bias in cancer case control studies where study participants are asked to recall their past exposures. In an ideal study, information about exposures for cases and controls would be collected under exactly the same circumstances. However, circumstances are quite different for cases and controls. Cancer cases have suffered a grievous illness and it is only natural for them to be deeply introspective about what might have caused their cancers. Controls have no such motivation that would augment their recall (or reporting). So, the concern expressed in many textbooks is that recall bias tends to produce false positive results. The purpose of this analysis by Crump was to evaluate the evidence for recall bias in the overall pattern of results in five case control studies and two cohort studies that comprise the main part of the glyphosate-NHL literature.

In evaluating the case control studies, Crump reasoned that the percentage of odds ratios > 1 for non-glyphosate exposures should be approximately 50% if recall bias was not operative and those exposures did not cause NHL. Yet, it turned out that the percentages of ORs > 1 for non-glyphosate exposures were 90% for Hardell et al. (2002), 90% for Erikson et al. (2008), 93% for McDuffie et al. (2001), 76% for Orsi et al. (2009), and 53% for DeRoos et al. (2003). These extreme departures from 50% for 4 of the 5 case control studies is consistent with recall bias, perhaps augmented by a type of selection bias in the analyses by Hardell et al. (2002) and Eriksson et al. (2008). In contrast, in the most recent publication from the Agricultural Health Study (Andreotti et al. 2018), only 48% of the relative risks (RR) calculated were > 1 – a percentage in the range expected with a true probability of 50%. While the evaluation of Andreotti et al. (2018) concerned glyphosate and other cancer sites and not other exposures and NHL, the principle is the same: under the null hypothesis the proportion of ORs or RRs > 1 should be roughly 50% absent bias.

We agree with Crump's conclusion that the 4 case-control studies with a high proportion of ORs > 1 are "contaminated" by statistical bias and are not reliable as evidence of a relationship between glyphosate and NHL. Of course, there are also other types of bias that may contribute to the high proportion of positive ORs (e.g., lack of control for confounding, lower participation for controls than cases (traditional selection bias), proxy respondents, etc.) (see Acquavella et al. 2016). Nonetheless, Crump's point is well taken that ORs for glyphosate in 4 of the 5 case control studies should be interpreted as unreliable because the vast majority of ORs for other exposures are > 1 .

Reliability Criteria: Epidemiology studies

Publication: Crump K., 2019	Criteria met? Y/N/?	Comments
Study Design		
Adequate study design given study objectives	Yes	For a methodologic evaluation of recall bias in existing studies
Appropriate study population to address potential glyphosate-related health outcomes	Not applicable	
Exposure studied		
Exposure to formulations with glyphosate as a.i.	Yes	
Exposure to formulations with other a.i.	Yes	
Exposure to other farm exposures	Yes	
Study Conduct/analysis		
Adequate description of study population	Not applicable	
Adequate description of exposure circumstances	Not applicable	
Comparable participation by groups being compared	Not applicable	
Information provided by proxy respondents	Not applicable	
Adequate statistical analysis	Yes	To illustrate bias
Adequate consideration of personal confounding factors	Not applicable	
Adequate consideration of potentially confounding exposures	Not applicable	
Overall assessment		
Reliable without restrictions	Yes	As methodologic work. Clearly illustrates recall bias in the glyphosate case control studies.
Reliable with restrictions	No	
Not reliable	No	

1. Information on the study

Data point:	NA Zebra fish cell line
Report author	da Silva N. D. G. <i>et al.</i>
Report year	2020
Report title	Interference of goethite in the effects of glyphosate and Roundup® on ZFL cell line
Document No	Toxicology in Vitro 65 (2020) 104755
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

It was shown in this *in vitro* study that goethite NPs and Roundup® presented cytotoxic and genotoxic effects in ZFL cells and, when co-exposed, produced a synergistic effect. Glyphosate did not promote cytotoxic, biochemical, or genotoxic damage to ZFL cells and, in association, the toxic effects produced by isolated goethite NPs were suppressed by glyphosate. It is concluded therefore that these findings indicate that the presence of other compounds in the formulated product may be responsible for the aquatic organism toxicity of this herbicide when compared to the active ingredient glyphosate.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test system and glyphosate were not sufficiently characterized and only one concentration of glyphosate was used for testing, preventing any characterisation of dose-response.

Reliability criteria for *in vitro* toxicology studies

Publication: Da Silva <i>et al.</i> , 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity of glyphosate is not reported, only source (Milenia Agrociencias S/ A)
Only glyphosate acid or one of its salts is the tested substance	N	Also formulation was tested
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	N	
Test conditions clearly and completely described	Y	

Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Only one concentration of glyphosate tested: 3.6 µg/mL.
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Only one concentration of glyphosate tested
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test system and glyphosate were not sufficiently characterized and only one concentration of glyphosate was used for testing.		

1. Information on the study

Data point:	CA 5.6
Report author	Dai P. <i>et al.</i>
Report year	2016
Report title	Effect of glyphosate on reproductive organs in male rat
Document No	Acta Histochemica (2016) Vol. 118, 519–526
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The potential toxicity of glyphosate to the male reproductive system of the rat has been investigated after oral treatment with glyphosate for 5 weeks at dose levels up to 500 mg/kg bw. The endpoints studied were body weight, food intake, daily weight gain, absolute and relative reproductive organ weight, serum hormone levels, oxidative stress parameters, testicular histopathology and expression of AR in testis. The effects found were a significant decrease in absolute (but not relative) weight of the seminal vesicle gland and coagulating gland and a decrease in sperm count at the highest dose tested.

This publication is considered relevant but reliable with restrictions because there are deviations from regulatory guidelines for reproductive toxicology studies and the reproductive effects seen are not corroborated by the results from regulatory studies at similar dose levels.

Reliability criteria for *in vivo* toxicology studies

Publication: Dai <i>et al.</i> , 2016	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	Incomplete study
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 90% as isopropylamine salt. Source Shanghai Ryon Biological Technology Co. Ltd., China.
Only glyphosate acid or one of its salts is the tested substance	Y	Isopropylamine salt
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y?	
Route and mode of administration described	Y	
Dose levels reported	Y	

Number of animals used per dose level reported	Y	8 males per group
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y?	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	Results are not concordant with outcome of regulatory reproduction toxicology studies
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant but reliable with restrictions because there are deviations from regulatory guidelines for reproductive toxicology studies and the reproductive effects seen are not corroborated by the results from regulatory studies at similar dose levels.		

1. Information on the study

Data point:	CA 5.4
Report author	De Almeida L. K. S. <i>et al.</i>
Report year	2018
Report title	Moderate levels of glyphosate and its formulations vary in their cytotoxicity and genotoxicity in a whole blood model and in human cell lines with different estrogen receptor status
Document No	3 Biotech (2018) Vol. 8(10), 438 (1-15)
Guidelines followed in study	None
Deviations from current test guideline	NA
Previous evaluation	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The cytotoxicity of glyphosate has been investigated in whole blood, in hormone independent (MDA-MB-231) and in hormone responsive (MCF7) cell lines and in an endometrial cancer cell line (HEC1A). The capacity of glyphosate to produce DNA damage was investigated in MCF7, MDA-MB-231 and HEC1A cells in the Comet assay. Glyphosate was found to reduce cell viability in whole blood at the intermediate concentrations (10-250 µg/mL) but not at the highest concentration tested (500 µg/L). A concentration related reduction in cell viability was seen with glyphosate in HEC1A cells but not in the two other cell lines. When glyphosate was tested at 500 and 1000 µg/mL an increase in tail length and tail moment was observed in HEC1A and MDA-MB-231 cells but not in the hormone responsive breast cancer cell line MCF7. The *in vitro* concentrations of glyphosate at which DNA damage was observed were 500 and 1,000 µg/mL which are systemic concentrations that cannot be reached in *in vivo* toxicology studies.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the Comet assay was only conducted at concentrations that are physiologically not feasible in *in vivo* toxicology studies (> 1mM).

Reliability criteria for *in vitro* toxicology studies

Publication: De Almeida et al., 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 99.5%. Source: Supelco Analytical USA.
Only glyphosate acid or one of its salts is the tested substance	N	Also glyphosate-based formulations were tested.
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Whole blood from volunteers, breast cancer cells (MCF7 and MDA-MB-231) and endometrial cancer cells (HEC1A).
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	N	For cytotoxicity testing glyphosate concentrations from 0.1 to 500 µg/mL were used. For comet testing only glyphosate concentrations of 500 and 1000 µg/mL were used (> 1 mM).
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	Was studied but not established.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the Comet assay was only conducted at concentrations that are physiologically not feasible in <i>in vivo</i> toxicology studies (> 1mM).		

1. Information on the study

Data point:	CA 5.5
Report author	Duforestel M. <i>et al.</i>
Report year	2019
Report title	Glyphosate primes mammary cells for tumorigenesis by reprogramming the epigenome in a TET3-dependent manner
Document No	Frontiers in genetics, (2019) Vol. 10, pp. 885.
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to investigate DNA hypomethylation in MCF10A cells, tumorigenic response for MCF10A Cells in a two-factor hit model, prevention of tumor formation in glyphosate-challenged cells, and TET3-Mediated Gene Demethylation following glyphosate exposure. This study was conducted in vitro using only one level of glyphosate. Glyphosate was not correlated to environmental exposures. In the in vivo portion of the study, a sufficient number of animals were not used to determine a carcinogenic response for statistical analysis. While this study is acceptable as supplemental information on the in vitro effects of glyphosate, it is not appropriate for endpoint derivation in human health risk assessment.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was insufficiently characterized and only one and extremely low concentration of glyphosate was used.

Reliability criteria for *in vitro* toxicology studies

Publication: Duforestel <i>et al.</i> , 2019.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity was not reported, source: Santa-Cruz, France.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Non-neoplastic breast epithelial MCF10A cells.
Test conditions clearly and completely described	Y	

Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	One test concentration at 10^{-11} M, 10^{-5} μ M (extremely low concentration) applied every 3 to 4 days over 21 days.
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Not possible with one concentration
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was insufficiently characterized and only one and extremely low concentration of glyphosate was used.		

1. Information on the study

Data point:	CA 5.6
Report author	Forgacs A. L. <i>et al.</i>
Report year	2012
Report title	BLTK1 Murine Leydig Cells: A Novel Steroidogenic Model for Evaluating the Effects of Reproductive and Developmental Toxicants
Document No	Toxicological Sciences (2012) Vol.127(2), 391–402
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study, recombinant human chorionic gonadotropin (rhCG) and forskolin (FSK) were used as positive controls for the induction of steroidogenesis, as measured by increases in progesterone, testosterone and 17 β -estradiol levels in culture media. Murine BLTK1 Leydig cells were investigated as a novel model for evaluating the effects of chemicals on steroidogenesis. The results demonstrated that BLTK1 cells can be used to screen substances that alter intracellular cAMP, steroidogenic gene expression, and sex steroid levels. When tested in this system glyphosate was not found to induce testosterone production or alter rhCG induction of testosterone.

This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because the test substance was not characterized and the results of only one concentration level were reported.

Reliability criteria for *in vitro* toxicology studies

Publication: Forgacs <i>et al.</i> , 2012	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity and source not reported.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)		

Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Only one concentration was tested (300 µM) Glyphosate, did not induce or alter rhCG induction of T. Glyphosate also had no effect on T levels in BLTK1 cells
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because the test substance was not characterised and only one concentration level was tested.		

1. Information on the study

Data point:	CA 5.8.2
Report author	Forsythe S. D. <i>et al.</i>
Report year	2018
Report title	Environmental Toxin Screening Using Human-Derived 3D Bioengineered Liver and Cardiac Organoids
Document No	Frontiers in Public Health (2018) Vol. 6, 103
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the toxicity of glyphosate for liver and cardiac organoids was investigated in the concentration range from 25 μ M to 25 mM. The endpoints considered were cell viability, ATP activity and beating rate of the cardiomyocytes. Glyphosate was shown to reduce organoid integrity and viability at doses from 250 μ M to 2.5 mM. The IC₅₀ values based on ATP activity of liver and cardiac organoids were found to be 10.53 and 10.85 mM, respectively. When cardiac organoids were exposed to glyphosate at 0.25 mM a non-statistically significant effect was found on beating rate. Exposure to 2.5 mM for 2 days resulted in all organoids stopping beating.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not characterized, no positive controls were used to validate the organoid test systems and the concentrations at which most of the effects have been observed are physiologically not feasible in *in vivo* experimental models.

Reliability criteria for *in vitro* toxicology studies

Publication: Forsythe <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity and source were not reported.
Only glyphosate acid or one of its salts is the tested substance	N	Also lead, mercury and thallium were assessed.
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y?	Liver and cardiac organoids. Origin of hepatic cells not sufficiently documented.
Test conditions clearly and completely described	Y	

Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Partly	Test concentrations at which effects were seen were > mM.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive controls used.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not characterized, no positive controls were used to validate the organoid test systems and the concentrations at which most of the effects have been observed are physiologically not feasible in <i>in vivo</i> experimental models.		

1. Information on the study

Data point:	CA 5.3
Report author	Gao H. <i>et al.</i>
Report year	2019
Report title	Activation of the N-methyl-D-aspartate receptor is involved in glyphosate-induced renal proximal tubule cell apoptosis
Document No	Journal of Applied Toxicology (2019) Vol. 39(8), 1096-1107
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the effect of glyphosate on human proximal tubular epithelial cells was studied *in vitro* and on kidney *in vivo*. Tubular epithelial cells (HK-2) *in vitro* were exposed to glyphosate at concentrations ranging from 20 to 100 µM whereas mice were orally treated with glyphosate at 400 mg/kg bw/day for 28 days. The endpoints investigated for the *in vitro* study were cell viability, apoptosis, oxidative stress, intracellular Ca²⁺, expression of the N-methyl-D-aspartate (NMDA) receptor and expression of proteins involved in apoptosis. The endpoints explored in the *in vivo* study in mice were kidney pathology biomarkers, oxidative stress in kidney tissue, kidney histopathology, NMDA receptor immunochemistry and apoptosis in kidney tissue. The results were that glyphosate was found to reduce cell viability, increase the incidence of apoptotic cells with an increase in the expression of apoptosis-related proteins, increase of oxidative stress in a concentration-related manner, increase of the expression of the NMDA receptor and increase Ca²⁺ influx. Kidney histopathology in mice treated with glyphosate at 400 mg/kg bw/day for 28 days revealed the exfoliation of renal tubular cells. It is postulated by the authors that glyphosate could affect renal tubule epithelial cells via the NMDAR1/[Ca²⁺]_i/ROS pathway.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the biochemical methods are not completely described, only one dose was used in the *in vivo* study and the pathology results from the *in vivo* study are not corroborated by regulatory 90-day repeated dose toxicity studies where no renal effects were seen in rats dosed up to more than 4,000 mg/kg bw/day and mice dosed up to more than 7,000 mg/kg bw/day.

Reliability criteria for *in vitro* toxicology studies

Publication: Gao <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 96% as glyphosate monoisopropylamine

		salt. Source: Millipore Sigma, St. Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Concentration range <i>in vitro</i> from 20 to 100 µM. Only one dose (400 mg/kg bw/day) was used in the oral toxicity study in mice.
Cytotoxicity tests reported	Y	
Biochemical methods described	Y?	Some could be better documented.
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	<i>In vitro</i> but not <i>in vivo</i> (only one dose used).
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the biochemical methods are not completely described, only one dose was used in the <i>in vivo</i> study and the pathology results from the <i>in vivo</i> study are not corroborated by regulatory 90-day repeated dose toxicity studies where no renal effects were seen in rats dosed up to more than 4,000 mg/kg bw/day and mice dosed up to more than 7,000 mg/kg bw/day.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Gigante P. <i>et al.</i>
Report year	2018
Report title	Glyphosate affects swine ovarian and adipose stromal cell functions
Document No	Animal Reproduction Science (2018) Vol. 195, 185–196
Guidelines followed in study	None
Deviations from current test guideline	NA
Previous evaluation	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effects of glyphosate on functional parameters of granulosa cells and adipose stromal cells from swine were investigated *in vitro*. In granulosa cells the effect of glyphosate was studied on cell proliferation, cell viability, steroid production, superoxide anion production, NO production and ferric reducing activity. In adipose stromal cells the effect of glyphosate was studied on cell viability, adipogenic differentiation, adipogenic marker genes (PPAR γ and leptin), intracellular lipid accumulation and adipose cell count. Glyphosate was found to significantly decrease cell proliferation, cell viability, estrogen production and ferric reducing capacity and increase progesterone and NO production in granulosa cells when tested at concentrations ranging from 0.2 to 16 $\mu\text{g/mL}$. However, in none of the assays with granulosa cells a concentration-effect relationship was established. Glyphosate treatment at 4 $\mu\text{g/mL}$ significantly decreased ($p < 0.001$) the viability of proliferating adipose stromal cells after 48 and 72 hours. Differentiated cell counts showed a significant inhibition ($p < 0.05$) of the adipogenic process by glyphosate at 4 $\mu\text{g/mL}$. Since only one concentration of glyphosate was tested it was not possible to establish a concentration-effect relationship. In this publication it is suggested that glyphosate interferes with the main functional parameters of the granulosa cell which could affect reproductive function. No effects on female reproductive function were reported in the rat in regulatory reproductive toxicology tests at doses beyond 2,000 mg/kg bw/day producing systemic glyphosate concentrations that are higher than those tested in this study.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were included in the assays and only one dose level was used for the testing of adipose stromal cells.

Reliability criteria for *in vitro* toxicology studies

Publication: Gigante <i>et al.</i> , 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		

Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity is not reported. Source: Sigma Chemical Co, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Granulosa cells from swine ovaries, adipose stromal cells from swine adipose tissue.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.2, 4 or 16 µg/mL.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive control.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were included in the assays and only one dose level was used for the testing of adipose stromal cells.		

1. Information on the study

Data point:	CA 5.6
Report author	Gorga A. <i>et al.</i>
Report year	2020
Report title	In vitro effects of glyphosate and Roundup on Sertoli cell physiology
Document No	Toxicology in Vitro 62 (2020) 104682
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This *in vitro* investigation showed that exposure to G and R at 100 ppm alters Sertoli cell junction barrier permeability, measured by decreased TER, and also decreased testosterone-stimulated TER. This study also showed that, at least in part, the loss of location of claudin11 at the interface between neighboring Sertoli cells might be responsible for the disassembly of the barrier. G or R did not modify androgen receptor mRNA or protein levels, nor did G modify P-p38-MAPK and P-ERK1/2 signalling pathways involved with BTB integrity at any doses tested, or affect the expression of intercellular junction proteins (claudin11, occludin and ZO-1). However, G and R induced redistribution of claudin11 at the zone of contact between cells. Neither G nor R modified lactate production, glucose uptake, GLUT1, FA oxidation, or *FAT/CD36* and *CPT1* expression in SC, thus indicating no effect of G or R on SC nutritional function or metabolism.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not sufficiently characterized, there was no positive control and most of the endpoints were tested at only 2 concentrations preventing any dose response evaluations, with the highest concentration exceeding that which is physiologically relevant.

Reliability criteria for *in vitro* toxicology studies

Publication: Gorga <i>et al.</i> , 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Sigma-Aldrich, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	N	Also formulation was tested: Roundup Full II (Monsanto, Argentina)
AMPA is the tested substance	N	

Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described		
Test concentrations in physiologically acceptable range (< 1 mM)	Y	3 test concentrations used of which the highest was > 1 mM (1000 µg/mL).
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive control reported.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported		Explored but not found (only 2 concentration levels tested for most endpoints)
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not sufficiently characterized and most of the endpoints were tested at only 2 concentrations.		

1. Information on the study

Data point:	CA 5.5
Report author	Hao Y., Xu W. et al
Report year	2019
Report title	Roundup-Induced AMPK/mTOR-Mediated Autophagy in Human A549 Cells
Document No	Journal of agricultural and food chemistry (2019) Vol. 67(41), 11364-11372
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effect of glyphosate, POEA and a herbicidal formulation containing POEA as a co-formulant on the AMPK/mTOR signaling pathway was studied in human alveolar carcinoma A549 cells *in vitro*. Only the results of exposure to glyphosate at 100 µg/mL are reported and discussed in this summary. The endpoints selected to study the effect of glyphosate on autophagy are inhibition of viability, monodansylcadaverine (MDC) staining to mark autophagic vacuoles, visualization of double-membrane autophagosomes by TEM, autophagic flux, colocalization of mitochondria and lysosomes, opening of the mitochondrial permeability transition pore (mPTP), expression of proteins involved in the AMPK/mTOR signaling pathway, and ATP content. No effect could be demonstrated of glyphosate on any of these endpoints indicating that glyphosate, in contrast to POEA and Roundup, does not contribute to the activation of the AMPK/mTOR signaling pathway and has thus no role in autophagy.

This publication is relevant for the risk assessment of glyphosate but reliable with restrictions because only one glyphosate concentration was tested and no positive controls were used.

Reliability criteria for *in vitro* toxicology studies

Publication: Hao, Xu <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of ≥95%. Source: Weihai Hanfu Biochemical Pharmaceutical Co., Ltd., China.
Only glyphosate acid or one of its salts is the tested substance	N	Also GBH (Monsanto, St. Louis, USA) and POEA tested.
AMPA is the tested substance	N	
Study		

Test system clearly and completely described	Y	Human alveolar carcinoma A549 cell line.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Glyphosate only at one concentration tested: 100 µg/mL.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive control.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Only one concentration for glyphosate.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is relevant for the risk assessment of glyphosate but reliable with restrictions because only one glyphosate concentration was tested and no positive controls were used.		

1. Information on the study

Data point:	CA 5.4
Report author	Ilyushina N. A. <i>et al.</i>
Report year	2018
Report title	Comparative investigation of genotoxic activities of glyphosate technical products in the micronucleus test in vivo
Document No	Toksikologicheskii Vestnik, (2018) No. 4, pp. 24-28.
Guidelines followed in study	OECD Test Guideline 474
Deviations from current test guideline	Positive control animals were included but the data are not reported. No ratio of PCE to NCE was reported. No evidence of bone marrow exposure Data have been presented per group rather than per animal
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This paper describes the results of three different technical batches of glyphosate tested in a mouse micronucleus test. The study follows the recommendations of OECD 474, with some deficiencies, mostly regarding the reporting of data rather than test methodology. However, the reliability of the reported conclusions are unknown due to a lack of clarity and accuracy of the reported data. Individual animal data and group mean $\pm$ SD frequency of micronucleated (MN) PCE have not been reported. Instead the results per group appear to be presented as the total number of MN PCE found per 40,000 PCE, together with the frequency of MN PCE values, expressed as relative to control, for the group with calculated 95% upper and lower limits (no explanation for how these data were derived is provided). The text describes the vehicle control MN PCE frequencies as ranging between 0.06% and 0.12% (within HCD) but similar detail is not provided for the treated groups. Consequently, there is no indication of animal variability within the groups and it is unknown if any of the treated animals fall outside of HCD. Furthermore, the total number of MN PCE is described as being per 40,000 PCE, however, only 4000 PCE were scored per animal and with 5 animals per group this would result in total of 20,000 PCE per group.

The authors postulate that the positive results observed for technical batch I are likely to be due to the presence of 0.13% formaldehyde in the material, although they provide no data to support their hypothesis.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the source of the 3 glyphosate batches was not revealed although the concentrations of the most important impurities were given for each batch. Although reference was made to OECD test guideline 474 too little detail was given on the conduct of the MN assay to conclude to reliability without restrictions and the data are inadequately reported.

Reliability criteria for *in vivo* toxicology studies

Publication: Ilyushina <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		

Study in accordance to valid internationally accepted testing guidelines	Y	OECD test guideline 474 according to the authors.
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Technical glyphosate from 3 sources with purity of 96.6%, 95.8%, and 95.7%. Sources were not reported but the concentration of impurities (nitroso-glyphosate and formaldehyde) was given.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	CD-1 mouse.
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Oral by gavage.
Dose levels reported	Y	0, 500, 1,000, and 2,000 mg/kg bw twice, twenty-four hours apart.
Positive control	Y	Cyclophosphamide.
Number of animals used per dose level reported	Y	5/dose group.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	Y	Referred to but not presented.
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the source of the 3 glyphosate batches was not revealed although the concentrations of the most important impurities were given for each batch. Although reference was made to OECD test guideline 474 too little detail was given on the conduct of the MN assay to conclude to reliability without restrictions, and the data are inadequately reported.		

1. Information on the study

Data point:	CA 5.4
Report author	Ilyushina N. <i>et al.</i>
Report year	2019
Report title	Maximum tolerated doses and erythropoiesis effects in the mouse bone marrow by 79 pesticides' technical materials assessed with the micronucleus assay
Document No	Toxicology Reports (2019) Vol. 6, 105-110
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Along with 51 other pesticides 4 batches of glyphosate with purities ranging from 95.1 to 98.3% were investigated for their effect on erythropoiesis in mice. To assess the toxicity of glyphosate on the bone marrow the *in vivo* micronucleus test in the mouse according to OECD test guideline 474 was conducted at the limit dose of 2,000 mg/kg bw. No effect of glyphosate on erythropoiesis was found.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the source of the glyphosate batches used was not reported and no suitable positive control was used in the micronucleus test to assess bone marrow toxicity. The test conducted was in compliance with OECD test guideline 474.

Reliability criteria for *in vivo* toxicology studies

Publication: Ilyushina <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	Y	OECD TG 474, <i>in vivo</i> MN assay only used with the purpose to assess toxicity to erythropoiesis in the bone marrow. The positive control used (cyclophosphamide) is not suitable as a positive control for bone marrow toxicity.
Study performed according to GLP	N	Not stated.
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y?	4 batches were tested with purity of 95.7, 98.3, 95.1, and 95.8%. Source was not

		mentioned.
Only glyphosate acid or one of its salts is the tested substance	N	51 other pesticides were tested as well.
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	
Dose levels reported	Y	Only limit dose of 2,000 mg/kg bw was considered.
Number of animals used per dose level reported	Y	At least 5 groups of minimum 5 mice per sex.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y?	Only effect on erythropoiesis was reported.
Statistical methods described	Y	
Historical control data of the laboratory reported	Y	
Dose-effect relationship reported	N	Not possible since only one dose was used.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the source of the glyphosate batches used was not reported and no suitable positive control was used in the micronucleus test to assess bone marrow toxicity. The test conducted was in compliance with OECD test guideline 474.		

1. Information on the study

Data point:	CA 5.6
Report author	Johansson H. K. L. <i>et al.</i>
Report year	2018
Report title	Exposure to a glyphosate-based herbicide formulation, but not glyphosate alone, has only minor effects on adult rat testis
Document No	Reproductive Toxicology (2018) Vol. 82, 25-31
Guidelines followed in study	None
Deviations from current test guideline	NA
Previous evaluation	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effects of glyphosate on intra-testicular testosterone levels, expression of Leydig cell specific genes Cyp11a1, Cyp17a1, Insl3, Hsd3β1 and Star and expression of somatic marker gene Ar or germ cell marker gene Ddx4, expression of Leydig cell-specific steroidogenesis factors CYP11A1 and STAR, testicular histopathology and apoptosis were investigated in male rats treated orally at 0, 2.5 and 25 mg/kg bw/day for 2 weeks. No effects were found on either of the testicular parameters tested suggesting that glyphosate does not contribute to endocrine disrupting effects of the male reproductive system.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because only two dose levels were used to explore the dose-effect relationship for the endpoints assessed.

Reliability criteria for *in vivo* toxicology studies

Publication: Johansson <i>et al.</i> , 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity ≥ 96%. Source: Sigma-Aldrich, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance		Also formulations were tested: Glyfonova 450 Plus, FMC corporation.
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	

Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Oral by gavage.
Dose levels reported	Y	Only 2 dose levels for glyphosate (2.5 and 25 mg/kg bw)
Number of animals used per dose level reported	Y	10 animals/group.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	Only 2 dose levels tested.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because only two dose levels were used to explore the dose-effect relationship for the endpoints assessed.		

1. Information on the study

Data point:	CA 5.4
Report author	Kasuba V. <i>et al.</i>
Report year	2017
Report title	Effects of low doses of glyphosate on DNA damage, cell proliferation and oxidative stress in the HepG2 cell line
Document No	Environ Sci Pollut Res (2017) Vol. 24, 19267–19281
Guidelines followed in study	Not mentioned
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to examine the effects of acute exposure (4 and 24 hours) of human hepatoma HepG2 cells to glyphosate at concentrations equivalent to the systemic concentrations at the ADI, REL and OEL. The endpoints investigated in this study are cell proliferation, DNA damage, MN formation and oxidative stress. A non-statistically significant increase in cell proliferation was seen in the CCK-8 test with no dose-effect relationship. The comet assay showed a statistically significant decrease in tail intensity after 4 hours with no difference from control after 24 hours. In the CBMN cytome assay a non-statistically significant increase in BN MN frequency was seen after 4 hours without a dose-effect relationship. After 24 hours, a decrease instead of an increase in BN MN frequency was reported. The nuclear bud frequency was statistically significantly elevated after 4 hours of exposure but was statistically significantly lower than control after 24 hours of exposure. The indicator tests for oxidative stress did not show a substance related effect.

This publication is considered relevant but reliable with restrictions because the cytogenetic damage found *in vitro* at a systemic concentration corresponding with the ADI (0.5 µg/mL which should have been 0.17 µg/mL) was not confirmed in *in vivo* regulatory MN studies with doses up to 2000 mg/kg bw corresponding with a systemic concentration of about 50 µg/mL.

Reliability criteria for *in vitro* toxicology studies

Publication: Kasuba <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines		
Study performed according to GLP		
Study completely described and conducted following scientifically acceptable standards		
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of ≤100% as Pestanal®. Source: Sigma-Aldrich Laborchemikalien GmbH, Germany.
Only glyphosate acid or one of its salts is the tested substance		As “Pestanal”
AMPA is the tested substance	N	

Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	Culture concentration not in correspondence with ADI of 0.5 mg/kg bw.
Metabolic activation system clearly and completely described	N	HepG2 cells used
Test concentrations in physiologically acceptable range (< 1 mM)	Y	
Cytotoxicity tests reported	N	Very low concentrations used
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	?	No significant effects were observed for the level of ROS and GSH for 4h and 24h incubation, and for 24 h for lipid peroxidation. Elevated levels of cytogenetic damage were found in the CBMN assay and the comet assay results indicate possible cross-linking or DNA adduct formation. These data were obtained at in vitro test concentrations that correspond with an external dose of 0.5 mg/kg bw/day (ADI) whereas there are regulatory studies with no effects at doses up to 2,000 mg/kg bw/day
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant but reliable with restrictions because the cytogenetic damage found in vitro at a systemic concentration corresponding with the ADI (0.5 µg/mL which should have been 0.17 µg/mL) was not confirmed in <i>in vivo</i> regulatory MN studies with doses up to 2000 mg/kg bw corresponding with a systemic concentration of about 50 µg/mL.		

1. Information on the study

Data point:	CA 5.4
Report author	Koller V. J. <i>et al.</i>
Report year	2012
Report title	Cytotoxic and DNA-damaging properties of glyphosate and Roundup in human-derived buccal epithelial cells
Document No	Arch Toxicol (2012) Vol. 86, 805–813
Guidelines followed in study	SCGE assays were performed according to the guidelines described by Tice <i>et al.</i> (2000) and the CBMN Cytome assay according to Fenech (2007). The corresponding Guidance Documents are OECD 489 and OECD 487
Deviations from current test guideline	Cell type (buccal cells)
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of the present study was to find out whether exposure of human-derived buccal epithelial TR146 cells to glyphosate and Roundup causes adverse effects. In cytotoxicity experiments, four different endpoints were used, which reflect different modes of action. To assess the effect of glyphosate and Roundup on DNA stability, single cell gel electrophoresis assays (SCGE) were conducted under standard alkaline conditions reflecting the formation of single- and double-strand breaks. Additionally cytokinesis-block MN cytome assays have been conducted in which different nuclear anomalies were measured. This study demonstrated that there is a big difference in cytotoxicity between glyphosate and Roundup. This is not surprising since the surfactants present in glyphosate formulations decrease the integrity of cell and mitochondrial membranes causing toxicity and ensuing DNA instability. Glyphosate was found to significantly increase tail intensity as of 20 mg/L but without any further increase with dose from 40 to 2000 mg/L. Roundup increased in a dose dependent manner the tail intensity from 20 mg glyphosate eq./L up to 200 mg glyphosate eq./L with increasing cytotoxicity and 0% cell integrity at 200 glyphosate eq. mg/L. This indicates that there is a relationship between the cytotoxicity of Roundup and DNA instability. This study has demonstrated a greater sensitivity of buccal epithelial cells for glyphosate and its formulations than hematopoietic cells where no effects have been noted in *in vivo* MN tests with doses up to 2,000 mg/kg bw. Since there is no direct exposure of the buccal epithelium with the Roundup formulation (unless it is swallowed) during application and the inhalation of aerosol of the spray dilution during application is negligible (Jauhiainen A *et al.* (1991) Am. Ind. Hyg. Assoc. J. 52, 61–64) the likelihood of DNA damage in epithelial cells of the GI and the respiratory tract remains very low.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with most of the reliability criteria of an *in vitro* toxicology study.

Reliability criteria for *in vitro* toxicology studies

Publication: Koller <i>et al.</i> , 2012.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	

Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 95%. Source: Monsanto Europe S.A.
Only glyphosate acid or one of its salts is the tested substance	Y	Also formulation (Roundup Ultra Max) was tested
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	10-1000 µg/mL
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	Roundup, but not glyphosate causes pronounced cytotoxic effects in human-derived buccal epithelial cells. The alkaline comet test results show that glyphosate as well as Roundup induce comet formation that reflect strand breaks and apurinic sites. 20 µg/mL glyphosate in Roundup caused a 3-fold increase over the background, with glyphosate alone a weaker effect was seen.
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with most of the reliability criteria of an <i>in vitro</i> toxicology study.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Kongtip P. <i>et al.</i>
Report year	2017
Report title	Glyphosate and Paraquat in Maternal and Fetal Serums in Thai Women
Document No	Journal of Agromedicine 2017, vol. 22 no. 3, 282-289
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study suggests that agricultural activities increase maternal serum levels of glyphosate, even in samples taken on the day of birth. Living near farmland where pesticides are sprayed can also significantly increase the risk of serum levels >LOD at birth. Limitations of this study include a small sample size (N=82) and large percentages of maternal samples cord serum that were at or below the LOD for glyphosate (46.3% and 50.7%, respectively).

This publication is considered relevant to the risk assessment of glyphosate but reliable with restrictions because the analytical method used for glyphosate could have been described in more detail.

Reliability criteria of exposure studies

Publication: Kongtip <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.	NA	Subjects of a pilot birth cohort being monitored for glyphosate and paraquat.
Exposure to formulations with glyphosate combined with other a.i.	NA	
Exposure to various formulations of pesticides	NA	
Study		
Study design clearly described	Y	
Population investigated sufficiently described	Y	

Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	Analytical method for glyphosate could be described in more detail (derivatization).
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant to the risk assessment of glyphosate but reliable with restrictions because the analytical method used for glyphosate could have been described in more detail.		

1. Information on the study

Data point:	CA 5.3
Report author	Kumar S. <i>et al.</i>
Report year	2014
Report title	Glyphosate-rich air samples induce IL-33, TSLP and generate IL-13 dependent airway inflammation
Document No	Toxicology 325 (2014) 42-51
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study evaluated nose-only exposure to glyphosate and collected farm samples containing glyphosate and evaluated the immune response in the lungs. This is not a guideline study nor an endpoint used in risk assessment. This study is not usable for risk assessment in terms of hazard assessment. In terms of exposure, the study determined that average amount of glyphosate per filter from environmental samples after spray application to fields was 17.33 µg, which correspond to average airborne concentration of 22.59 ng/m³. The method for the collection and analysis of the air samples was not validated and the assumptions and calculations used in the determination of the average airborne concentration were not provided, therefore the results cannot be verified. While the study itself is acceptable, it is unreliable in terms of usable endpoints for risk assessment.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the method for the collection and analysis of the air samples was not validated.

Reliability criteria for *in vivo* toxicology studies

Publication: Kumar <i>et al.</i> , 2014.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity is reagent grade. Source: Sigma - Aldrich, St. Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	N	Sampling of aerosols from field spraying also contain co-formulants of the GBH applied.

AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	Female mice of wild type and IL-13/-BALB/c background.
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Intranasal application of air samples taken during glyphosate field application (24 hours) and glyphosate.
Dose levels reported	Y	Field air sample and 100 ng, 1 µg or 100 µg of glyphosate delivered intranasally.
Number of animals used per dose level reported	Y	
Method of analysis described for analysis test media	Y	Glyphosate measured in air sample with ELISA kit.
Positive control	Y	Ovalbumin.
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	For glyphosate.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the method for the collection and analysis of the air samples was not validated.		

1. Information on the study

Data point:	CA 5.4
Report author	Kwiatkowska M. <i>et al.</i>
Report year	2017
Report title	DNA damage and methylation induced by glyphosate in human peripheral blood mononuclear cells (in vitro study)
Document No	Food and Chemical Toxicology (2017) Vol. 105, 93-98
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

It was the objective of this study to investigate the effect of high glyphosate concentrations on DNA integrity and DNA methylation in PBMCs *in vitro*. It was demonstrated that glyphosate increased statistically significantly DNA damage (single and double strand-breaks and alkali-labile sites formation) from 0.5 mM up to 10 mM. Repair of the DNA lesions was significant at all concentrations tested after 120 minutes of recovery. The percentage of the global DNA methylation level was statistically significantly decreased by glyphosate at 0.25 mM but not at 0.5 mM. On the contrary, p53 promoter region methylation was statistically significantly increased as compared to control cells at 0.25 and 0.5 mM.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the lowest concentration at which DNA damage was observed (0.5 mM) is higher than the blood concentrations in rats (0.3 mM) obtained after dosing at the limit dose of 2000 mg/kg bw where no MN effects were seen.

Reliability criteria for *in vitro* toxicology studies

Publication: Kwiatkowska <i>et al.</i> , 2017.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 95%. Source: Sigma-Aldrich, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	Salt not mentioned
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described		
Test concentrations in physiologically acceptable range (< 1	Y/N	0.25 to 10 mM

mM)		
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	For DNA damage. The concentration at which DNA damage was observed is higher than the blood concentrations in rats obtained after dosing at the limit dose of 2000 mg/kg bw for the detection of MN in vivo. The results obtained are not corroborated by regulatory in vivo genotoxicity studies.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the lowest concentration at which DNA damage was observed (0.5 mM) is higher than the blood concentrations in rats (0.3 mM) obtained after dosing at the limit dose of 2000 mg/kg bw where no MN effects were seen.		

1. Information on the study

Data point:	CA 5.8.1
Report author	Kwiatkowska M. <i>et al.</i>
Report year	2020
Report title	Evaluation of apoptotic potential of glyphosate metabolites and impurities in human peripheral blood mononuclear cells (<i>in vitro</i> study)
Document No	Food and chemical toxicology (2020) Vol. 135, pp. 110888
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (Research conducted in an academic laboratory)
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study describes in-vitro investigations of glyphosate, its metabolites (AMPA and methylphosphonic acid) and impurities (PMIDA, N-methylglyphosate, hydroxymethylphosphonic acid, and bis-(phosphonomethyl)amine) on six intermediate endpoints of apoptosis (membrane permeability, cytosolic calcium concentration, mitochondrial transmembrane potential, caspase activity, chromatin condensation, and ROS quantitation by two methods) in human peripheral blood mononuclear cells. The reason for selection of this model is not stated but is possibly as potential target tissue for Non-Hodgkins Lymphoma. The methodologies used are frequently reported in literature but are not a standardized or validated method by GLP standards; there is no OECD guideline. Positive control results are not presented and it is unclear if positive controls were used for all assays; wording is sufficiently poor that it may be inferred that some positive controls were used, e.g. nigericin and valinomycin in the studies of mitochondrial transmembrane potential, campothecin in the caspase assays, although these may alternatively be reagents for the assay. It is unclear if assays were conducted in duplicate or triplicate (the stated term was “trice” which may be either twice or thrice), which may then also influence statistical evaluation. However, the methodology appears basically sound.

Apoptotic or pre-apoptotic activity was seen generally consistently across the assays. While glyphosate, its metabolites, and impurities were seen to increase apoptotic endpoints in these assays (0.5 mM and higher), clear effects occurred only at high concentrations.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no proper cytotoxicity tests were performed, no positive controls were used and the concentration range at which most of the effects were observed is beyond the acceptable physiological range (> 1 mM). The concentration range at which the glyphosate impurities were tested is the same as that for glyphosate which is not a realistic approach for risk assessment of impurities.

Reliability criteria for *in vitro* toxicology studies

Publication: Kwiatkowska <i>et al.</i> , 2020	Criteria met? Y/N/?	Comments
Guideline-specific		

Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity (95%). Source: Sigma-Aldrich, USA.
Only glyphosate acid or one of its salts is the tested substance	N	Also glyphosate impurities were tested.
AMPA is the tested substance	Y	
Study		
Test system clearly and completely described	Y	PBMCs
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Partly	0.01, 0.05, 0.25, 0.5, 5, 10 mM
Cytotoxicity tests reported	?	
Positive and negative controls	N	No positive controls.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no proper cytotoxicity tests were performed, no positive controls were used and the concentration range at which most of the effects were observed is beyond the acceptable physiological range (> 1 mM). The concentration range at which the glyphosate impurities were tested is the same as that for glyphosate which is not a realistic approach for risk assessment of impurities.		

1. Information on the study

Data point:	CA 5.4
Report author	Mañas F. <i>et al.</i>
Report year	2013
Report title	Oxidative stress and comet assay in tissues of mice administered glyphosate and AMPA in drinking water for 14 days
Document No	Journal of Basic & Applied Genetics (2013) Vol. 24(2), Article 7 - research
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to investigate the effect of glyphosate and AMPA on indicators of oxidative stress and DNA integrity in mice after oral exposure for 14 days via the drinking water. The results of this study indicate that no statistically significant differences have been found in liver, kidney, lung and heart for all oxidative stress parameters measured with the exception of a decrease in SOD activity in the heart and an increase in CAT activity in the kidney at a daily glyphosate dose of 400 mg/kg bw. There was an increase in CAT activity in the lung but this was not statistically significant and didn't show a dose-effect relationship. A statistically significant increase in DNA damage parameters was observed for glyphosate and AMPA with the exception of tail intensity in the liver for glyphosate at 40 mg/kg bw/day. No clear dose-effect relationship was evident for DNA damage parameters in blood after treatment with glyphosate. A dose-effect relationship was present for tail length and tail moment in the liver.

This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because the increased DNA damage seen (only 2 dose levels tested for glyphosate with too few animals) didn't show a dose-effect relationship in blood and occurred at dose levels (40 and 400 mg/kg bw/day) that are much lower than the 2000 mg/kg bw used in regulatory *in vivo* MN tests in the mouse with negative results.

Reliability criteria for *in vivo* toxicology studies

Publication: Manas et al., 2013	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	2 dose groups for glyphosate, one dose group for AMPA
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	Very old determination methods applied
Test substance		
Test material (Glyphosate) is sufficiently documented and	Y	Purity of 96%.

reported (i.e. purity, source, content, storage conditions)		Source: Sigma-Aldrich, Argentina.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	Y	Purity of 99%. Source: Sigma-Aldrich, Argentina.
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Exposure via drinking water
Dose levels reported	Y	
Number of animals used per dose level reported	Y	
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported		Only 2 dose levels used. DNA damage (comet) at 40 and 400 mg/kg bw/day (no dose-effect relationship) not confirmed by regulatory genotoxicity (MN) studies up to 2000 mg/kg bw/day
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because the increased DNA damage seen (only 2 dose levels tested for glyphosate with too few animals) didn't show a dose-effect relationship in blood and occurred at dose levels (40 and 400 mg/kg bw/day) that are much lower than the 2000 mg/kg bw used in regulatory in vivo MN tests in the mouse with negative results.		

1. Information on the study

Data point:	CA 5.6
Report author	Manservisi F. <i>et al.</i>
Report year	2019
Report title	The Ramazzini Institute 13-week pilot study glyphosate-based herbicides administered at human-equivalent dose to Sprague Dawley rats: effects on development and endocrine system
Document No	Environmental Health (2019) Vol.18, 15
Guidelines followed in study	Pilot study based on OECD test guideline 443: Extended one-generation reproductive toxicity study.
Deviations from current test guideline	Yes, only one dose level for each test item and insufficient number of animals per dose level used.
GLP/Officially recognised testing facilities	No, no GLP statement delivered.
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this pilot study the effect of glyphosate and its reference formulation Roundup Bioflow (MON 52276) at a dose of 1.75 mg glyphosate acid eq./kg bw/day on endocrine modulation was investigated in female rats during pregnancy and lactation and in male and female rats during lactation, the peripubertal period and adulthood. The endpoints explored were body weight, water and food consumption, gestational parameters, litter parameters, landmarks of sexual development, estrous cyclicity, gross and histopathology of reproductive and endocrine tissues, sperm parameters and serum and plasma hormone levels. MON 52276 exposure was associated with statistically significant increase of ano-genital distance in males and females, a delay of first estrous and increased serum testosterone in females and altered testosterone metabolism in both males and females. MON 52276 elicited more pronounced effects than glyphosate, which only increased statistically significantly anogenital distance during the peripubertal period. The statistically significant increase in TSH levels in glyphosate and MON 52276 treated rats was not associated with histopathological changes in the thyroid and thus of minor toxicological significance. The effect of glyphosate on ano-genital distance is not corroborated by a regulatory reproductive toxicology study where rats were exposed to much higher doses of glyphosate (> 1,000 mg/kg bw/day).

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because of the limited number of animals used per dose level and only one dose level was tested.

Reliability criteria for *in vivo* toxicology studies

Publication: Manservisi <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Pilot study based on OECD test guideline 443 but with deviations.
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and	Y	Purity of > 99.5% as

reported (i.e. purity, source, content, storage conditions)		Pestanal™ . Source: Sigma-Aldrich, Milan, Italy.
Only glyphosate acid or one of its salts is the tested substance	N	Also representative formulated product tested. Roundup Bioflow (MON 52276, containing 360 g/L of glyphosate acid in the form of 480 g/L isopropylamine salt of glyphosate (41.5%), water (42.5%) and surfactant (16%)). Source: Consorzio Agrario dell'Emilia, Bologna, Italy.
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Oral via the drinking water.
Dose levels reported	Y	1.75 mg glyphosate acid eq./bw/day.
Number of animals used per dose level reported	Y	Dams: 8/group. Offspring: 8 M + 8F/group (6-week cohort); 10 M + 10F/group (13-week cohort).
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	Not possible, only comparison between glyphosate and MON 52276.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered as relevant for the risk assessment of glyphosate but reliable with restrictions because of the limited number of animals used per dose level and only one dose level was tested.		

1. Information on the study

Data point:	CA 5.7
Report author	Martínez M. et al.
Report year	2018
Report title	Neurotransmitter changes in rat brain regions following glyphosate exposure
Document No	Environmental Research 161 (2018) 212 - 219
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Although the study concludes “loss of 5-HT, DA and NE levels in the CNS”, no historical controls are available to assess and compare the changes in the treatment-groups to ascertain if the effects are within background or if they are biologically relevant.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because there was historical control to determine if changes in the levels of neurotransmitters were within historical controls. No positive control included either. Also no analytical verification of dose levels.

Reliability criteria for *in vivo* toxicology studies

Publication: Martínez M. <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Non-guideline
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Technical glyphosate purity of ≥98%. Source: Sigma-Aldrich. No information on storage,
Only glyphosate acid or one of its salts is the tested substance	Y	Yes
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	Wistar rat (male)
Test conditions clearly and completely described	Y	Yes
Route and mode of administration described	Y	Oral by gavage.
Dose levels reported	Y	35, 75, 150, 800 mg/kg bw/day for 6 days

Positive control	N	-
Number of animals used per dose level reported	Y	6/dose group.
Method of analysis described for analysis test media	N	-
Validation of the analytical method	N	-
Analytical verifications of test media	N	-
Complete reporting of effects observed	N	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	No historical control data for comparison, no analytical verification of dose or stability.
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because there was historical control to determine if changes in the levels of neurotransmitters were within historical controls. No positive control was included. Also no analytical verification of dose levels.		

1. Information on the study

Data point:	CA 5.7
Report author	Martinez A. <i>et al.</i>
Report year	2019
Report title	Effects of glyphosate and aminomethylphosphonic acid on an isogenic model of the human blood-brain barrier.
Document No	Toxicology Letters (2019) Vol. 304, 39-49.
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effect of glyphosate, AMPA and glycine was investigated on the integrity of the blood-brain barrier *in vitro* using an induced pluripotent stem cell line differentiated into brain microvascular endothelial cells (BMEC) and neurons. The endpoints investigated were BMEC cell viability, fluorescein permeability in BMEC cell monolayers, tight junction complexes integrity, diffusion across the blood-brain barrier, modulation of glucose uptake in BMECs, barrier function of neurons co-cultured with BMECs, neurovascular coupling, differentiation of neuron progenitor cells and neurites density. The results of this study indicate that glyphosate or AMPA unlikely present toxicity towards the blood-brain barrier, glyphosate and AMPA at 1 and 10 μM may increase the barrier permeability in BMECs monolayers, glyphosate may increase paracellular permeability in BMECs monolayers to fluorescein via partial disruption of tight junction complexes integrity, exposure to high levels of glycine or AMPA (100 μM) may impair glucose uptake and metabolism in BMEC monolayers via an alteration in GLUT1 expression and/or activity, exposure to high concentrations of glyphosate (100 μM) may impair neurovascular coupling, chronic exposure to low levels (0.1 μM) of glyphosate or AMPA failed to show any signs of neurotoxicity and that low concentrations (< 10 μM) of glyphosate and AMPA may not have detrimental effects on iPSC-derived neurons.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not sufficiently characterized and no positive controls were used in any of the assays conducted.

Reliability criteria for *in vitro* toxicology studies

Publication: Martinez <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of glyphosate and AMPA not reported. Source: Sigma-Aldrich, St. Louis, USA.

Only glyphosate acid or one of its salts is the tested substance	N	Also glycine and AMPA tested.
AMPA is the tested substance	Y	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Concentration range <i>in vitro</i> from 0.1 to 1000 µM for some tests.
Cytotoxicity tests reported	Y	
Biochemical methods described	Y	Some could be better documented.
Analytical method described	Y	The method for the analysis of glyphosate.
Positive and negative controls	N	No positive controls were used.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	For some tests
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not sufficiently characterized and no positive controls were used in any of the assays conducted.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	McGuire M. K. <i>et al.</i>
Report year	2016
Report title	Glyphosate and aminomethylphosphonic acid are not detectable in human milk
Document No	The American journal of clinical nutrition, (2016) Vol. 103, No. 5, pp. 1285-90.
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study breast milk and urine samples from lactating women were analyzed for glyphosate and AMPA. The results provide evidence that the concentrations of glyphosate and AMPA in milk produced by healthy women are below the detection limits of available validated analytical assays. In urine, glyphosate and AMPA were detectable in many samples, but the concentrations were very low and well below the values reported in other healthy adult populations.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with all the reliability criteria of an exposure study.

Reliability criteria for exposure studies

Publication: McGuire <i>et al.</i> , 2016	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.		
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Reference material (glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	
Exposure to formulations with only glyphosate as a.i.		
Exposure to formulations with glyphosate combined with other a.i.		
Exposure to various formulations of pesticides	Y	Exposure mainly via food
Study		
Study design clearly described	Y	Monitoring of glyphosate in urine and breast milk of lactating women
Population investigated sufficiently described	Y	

Publication: McGuire <i>et al.</i> , 2016	Criteria met? Y/N/?	Comments
Guideline-specific		
Exposure circumstances sufficiently described	Y	
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Overall assessment		
Reliable	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with all the reliability criteria of an exposure study.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Mesnage R. <i>et al.</i>
Report year	2017
Report title	Evaluation of estrogen receptor alpha activation by glyphosate-based herbicide constituents
Document No	Food and Chemical Toxicology (2017) Vol. 108, 30-42
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to evaluate the possible estrogenicity of glyphosate and glyphosate-based formulations and their adjuvants. The tests performed were the E-screen using different cell lines, the ERE-luciferase reporter gene assay, microarray gene expression profiling and RNA-sequencing gene expression profiling. An increase in cell proliferation was observed in human breast cancer cells (MCF-7) at 10,000 µg/L and reached a maximum response at 1,000,000 µg/L. Similar but less pronounced results were observed with the T47D cell line. Glyphosate stimulated ERE-mediated transcription of the luciferase reporter gene starting at a concentration of 1,000 µg/L. The analysis of gene ontology confirms that genes having their expression altered by treatment of MCF-7 cells with glyphosate were involved in cell cycle regulation, stimulation by steroid hormones and cell death through apoptosis. ONIOM binding energy assessment strongly implies that the binding of glyphosate at the active site of the estrogen receptor is weak and unstable, suggesting that glyphosate is unlikely to bind to ERα.

This study has demonstrated that glyphosate activates ERα through a ligand-independent pathway only at high concentrations that are not encountered at typical exposure levels. This publication is considered relevant for glyphosate risk assessment and reliable without restrictions.

Reliability criteria for *in vitro* toxicology studies

Publication: Mesnage <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 98.0%. Source: Sigma-Aldrich (UK).
Only glyphosate acid or one of its salts is the tested substance	Y	Also glyphosate based formulations and surfactants were tested.
AMPA is the tested substance	N	
Study		

Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This study has demonstrated that glyphosate activates ER α through a ligand-independent pathway only at high concentrations that are not encountered at typical exposure levels. This publication is considered relevant for glyphosate risk assessment and reliable without restrictions.		

1. Information on the study

Data point:	CA 5.3
Report author	Mesnage R. <i>et al</i>
Report year	2018
Report title	Comparison of transcriptome responses to glyphosate, isoxaflutole, quizalofop-p-ethyl and mesotrione in the HepaRG cell line
Document No	Toxicology Reports (2018) Vol. 5, 819–826
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Together with 3 other herbicide active ingredients (quizalofop-p-ethyl, isoxaflutole and mesotrione) the effect of glyphosate on the transcriptome and metabolome profile of differentiated HepaRG cells was investigated at 0.06, 6 and 600 μM . Glyphosate was found to be only weakly toxic inducing little change in transcriptome profiles when compared with the other herbicides tested. A follow-up metabolomics analysis of HepaRG cells exposed to glyphosate at 0.06 μM revealed a significant decrease in the levels of long chain fatty acids (LCFAs) and polyunsaturated fatty acids (PUFAs). At the higher glyphosate concentrations of 6 and 600 μM , lower lipid levels were also observed but these did not reach statistical significance. It is not clear, however, how these findings from an *in vitro* tissue culture model can be translated to effects *in vivo*.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no positive control was used and no cytotoxicity tests were performed to optimise the concentration range to be explored.

Reliability criteria for *in vitro* toxicology studies

Publication: Mesnage <i>et al.</i> , 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate (purity $\geq$ 96%). Source: Sigma-Aldrich, Gillingham, Dorset, UK.
Only glyphosate acid or one of its salts is the tested substance	N	Also three other pesticide active ingredients were tested (quizalofop-p-ethyl, isoxaflutole and

		mesotrione).
AMPA is the tested substance	N	
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.06, 6 and 600 µM.
Cytotoxicity tests reported	N	
Transcriptomics and metabolomics methods described	Y	
Positive and negative controls	N	No positive controls included.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no positive control was used and no cytotoxicity tests were performed to optimise the concentration range to be explored.		

1. Information on the study

Data point:	5.8.2/016
Report author	Mesnager, R. <i>et al.</i>
Report year	2018
Report title	Ignoring Adjuvant Toxicity Falsifies the Safety Profile of Commercial Pesticides
Document No	doi.org/10.3389/fpubh.2017.00361
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This review article is presenting information on unverified effects of a small subset of co-formulants in some Glyphosate-based formulations, with an emphasis on POEA. This co-formulant is a surfactant banned in the EU glyphosate-based products.

Literature review section reaffirms low toxicity of the active ingredient compared with formulated products. No new data presented.

1. Information on the study

Data point:	CA 5.3
Report author	Milic M. <i>et al.</i>
Report year	2018
Report title	Oxidative stress, cholinesterase activity, and DNA damage in the liver, whole blood, and plasma of Wistar rats following a 28-day exposure to glyphosate
Document No	Arh Hig Rada Toksikol (2018) Vol. 69, 154-168
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Glyphosate was orally administered to male rats at 0.1, 0.5, 1.75 and 10 mg/kg bw for 28 days to investigate its effect on DNA damage, oxidative stress and cholinesterase activity. The endpoints of this study were DNA damage as measured in the alkaline comet assay, ROS in plasma and liver, lipid peroxidation in plasma and liver, GSH in plasma and liver, GSH-Px activity in whole blood and liver and total cholinesterase, acetyl cholinesterase and butyl cholinesterase activity in plasma. The results of the alkaline comet assays revealed a statistically significant increase in tail length and tail intensity in leucocytes and small and medium sized liver nuclei. With the exception of tail length of small sized liver nuclei no dose effect relationship was evident. Tail intensity of the leucocytes could not be assessed because of the very high variability of the results. From the results of the oxidative stress markers in plasma and liver and cholinesterase activity in plasma it can be concluded that there was no dose related effect.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because of the high variability of the results of the comet assay, although the conduct of this assay was in general compliant with OECD test guideline 489.

Reliability criteria for *in vivo* toxicology studies

Publication: Milic <i>et al.</i> , 2018.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	Y	<i>In vivo</i> Comet assay was compliant with OECD TG 489.
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of ≤ 100 %). Source: PESTANAL®, a registered trademark of Sigma-Aldrich Laborchemikalien

		GmbH, Germany
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Oral by gavage.
Dose levels reported	Y	0.1, 0.5, 1.75 and 10 mg/kg bw/day, positive and negative control included.
Number of animals used per dose level reported	Y	5 males per dose group.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	Limited to body weight, organ weight, DNA damage, oxidative stress and ChE activity.
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because of the high variability of the results of the comet assay, although the conduct of this assay was in general compliant with OECD test guideline 489.		

1. Information on the study

Data point:	CA 5.4
Report author	Nagy K. <i>et al.</i>
Report year	2019
Report title	Comparative cyto- and genotoxicity assessment of glyphosate and glyphosate-based herbicides in human peripheral white blood cells
Document No	Environmental Health (2018) Vol. 17, pp. 52/1-52/13
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This paper describes a well conducted comet assay using human lymphocytes as the test system to examine the genotoxicity and cytotoxicity of glyphosate and 3 commercial products containing glyphosate. No DNA damage was induced by analytical grade glyphosate. The 3 glyphosate products induced an increase in tail intensity in the comet assay only at highly cytotoxic concentrations, non-toxic concentrations induced no DNA damage.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized and no positive control was used.

Reliability criteria for *in vitro* toxicology studies

Publication: Nagy <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity, content and storage conditions are not reported. Source: VWR International Kft, Debrecen, Hungary.
Only glyphosate acid or one of its salts is the tested substance	N	Also 3 GBH tested: Roundup Mega, Fozat 480, Glyfos.
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Human mononuclear white blood cells.
Test conditions clearly and completely described	Y	Comet selection criteria were not stated. It is not stated if the

		slides were coded prior to scoring
Metabolic activation system clearly and completely described	Y	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	1, 10, 100, 250, 500, 750 and 1000 µM.
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive control.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	No HCD so it is unknown what degree of background variation is apparent in this test system. This is exacerbated by the use of a single set of control cultures
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized and no positive control was used.		

1. Information on the study

Data point:	CA 5.5
Report author	Pahwa M. <i>et al.</i>
Report year	2019
Report title	Glyphosate use and associations with non-Hodgkin lymphoma major histological sub-types: findings from the North American Pooled Project
Document No	Scandinavian Journal of Work, Environment & Health. 2019;45(6):600–609
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Not applicable for epidemiologic studies
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The main advantage of this pooled analysis compared with the previously published individual studies was to enable a more comprehensive analysis for glyphosate with regard to confounding factors and proxy respondents. In general, adjusting for use of 2,4-D, dicamba, and malathion reduced ORs for glyphosate. Analyses that excluded proxy respondents were generally similar to analyses that included them, though there were some instances, specifically for other NHL subtypes, where excluding proxies appreciably reduced the adjusted OR.

Left unaddressed in this pooled analysis is the intractable issue of case-recall bias in case control studies. Crump has shown in an analysis of all the case control studies that have reported ORs for glyphosate, including the studies in this pooled analysis, that results for all pesticides were markedly skewed toward positive associations (Crump K, Risk Analysis DOI: 10.1111/risa.13440). Crump noted particularly that the ORs for individual pesticides in the McDuffie et al. study (and 2 other studies not included in this pooled analysis) were nearly all greater than 1.0. He considered this evidence of case recall bias. Fundamentally, using self-reported exposure recollections from cases and controls violates the basic principle that data should be collected under equivalent circumstances for the groups to be compared (*viz.*, cases and controls). That is impossible when pesticide recall is likely to be affected by their grievous illness for cases and not for controls. Accordingly, while this pooled analysis is an advance in understanding confounding by other pesticides and in assessing the impact of reporting by proxies (except in analysis where 50% of the subjects were excluded due to data limitations) in the 2 included studies, systematic error related to case recall bias remains an outstanding issue for interpreting the results for glyphosate.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because it concerns a pooled case control study which is subject to recall and selection bias. Notably, potential case-recall bias remains an unresolved issue in this pooled reanalysis.

Reliability Criteria: Epidemiology studies

Publication: Pahwa M. <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Study Design		

Publication: Pahwa M. <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Adequate study design given study objectives	Yes	Pooled reanalysis of 2 previously published studies.
Appropriate study population to address potential glyphosate-related health outcomes	Uncertain	Populations had very limited glyphosate exposure frequency.
Exposure studied		
Exposure to formulations with glyphosate as a.i.	Yes	
Exposure to formulations with other a.i.	Yes	
Exposure to other farm exposures	Uncertain	
Study Conduct/analysis		
Adequate description of study population	Yes	
Adequate description of exposure circumstances	Yes	
Comparable participation by groups being compared	No	Much less participation by controls: example: McDuffie study – participation 67% for cases, 48% for controls.
Information provided by proxy respondents	Yes, substantial	31% for cases, 40% for controls in DeRoos study; 21% for cases, 15% for controls McDuffie study (per Chang & Delzell 2016)
Adequate statistical analysis	Yes	More comprehensive than the original publications regarding confounding & proxy responses. Data for 47% of subjects were missing for analyses by days of use per year and lifetime cumulative days of use.
Adequate consideration of personal confounding factors	Yes	Better than original studies.

Publication: Pahwa M. <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Adequate consideration of potentially confounding exposures	Yes	Better than original studies
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Yes	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because illustrates bias toward positive findings for glyphosate in the original publications due to confounding and, in part, due to proxy responses. Recall bias unresolved. Missing data for 47% of subjects for analyses by days/year of use and lifetime cumulative days of use hinders interpretation of related results.		

1. Information on the study

Data point:	CA 5.6
Report author	Panzacchi S. <i>et al.</i>
Report year	2018
Report title	The Ramazzini Institute 13-week study on glyphosate-based herbicides at human equivalent dose in Sprague Dawley rats: study design and first in-life endpoints evaluation
Document No	Environmental Health (2018) Vol. 17, 52
Guidelines followed in study	Based on the National Toxicology Program's (NTP) Modified One-Generation Reproduction Study 2011.
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Yes, conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the general toxicity of glyphosate was compared against that of its reference formulation MON 52276 in pregnant rats and their progeny. Also the urinary excretion of glyphosate and AMPA was investigated. The test compounds were administered via the drinking water resulting in a daily dose of 1.75 mg glyphosate acid eq./ kg bw. The endpoints investigated were mortality, body weight, water and food consumption, and clinical signs in dams and offspring and litter data. There was no mortality and no statistically significant differences were observed among control, glyphosate, and MON 52276 groups in any of the endpoints investigated. Urinary concentrations of glyphosate and AMPA of rats treated with glyphosate at 1.75 mg/kg bw/day were comparable to those observed in rats treated with MON 52276 at 1.75 mg glyphosate acid eq. /kg bw/day. This indicates that the co-formulants in this glyphosate formulation have little influence on the oral bioavailability of glyphosate. In the treated rats, the majority of glyphosate was excreted in urine unchanged at levels of about 100-fold higher than that of AMPA and the mean urinary concentration of glyphosate increased with the duration of treatment.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because only one dose level for glyphosate and MON 52276 was considered, only 8 animals were used per dose and per sex and the method of analysis of glyphosate and AMPA in urine and its validation were not fully reported.

Reliability criteria for *in vivo* toxicology studies

Publication: Panzacchi <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Only a part of the reproductive toxicology study was reported, one dose level of glyphosate or MON 52276 was considered and 8 females per dose group were used.
Study performed according to GLP	N	
Study completely described and conducted following	Y	For the part that was

scientifically acceptable standards		reported.
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate (purity of > 99,5%), Pestanal™ analytical standard purchased from Sigma-Aldrich (Milan, Italy).
Only glyphosate acid or one of its salts is the tested substance	N	The representative formulated product, Roundup Bioflow (MON 52276, containing 360 g/L of glyphosate acid in the form of 480 g/L isopropylamine salt of glyphosate (41.5%), water (42.5%) and surfactant (16%) was purchased from Consorzio Agrario dell'Emilia, Bologna, Italy.
AMPA is the tested substance	Y	Determined in urine of rats treated with glyphosate and MON 52276.
Study		
Test species clearly and completely described	Y	Male and female SD rats.
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Oral via drinking water.
Dose levels reported	Y	1.75 mg glyphosate acid eq./kg bw/day administered as glyphosate and as MON 52276.
Number of animals used per dose level reported	Y	8 virgin female SD rats per dose group.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Method of analysis described for analysis of urine	N	No details on the conduct of the method of analysis and no complete validation data set.
Complete reporting of effects observed	Y	Limited to body weight,
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	N	Not possible with one dose level of each test item.

Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because only one dose level for glyphosate and MON 52276 was considered, only 8 animals were used per dose and per sex and the method of analysis of glyphosate and AMPA in urine and its validation were not fully reported.		

1. Information on the study

Data point:	CA 5.6
Report author	Perego M.C. <i>et al.</i>
Report year	2017
Report title	Evidence for direct effects of glyphosate on ovarian function: glyphosate influences steroidogenesis and proliferation of bovine granulosa but not theca cells <i>in vitro</i>
Document No	J. Appl. Toxicol. 2017; 37: 692–698
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restriction

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this *in vitro* study, glyphosate had minimal effects on granulosa cells (GC). In the presence of FSH only, glyphosate had no effect on GC cell viability or on progesterone or estradiol production. In the presence of FSH and IGF1, glyphosate reduced GC proliferation without a dose-response at 0.5 and 5 µg ml⁻¹ but not at lower test concentrations (0.01 and 0.3 µg ml⁻¹) and did not affect progesterone production or CYP19A1 and CYP11A1 mRNA expression; estradiol production was reduced at 5 µg ml⁻¹ only (not at lower test concentrations). Without FSH or IGF1, 1.7 µg ml⁻¹ of glyphosate slightly increased GC proliferation in response to serum (≤11%).

Glyphosate at 5 µg ml⁻¹ had no effect on the theca cell (TC) proliferation or the production of progesterone or androstenedione.

Overall, with the exception of slight, non-dose-related alterations in GC proliferation under different test conditions, this study showed no effects of glyphosate on GC at physiologically relevant test concentrations. Glyphosate had no effect on TH.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were used and the tests were conducted with only one or 2 test concentrations of glyphosate.

Reliability criteria for *in vitro* toxicology studies

Publication: Perego <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		

Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Sigma Aldrich.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Test system clearly and completely described	Y	Bovine granulosa and theca cells.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y (partly)	0, 0.5, 5, or 0, 10, 300 µg/mL (1.77 mM), or 0, 5 µg/mL.
Cytotoxicity tests reported	Y?	Viability tested at only one concentration of glyphosate.
Biochemical methods described	Y?	Some could be more detailed.
Positive and negative controls	N	No positive controls.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	Limited since max. 2 test concentrations.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were used and the tests were conducted with only one or 2 test concentrations of glyphosate.		

1. Information on the study

Data point:	CA 5.6
Report author	Perego M.C. <i>et al.</i>
Report year	2017
Report title	Evidence for direct effects of glyphosate on ovarian function: glyphosate influences steroidogenesis and proliferation of bovine granulosa but not theca cells <i>in vitro</i>
Document No	J. Appl. Toxicol. 2017; 37: 692–698
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restriction

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this *in vitro* study, glyphosate had minimal effects on granulosa cells (GC). In the presence of FSH only, glyphosate had no effect on GC cell viability or on progesterone or estradiol production. In the presence of FSH and IGF1, glyphosate reduced GC proliferation without a dose-response at 0.5 and 5 µg ml⁻¹ but not at lower test concentrations (0.01 and 0.3 µg ml⁻¹) and did not affect progesterone production or CYP19A1 and CYP11A1 mRNA expression; estradiol production was reduced at 5 µg ml⁻¹ only (not at lower test concentrations). Without FSH or IGF1, 1.7 µg ml⁻¹ of glyphosate slightly increased GC proliferation in response to serum (≤11%).

Glyphosate at 5 µg ml⁻¹ had no effect on the theca cell (TC) proliferation or the production of progesterone or androstenedione.

Overall, with the exception of slight, non-dose-related alterations in GC proliferation under different test conditions, this study showed no effects of glyphosate on GC at physiologically relevant test concentrations. Glyphosate had no effect on TH.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were used and the tests were conducted with only one or 2 test concentrations of glyphosate.

Reliability criteria for *in vitro* toxicology studies

Publication: Perego <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		

Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Sigma Aldrich.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Test system clearly and completely described	Y	Bovine granulosa and theca cells.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y (partly)	0, 0.5, 5, or 0, 10, 300 µg/mL (1.77 mM), or 0, 5 µg/mL.
Cytotoxicity tests reported	Y?	Viability tested at only one concentration of glyphosate.
Biochemical methods described	Y?	Some could be more detailed.
Positive and negative controls	N	No positive controls.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	Limited since max. 2 test concentrations.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized, no positive controls were used and the tests were conducted with only one or 2 test concentrations of glyphosate.		

1. Information on the study

Data point:	CA 5.6
Report author	Pham T. H. <i>et al.</i>
Report year	2019
Report title	Perinatal Exposure to Glyphosate and a Glyphosate-Based Herbicide Affect Spermatogenesis in Mice
Document No	Toxicological Sciences (2019) Vol. 169(1), 260–271
Guidelines followed in study	None
Deviations from current test guideline	NA
Previous evaluation	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The effect of glyphosate exposure from the day of vaginal plug detection to 20 days post-partum via the drinking water at concentrations corresponding with 0.5, 5 and 50 mg/kg bw/day on male reproductive parameters in mice of 5, 20 and 35 days old and 8 months old was investigated. The parameters measured were the number of spermatogonia and expression of genes important to testicular function in 5-day old mice, testicular histopathology in 20-day old mice, relative weight of testes, epididymis and seminal vesicles, epididymal sperm count, serum testosterone levels, GATA1 positive cell count and ZBTB16 positive cell count in 35-day old mice, and relative weight of testes, epididymis and seminal vesicles and serum testosterone levels in 8-month old mice. No statistically significant change was found for the number of spermatogonia in 5-day old mice. The only genes of which the expression was statistically significantly changed in a dose-related fashion were Bcl2 and Kit. In 20-day old mice, sperm depleted seminiferous tubules were noted at 5 mg/kg bw but not at 0.5 and 50 mg/kg bw glyphosate. In 35-day old mice there was no statistically significant change in the relative weight of the epididymis and the seminal vesicles, epididymal sperm count and GATA1 positive cell count. No dose-effect relationship could be established for relative weight of testes, serum testosterone levels and ZBTB16 positive cell count. In 8-month old mice no statistically significant change could be observed for relative weight of epididymis and seminal vesicles and serum testosterone levels. No dose effect relationship could be established for the decrease in relative testes weight. From these data it can be concluded that there is no evidence that glyphosate dosed orally to mice up to 50 mg/kg bw/day during the perinatal period is an endocrine disruptor and has an adverse effect on testicular function and development. This has been corroborated by regulatory reproduction toxicology studies with rats at much higher dose levels.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test conditions were not clearly described and the number of animals tested per dose level is too limited.

Reliability criteria for *in vivo* toxicology studies

Publication: Pham <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing	N	

guidelines		
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity $\geq$ 99.2%. Source: Sigma-Aldrich.
Only glyphosate acid or one of its salts is the tested substance	N	Also formulation was tested: Roundup 3 plus.
AMPA is the tested substance		
Study		
Test species clearly and completely described	Y?	
Test conditions clearly and completely described	Y?	Not completely described. Control and treated young prepubertal or adult mice were euthanized, and reproductive organs were dissected in 5, 20, 35 days old (d.o.), and in 8 months old (m.o.) mice. Only male mice were analysed.
Route and mode of administration described	Y	Oral via drinking water.
Dose levels reported	Y	0.5, 5, 50 mg/kg bw/day.
Number of animals used per dose level reported	Y?	5 animals derived from at least 3 to 4 different litters in each group
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y?	Not always presented in tables.
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test conditions were not clearly described and the number of animals tested per dose level is too limited.		

1. Information on the study

Data point:	CA 5.5
Report author	Presutti R. et al.
Report year	2016
Report title	Pesticide exposures and the risk of multiple myeloma in men: An analysis of the North American Pooled Project
Document No	International Journal of Cancer (2016) Vol. 139, 1703–1714
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Four population-based incident case-control studies (3 US studies and one Canadian study) pooled in the North American Pooled Project (NAPP) aimed to investigate the effects of pesticides and other agricultural exposures on the risk of lymphatic and hematopoietic cancers. The present analysis is restricted to a subset of three NAPP studies (Iowa, Nebraska and Canada) where multiple myeloma (MM) cases were recruited. Self-reported information on pesticide use, farming activities and demographic characteristics was collected and the odds ratios (OR) were calculated for “ever/never” exposure, years of exposure and cumulated lifetime days of exposure to glyphosate with and without exclusion of proxy respondents. The result is that no statistically significant increases in risk of multiple myeloma (MM) associated with self-reported exposure to glyphosate were observed.

This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because it concerns pooled case control studies which are subject to recall bias and in which confounding factors could not be ruled out.

Reliability criteria for epidemiology studies

Publication: Presutti <i>et al.</i> , 2016	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	Y	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.		
Exposure to formulations with glyphosate combined with other a.i.		
Exposure to various formulations of pesticides	Y	
Study		
Study design – epidemiological method followed	Y	Pooled case control studies
Description of population investigated	Y	
Description of exposure circumstances	Y	May be subject to recall bias

Description of results	Y	
Have confounding factors been considered	N	Confounding factors cannot be ruled out
Statistical analysis	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for glyphosate risk assessment but reliable with restrictions because it concerns pooled case control studies which are subject to recall bias and in which confounding factors could not be ruled out.		

1. Information on the study

Data point:	CA 5.6
Report author	Ren X. <i>et al.</i>
Report year	2019
Report title	Effects of chronic glyphosate exposure to pregnant mice on hepatic lipid metabolism in offspring
Document No	Environmental pollution (2019) Vol. 254, pp. 112906.
Guidelines followed in study	None
Deviations from current test guideline	Not applicable.
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The current study set out to examine any effects on lipid metabolism in fetuses and pups following prenatal exposure to glyphosate or the glyphosate formulation, Roundup™. Ten pregnant female rats per group were exposed from gestation day 1 through 19 to drinking water containing either 0.5% glyphosate, prepared using “pure” glyphosate (N-(phosphonomethyl) glycine), or 0.5% glyphosate using an appropriate dilution of Roundup™. A similar group of animals were given distilled water and served as the control group. Five females per group were terminated on gestation day 19 for examination of fetuses, while the remaining dams were allowed to litter and maintain their litters to postnatal day 21. Offspring (2/sex/litter where possible) were selected on postnatal days 7 and 21 for evaluation. Fetal and offspring evaluations included liver histology, serum biochemistry, liver lipid concentration and gene expression analysis of genes related to lipid metabolism in the liver.

The study is non-GLP and does not report the following information;

- Purity of test items
- Body weight and clinical signs for pregnant animals
- Clinical observations of offspring
- Achieved dose of glyphosate in treated animals in mg/kg bw/day.
- Measures to control inter animal and intergroup variability such as
 - Time of necropsy distributed equally across groups
 - Standardization of litter size on day 4 of lactation to mitigate variability caused by differences in litter size.
- More than a single dose level of glyphosate (0.5% solution); thus, preventing dose-response characterisation
- Liver weight of fetuses or offspring
- Normal physiological ranges for serum and liver biochemistry in this strain of rat at this laboratory
- Clear reporting of statistical evaluation and differences
- Thorough histological evaluations of the liver with incidence and severity of any recorded findings.

Although the authors concluded that there were treatment related effects on fetal and offspring body weight, there is no evidence from this study to suggest that glyphosate exposure has had any impact on fetal development or pup development postnatally. There was no effect on average birth weight of pups, the slight difference observed in the glyphosate treated group should be attributed to the slightly larger mean litter size observed (14.4 pups compared to 10.8 in the control group).

Although figure 1 shows a reduction in mean pup weight in the glyphosate and Roundup™ treated

groups (male and females combined). Group mean body weight of pups by sex showed no statistical differences from control.

Given the small group size, the large inter animal variability observed, the lack of consistency between the same parameter across the sexes, timepoints or sampling matrices, and the deficiencies listed above, it not possible to clearly attribute any of the observed differences to glyphosate exposure. Therefore, the current study provides no evidence that glyphosate exposure causes lipid metabolism disruption in offspring following prenatal (in utero) exposure.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used is not sufficiently characterized, only one dose level was tested, there was large inter animal variability observed and too few animals per dose level were analysed.

Reliability criteria for *in vivo* toxicology studies

Publication: Ren <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Shanghai Ryon Biological Technology Co, Shanghai, China.
Only glyphosate acid or one of its salts is the tested substance	N	Also formulation was tested: Roundup from Sinochem Crop Protection Products, Shanghai, China.
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	?	Mice.
Test conditions clearly and completely described	?	
Route and mode of administration described	Y	Oral via drinking water.
Dose levels reported	Y	One dose level: 0.5% in drinking water.
Number of animals used per dose level reported	Y	10/dose.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		

Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used is not sufficiently characterized, only one dose level was tested, there was large inter animal variability observed and too few animals per dose level were analysed.		

1. Information on the study

Data point:	CA 5.4
Report author	Roustan A. <i>et al.</i>
Report year	2014
Report title	Genotoxicity of mixtures of glyphosate and atrazine and their environmental transformation products before and after photoactivation
Document No	Chemosphere (2014) Vol. 108, 93–100
Guidelines followed in study	OECD Test Guideline 487
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The cytogenetic effect of two herbicides (glyphosate and atrazine), their metabolites (AMPA and DEA), and mixtures thereof was investigated in CHO-K1 cells in the *in vitro* micronucleus test. Only the results of glyphosate and AMPA tested alone are reported and discussed in the summary. Glyphosate and AMPA were tested with and without metabolic activation and with light irradiation. Also the potency of glyphosate and AMPA to produce ROS was investigated. The concentrations tested ranged from 5 to 100 µg/mL for glyphosate and from 0.00005 to 5 µg/mL for AMPA. No statistically significant increase in the incidence of bi-micronucleated cells (BMC) was observed with glyphosate at concentrations up to 100 µg/mL in the dark and without metabolic activation. However, a statistically significant and dose-related increase in BMC was noted from 10 µg/mL in the presence of metabolic activation. With light irradiation a statistically significant increase in BMC was noted for glyphosate at a concentration of 100 µg/mL. AMPA produced a statistically significant and dose-related increase in BMC from a concentration of 0.01 µg/mL in the dark and without metabolic activation. With metabolic activation a statistically significant increase in BMC was seen with AMPA from 1 µg/mL. With light irradiation the lowest test concentration of AMPA with a statistically significant increase in BMC was 0.0005 µg/mL. Only AMPA was found to produce an elevated oxidative effect, whereas the oxidative potency of glyphosate was very low. The results of glyphosate in the *in vitro* micronucleus test with metabolic activation reported in this study are surprising since glyphosate is essentially unmetabolized *in vitro* in the presence of a rat liver S9 homogenate. Moreover, these results are not corroborated by regulatory *in vivo* micronucleus tests in the mouse dosed up to more than 2,000 mg/kg bw.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate and AMPA tested were not sufficiently characterized and no positive and control historical data were reported. The *in vitro* micronucleus test carried out was in compliance with OECD TG 487.

Reliability criteria for *in vitro* toxicology studies

Publication: Roustan <i>et al.</i> , 2014	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	Y	In vitro MN test compliant with OECD TG 487.
Study performed according to GLP	N	

Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity not reported. Source: Sigma-Aldrich Chemical Company, St Quentin-Fallavier, France.
Only glyphosate acid or one of its salts is the tested substance	N	Other pesticides (atrazine, desethyl atrazine (DEA)) were tested and mixtures thereof.
AMPA is the tested substance	Y	Tested alone and as mixtures with glyphosate, atrazine and DEA.
Test system clearly and completely described	Y	CHO-K1 cells.
Test conditions clearly and completely described	Y	CHO-K1 cell MN test.
Metabolic activation system clearly and completely described	Y	S9-mix.
Test concentrations in physiologically acceptable range (< 1 mM)	Y	From 5 to 100 µg/mL for glyphosate and from 0.00005 to 5 µg/mL for AMPA.
Cytotoxicity tests reported	Y	Cytokinesis Blocked Proliferation Index (CBPI) and incidence of bi-micronucleated cells (BMC).
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate and AMPA tested were not sufficiently characterized and no positive and control historical data were reported. The <i>in vitro</i> micronucleus test carried out was in compliance with OECD TG 487.		

1. Information on the study

Data point:	CA 5.4
Report author	Santovino A. <i>et al.</i>
Report year	2018
Report title	In vitro evaluation of genomic damage induced by glyphosate on human lymphocytes
Document No	Environmental Science and Pollution Research (2018) 25:34693-34700s
Guidelines followed in study	Some compliance with OECD 473 and OECD 487
Deviations from current test guideline	Only continuous treatments in the absence of S9 were performed and these exceeded the 1.5 cell cycles recommended by both guidelines No historical control data are reported. Treatment commenced within 24 hours of PHA stimulation rather than 44-48 hours
Previous evaluation	No
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This paper describes human lymphocyte chromosome aberration and micronucleus tests with glyphosate. Although broadly compliant with OECD 473 and 487 there are some critical deficiencies which will have adversely influenced the reliability of the findings. Treatment with glyphosate was initiated 24 hours after lymphocyte cultures were stimulated to divide, instead of the recommended 48 hours, consequently the cultures would not have been asynchronous. This could mean cells in some stages of the cell cycle may have been under-represented, whilst others over-represented. Exposure to glyphosate was continuous for 28 hours in the chromosome aberration assay or 48 hours in the micronucleus assay. In contrast OECD test guidelines recommend maximum exposure of 1.5 cell cycles, equivalent to approximately 24 hours for lymphocyte cultures. For both endpoints the paper does not confirm if the slides were coded prior to analysis. The positive control has been compared statistically to the glyphosate treated cultures rather than the solvent controls.

The authors consider that glyphosate induces tri-tetradial aberrations (amongst other aberration types) but fails to comment that the frequency of these aberrations observed at a single glyphosate concentration is 3-fold lower than the frequency observed in the solvent control cultures. Furthermore, it is unusual that the only multi-aberrant metaphases observed were a small number of positive control metaphases and gaps did not appear to increase with treatment but chromatid and chromosome breaks did.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized and although the genotoxicity tests conducted were in general in accordance with the OECD test guidelines, significant deficiencies were noted.

Reliability criteria for *in vitro* toxicology studies

Publication: Santovito <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing	Y	In accordance with

guidelines		OECD TG.
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity is not reported. Source: Sigma-Aldrich, Saint Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Lymphocytes.
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.500, 0.100, 0.050, 0.025 and 0.0125 µg/mL.
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate tested was not sufficiently characterized and although the genotoxicity tests conducted were in general in accordance with the OECD test guidelines, significant deficiencies were noted.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Sierra-Diaz E. <i>et al.</i>
Report year	2019
Report title	Urinary pesticide levels in children and adolescents residing in two agricultural communities in Mexico
Document No	International Journal of Environmental Research and Public Health (2019), Volume 16, Number 4, 562 p.
Guidelines followed in study	None.
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In a comparative cross-sectional study using the urine of children living in two agricultural communities with very similar characteristics in Mexico (a total of 281 children participated in the study), glyphosate was detected in more than 70% of the cases in both communities. The mean urinary levels of glyphosate were 0.363 ± 0.3210 ng/mL in Agua Caliente and 0.606 ± 0.5435 ng/mL in Ahuacapán.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no validation data were presented for the analytical method employed.

Reliability criteria of exposure studies

Publication: Sierra-Diaz <i>et al.</i> , 2019.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Exposure to formulations with only glyphosate as a.i.		
Exposure to formulations with glyphosate combined with other a.i.		
Exposure to various formulations of pesticides	Y	
Study		
Study design clearly described	Y	Survey of glyphosate concentrations in children.
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	?	No pesticide exposures reported.
Sampling scheme sufficiently documented	Y	Production of one early morning urine sample.
Analytical method described in detail	Y	
Validation of analytical method reported	N	
Monitoring results reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because no validation data were presented for the analytical method employed.		

1. Information on the study

Data point:	CA 5.5
Report author	Sorahan T.
Report year	2015
Report title	Multiple Myeloma and Glyphosate Use: A Re-Analysis of US Agricultural Health Study (AHS) Data
Document No	International Journal of Environmental Research and Public Health (2015) Vol. 12, 1548-1559
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the relative risk estimates for exposed and non-exposed applicators were calculated using Poisson regression and subjects with missing data were not excluded from the main analyses. When using the full dataset adjusted for age and gender the analysis produced a RR close to unity for ever-use of glyphosate. Additional adjustment for lifestyle factors and use of ten other pesticides had little effect. This study found no statistically significant trends of multiple myeloma risk with reported cumulative days of glyphosate use and unexceptional point estimates of risk for ever-use of glyphosate. This was irrespective of whether the analyses had adjustment for a few basic variables (age and gender) or adjustment for many other lifestyle factors or pesticide exposures, as long as data on all available pesticide applicators were used. The suspiciously elevated RRs reported previously arose from the use of restricted data sets that, probably by chance, turned out to be unrepresentative.

This publication concerns a secondary analysis of the data from the Agricultural Health Study (AHS) and is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the reliability criteria of a well conducted epidemiology study.

Reliability criteria for epidemiology studies

Publication: Sorahan T., 2015	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.		
Study completely described and conducted following scientifically acceptable standards	Y	Secondary analysis of the AHS data
Test substance		
Exposure to formulations with only glyphosate as a.i.		
Exposure to formulations with glyphosate combined with other a.i.		
Exposure to various formulations of pesticides	Y	
Study		

Publication: Sorahan T., 2015	Criteria met? Y/N/?	Comments
Study design – epidemiological method followed	Y	
Description of population investigated	Y	
Description of exposure circumstances	Y	
Description of results	Y	
Statistical analysis	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication concerns a secondary analysis of the data from the agricultural health study and is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the reliability criteria of a well conducted epidemiology study.		

1. Information on the study

Data point	CA 5.9 Exposure study
Report author	Steinborn A. <i>et al.</i>
Report year	2016
Report title	Determination of Glyphosate Levels in Breast Milk Samples from Germany by LC-MS/MS and GC-MS/MS
Document No.	J Agric Food Chem (2016), Vol. 64, 1414–1421
Guidelines followed in study	Guidance document on analytical quality control and validation procedures for pesticide residues in food and feed, SANCO/12571/2013
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No/Not stated
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Two analytical methods were developed for the determination of glyphosate in human breast milk. In the first method fat was removed by centrifugation and the proteins by ultra-filtration using a molecular weight cutoff filter of 30 kDa. The final extract was then analyzed by LC-MS/MS. In the second method the milk sample was acidified with acetic acid, centrifuged and the supernatant extracted with dichloromethane. The aqueous phase was filtered and cleaned-up using a cation exchange resin. The final extract was then analyzed by GC-MS/MS after derivatization with heptafluoro-1-butanol and trifluoroacetic acid anhydride. $^{13}\text{C}_2^{15}\text{N}$ glyphosate was used as the internal standard in both methods. Both analytical methods were validated according to the EU guidance document on analytical quality control and validation procedures for pesticide residues in food and feed (SANCO/12571/2013) and were found suitable for the determination of glyphosate in human breast milk with an LOQ of 1 ng/mL. In August and September 2015, 114 breast milk samples were collected from German women and were analyzed for glyphosate. In none of the samples analyzed glyphosate concentrations were found at or beyond the LOQ.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the breast milk samples analyzed were collected on a voluntary basis and there were no restrictions for participating in the monitoring program. As a consequence the samples cannot be considered representative of the German population. Both analytical methods developed were validated in accordance with the EU guidance on the procedures for the analysis of pesticide residues in food and feed.

Reliability criteria of exposure studies

	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	Y	Guidance document on analytical quality control and validation procedures for pesticide residues in food and feed, SANCO/12571/2013.
Study performed according to GLP	N	
Study completely described and conducted following	Y	

Publication: Steinborn et al., 2016.	Criteria met? Y/N/?	Comments
Guideline-specific		
scientifically acceptable standards		
Test substance		
Exposure to formulations with only glyphosate as a.i.		Self-reported exposure to pesticides.
Exposure to formulations with glyphosate combined with other a.i.		
Exposure to various formulations of pesticides		
Study		
Study design clearly described	Y?	Mainly the development of methods for the analysis of glyphosate in human breast milk and applied to a set of 114 samples from German women.
Population investigated sufficiently described	Y?	Biometric data of the study population were rather limited. The samples were collected on a voluntary basis and without restrictions.
Exposure circumstances sufficiently described	Y?	No detail was provided on self-reported exposure to pesticides.
Sampling scheme sufficiently documented	Y?	More detail could have been provided.
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	None of the 114 samples analyzed was positive for glyphosate.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the breast milk samples analyzed were collected on a voluntary basis and there were no restrictions for participating in the monitoring program. As a consequence the samples cannot be considered representative of the German population. Both analytical methods developed were validated in accordance with the EU guidance on the procedures for the analysis of pesticide residues in food and feed.		

1. Information on the study

Data point:	CA 5.4
Report author	Suárez-Larios K. <i>et al.</i>
Report year	2017
Report title	Screening of Pesticides with the Potential of Inducing DSB and Successive Recombinational Repair
Document No	Journal of Toxicology (2017), Article ID 3574840,
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to assess whether glyphosate and its metabolite AMPA produced DNA double strand breaks in human peripheral lymphocytes and whether proteins involved in DNA repair were induced. The results show that glyphosate, but not AMPA, increased the mean of the percent cells with more than 10 γ -H2AX foci, however, without a clear dose-effect relationship. Glyphosate was found to induce statistically significantly a protein involved in DNA repair, p-Ku80, at 5 μ M without a dose-effect relationship (when measured as median OD).

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because glyphosate as a test chemical was not sufficiently characterized and the effect found on an indicator of DNA double strand breaks was not concentration related and occurred at concentrations that were much lower than the systemic concentrations (approx. 300 μ M) of regulatory *in vivo* MN tests at 2000 mg/kg bw which were negative.

Reliability criteria for *in vitro* toxicology studies

Publication: Suarez-Larios <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	No guideline study for genotoxicity
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Only source reported: Sigma-Aldrich Mexico.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	Y	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	Not applied

Test concentrations in physiologically acceptable range (< 1 mM)	Y	Up to 50 µM
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	SS increase at 2 concentrations but no dose effect relationship for γ-H2AX foci. SS increase of P-Ku80 at 5 µM but no dose-effect relationship in treated cultures (measured as median OD)
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	Results of this study are not corroborated by in vivo MN studies with much higher blood concentrations (approx. 300µM).
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because glyphosate as a test chemical was not sufficiently characterized and the effect found on an indicator of DNA double strand breaks was not concentration related and occurred at concentrations that were much lower than the systemic concentrations (approx. 300 µM) of regulatory <i>in vivo</i> MN tests at 2000 mg/kg bw which were negative.		

1. Information on the study

Data point:	CA 5.3
Report author	Tang J. <i>et al.</i>
Report year	2017
Report title	Ion imbalance Is Involved in the Mechanisms of Liver Oxidative Damage in Rats Exposed to Glyphosate
Document No	Frontiers in Physiology (2017) Vol. 8, Article 1083
Guidelines followed in study	None
Deviations from current test guideline	No
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to investigate the toxicity, oxidative stress and metal ion concentrations in tissues of rats after oral exposure to glyphosate for 35 days at doses up to 500 mg/kg bw/day. Oxidative stress was studied by the determination of markers of oxidative stress such as SOD, CAT, H₂O₂, MDA, GSH and GSH-px and the transcription of genes related to inflammation and lipid metabolism. Statistically significant effects were found on body weight, body weight gain, organ weight, serum indicators of liver toxicity and histopathology of the liver and the kidney. Significant changes were also reported on markers of oxidative stress and transcription of genes related to inflammation and lipid metabolism. Many of the effects reported were mild in nature and/or didn't show a clear dose-effect relationship. Also the effects on metal ion concentrations in organ tissues were not always consistent and often didn't show a dose-effect relationship.

This publication is considered relevant but reliable with restrictions because the test material was not sufficiently characterized, the number of animals used for this study duration is not sufficient, the results were not always accurately reported and are not corroborated by regulatory toxicology studies of similar test durations and dose ranges.

Reliability criteria for *in vivo* toxicology studies

Publication: Tang <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Number of animals per dose level lower than minimum required for 4-week testing
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	?	Not described in sufficient detail
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Only source reported: Shanghai Ryon Biological Technology Co. Ltd., China.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	

Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	
Dose levels reported	Y	
Number of animals used per dose level reported	Y	
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	Sometimes inaccurate reporting of data in tables. Results not concordant with short term regulatory toxicology studies
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant but reliable with restrictions because the test material was not sufficiently characterized, the number of animals used for this study duration is not sufficient, the results were not always accurately reported and are not corroborated by regulatory toxicology studies of similar test durations and dose ranges.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Thongprakaisang S. <i>et al.</i>
Report year	2013
Report title	Glyphosate induces human breast cancer cells growth via estrogen receptors
Document No	Food and Chemical Toxicology (2013) Vol. 59, 129–136
Guidelines followed in study	None
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	Non-GLP
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to investigate the possible estrogenic effect of glyphosate and its mode of action. The endpoints explored were the cell proliferation of hormone-dependent and hormone-independent cell lines with and without an ER antagonist, ERE-transcription activity with and without an ER antagonist, and expression of ERs. Glyphosate was found to produce cell proliferation in a hormone-dependent cancer cell line but not in a hormone-independent cancer cell line in the absence of E2. In the presence of a potent ER antagonist the cell proliferation caused by glyphosate in a hormone-dependent cancer cell line was reduced. The interaction of glyphosate with the ER was confirmed by ERE activation with and without an ER antagonist. When cells were co-incubated with glyphosate and E2, glyphosate suppressed the E2-induced ERE activation suggesting that glyphosate behaves as an antagonist in the presence of an endogenous agonist. It was demonstrated that glyphosate alters the expression of both ER α and ER β in human breast cancer cells.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test results are not corroborated by *in vivo* regulatory ED toxicology studies such as the uterotrophic assay and the female pubertal assay (U.S. EPA Endocrine Disruptor Screening Program).

Reliability criteria for *in vitro* toxicology studies

Publication: Thongprakaisang <i>et al.</i> , 2013	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of >98%. Source: AccuStandard, New Haven, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	

AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	The slight estrogenic effect of glyphosate reported was not confirmed in <i>in vivo</i> studies such as the uterotrophic assay and the female pubertal assay.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	Results not consistent with other publications on ED.
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the test results are not corroborated by <i>in vivo</i> regulatory ED toxicology studies such as the uterotrophic assay and the female pubertal assay.		

1. Information on the study

Data point:	CA 5.4
Report author	Townsend M. <i>et al.</i>
Report year	2017
Report title	Evaluation of various glyphosate concentrations on DNA damage in human Raji cells and its impact on cytotoxicity
Document No	Regulatory Toxicology and Pharmacology (2017) Vol. 85 79-85
Guidelines followed in study	None
Deviations from current test guideline	NA
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The purpose of this study was to investigate the concentration and time dependent DNA damaging potential of glyphosate in Burkitt's B Cell Lymphoma (Raji) cells using the comet assay and MTT viability assay. The cells were exposed to glyphosate concentrations ranging from 0.1 μ M to 15 mM and resulting DNA damage and loss of cell viability were measured after various lengths of exposure. DNA damage could only be observed at 1mM and higher which are concentrations that cannot be attained *in vivo*. The DNA damage seen at 1 and 5 mM reached its maximum between 60 and 80 minutes of incubation which returned to control values thereafter. To reach 1 mM of systemic concentration *in vivo* experimental animals have to be treated orally with glyphosate at dose levels that are much higher than those used in long term carcinogenicity studies which showed no carcinogenic effect of glyphosate.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with most of the reliability criteria for *in vitro* testing although no historical control data were reported. The significance for the risk assessment of glyphosate is limited because DNA damage has only been demonstrated at concentrations of glyphosate that cannot be attained in *in vivo* test systems.

Reliability criteria for *in vitro* toxicology studies

Publication: Townsend <i>et al.</i> , 2017	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 95%. Source: not reported.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		

Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y/N	0.1 µM to 15 mM for alkaline comet assay
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	Human cell exposure to glyphosate has minimal cytotoxicity and DNA damage at concentrations at or below 100 µM. Only effects found beyond 1 mM.
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with most of the reliability criteria for in vitro testing although no historical control data were reported.		

1. Information on the study

Data point:	CA 5.9 Exposure study
Report author	Trasande L. <i>et al.</i>
Report year	2020
Report title	Glyphosate exposures and kidney injury biomarkers in infants and young children
Document No	Environ Pollution (2020), 256, 113334
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	Yes, all research was performed in accordance with relevant guidelines/regulations.
Acceptability/Reliability:	Yes/Reliable without restriction

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study evaluated three cohorts across different phases of child development and measured urinary levels of glyphosate. They evaluated associations of glyphosate with three biomarkers of kidney injury: ACR, NGAL, and KIM-1. Sample collection and analysis as well as statistical evaluation of data have been conducted using well described methodologies. Multivariable regression models failed to identify significant associations of log-transformed glyphosate with any of the kidney injury biomarkers, controlling for covariates age, sex, and maternal education. The authors confirm detectability of glyphosate in children's urine at various ages and stages of life, there is no evidence in this study for renal injury in children exposed to low levels of glyphosate.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good monitoring study.

Reliability criteria of exposure studies

	Criteria met? Y/N/?	Comments
Publication: Trasande et al., 2020.		
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines/practices.	Y	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Y	
Exposure to formulations with glyphosate combined with other a.i.	Y	
Exposure to various formulations of pesticides	Y	Environmental exposure.
Study		
Study design clearly described	Y	Longitudinal birth cohort and 2 cross sectional studies. Study of the association between renal biomarkers and glyphosate in urine.

Publication: Trasande et al., 2020.	Criteria met? Y/N/?	Comments
Guideline-specific		
Population investigated sufficiently described	Y	
Exposure circumstances sufficiently described	Y	Environmental exposure.
Sampling scheme sufficiently documented	Y	
Analytical method described in detail	Y	
Validation of analytical method reported	Y	
Monitoring results reported	Y	
Statistical analysis	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because it complies with the quality criteria of a good monitoring study.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Vanlaeys A. <i>et al.</i>
Report year	2018
Report title	Formulants of glyphosate-based herbicides have more deleterious impact than glyphosate on TM4 Sertoli cells
Document No	Toxicology in Vitro (2018) Vol. 52, 14–22
Guidelines followed in study	None
Deviations from current test guideline	NA
Previous evaluation	No
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study the effect of glyphosate on murine TM4 Sertoli cells was investigated *in vitro*. The endpoints were cytotoxicity, glutathione transferase activity and lipid accumulation. In contrast to the glyphosate-based formulations and co-formulants tested glyphosate was found to have no impact on cell viability after 24 hours of exposure at concentrations ranging from 10 ppm to 10,000 ppm. Glyphosate reduced succinate dehydrogenase to some extent over the entire concentration range from 10 (approx. 85% of control) to 10,000 ppm (approx. 75% of control) with no dose-effect relationship and was found to have no impact on glutathione transferase activity. Exposure of TM4 cells to glyphosate for 24 hours at 2,500 or 5,000 ppm induces an increase in cytoplasmic lipid droplets. These concentrations are far beyond what is physiologically feasible *in vivo*.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used is not sufficiently characterized and no positive controls were used in any of the assays conducted.

Reliability criteria for *in vitro* toxicology studies

Publication: Vanlaeys <i>et al.</i> , 2018	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Sigma-Aldrich, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance	N	Also co-formulants and formulations were tested.
AMPA is the tested substance	N	

Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y (partly)	
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive controls used.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used is not sufficiently characterized and no positive controls were used in any of the assays conducted.		

1. Information on the study

Data point:	CA 5.5
Report author	Wang L. <i>et al.</i>
Report year	2019
Report title	Glyphosate induces benign monoclonal gammopathy and promotes multiple myeloma progression in mice
Document No	Hematol Oncol 12, 70 (2019)
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective of this study was to investigate the pathogenic role of glyphosate in multiple myeloma using Vk*MYC mice. The study did demonstrate the ability of glyphosate to impact measured parameters in the tested models. However, this study is not appropriate for human health risk assessment. The number of animals per group was below the recommended number for guideline toxicity studies and to perform sufficient statistical analysis. Only one dose level was used in the chronic study. It was not possible to correlate effects with a glyphosate dose-response as the water consumption of animals was not provided and is therefore impossible to calculate a dose on a mg/kg bw basis for risk assessment.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not characterized, only one dose was considered for the chronic study and the number of animals used per group was either too low (acute study) or not reported (chronic study).

Reliability criteria for *in vivo* toxicology studies

Publication: Wang <i>et al.</i> , 2019	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity not reported. Source: Sigma-Aldrich, St Louis, USA.
Only glyphosate acid or one of its salts is the tested substance		
AMPA is the tested substance		
Study		

Test species clearly and completely described	Y	Wild-type (WT) C57Bl/6 mice and Vk*MYC mice.
Test conditions clearly and completely described		
Route and mode of administration described	Y	Oral via drinking water.
Dose levels reported	Y	For the chronic study: 1 g/L in drinking water for 72 weeks. For the acute study: 1, 5, 10, 30 g/L for 7 days.
Number of animals used per dose level reported	Y	5/group for the acute study, no/group not reported for the chronic study.
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	N	Not possible. Only one dose level used.
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because the glyphosate used was not characterized, only one dose was considered for the chronic study and the number of animals used per group was either too low (acute study) or not reported (chronic study).		

1. Information on the study

Data point:	CA 5.5
Report author	Wozniak E. <i>et al.</i>
Report year	2020
Report title	Glyphosate affects methylation in the promoter regions of selected tumor suppressors as well as expression of major cell cycle and apoptosis drivers in PBMCs (in vitro study)
Document No	Toxicology in Vitro 63 (2020)
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The objective was to assess epigenetic mechanisms of action of glyphosate in human PBMCs, which has been poorly studied in cellular models including blood cells. The study was conducted using an *in vitro* test system. The ability of glyphosate to impact the measured parameters was demonstrated (global DNA methylation of PBMCs, methylation in the promoter regions of selected tumor suppressors (P21 and TP53), and expression of major cell cycle and apoptosis drivers (P16, TP53, BCL2, CCND1 and P21). However, a positive control was not used, and a clear dose-response was not established for all of the measured parameters. Additionally, the measured effects *in vitro* are not clearly linked to an adverse outcome *in vivo*. While it is stated that the concentrations used are comparable to environmental exposure, external exposure was not linked to a corresponding internal concentration. Therefore, it is not possible to calculate a dose for risk assessment purposes. The study is useful for supplemental information on *in vitro* effects resulting from glyphosate exposure, but, is not appropriate for derivation of an endpoint in human health risk assessment.

This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because the assays conducted comply in general with the quality criteria for *in vitro* testing.

Reliability criteria for *in vitro* toxicology studies

Publication: Wozniak <i>et al.</i> , 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of 95%. Source: Sigma-Aldrich, USA.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	PBMC.

Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.5 to 100 µM
Cytotoxicity tests reported	Y	Ref. to earlier paper.
Positive and negative controls	Y	Methylated control DNA as positive control.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because the assays conducted comply in general with the quality criteria for in vitro testing.		

1. Information on the study

Data point:	CA 5.6
Report author	Zhang, J-W. <i>et al.</i>
Report year	2019
Report title	The toxic effects and possible mechanisms of glyphosate on mouse oocytes
Document No	Chemosphere 237 (2019) 124435
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
Previous evaluation	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities.
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In vitro intracellular changes in Kunming mice oocytes were evaluated after being cultured in medium supplemented with 500 µM glyphosate. Findings included: decreased germinal vesicle breakdown, decreased first polar body extrusion, increased mRNA expression of anti-oxidant enzyme related genes, abnormal spindle morphology, increased DNA double strand breaks, aggregated mitochondria, decreased mitochondrial membrane potential, increased protein expression of apoptosis factors, increased mRNA expression of apoptosis related genes and decreased autophagy-related genes.

No dose-response could be determined seeing as only one concentration was tested, far in excess of that considered biologically relevant. Whilst some evaluations were conducted on oocytes harvested from a wider data set of 24 mice (protein expression levels of apoptosis factors by Western blot analysis), a number of the assessments were conducted on oocytes from just 12 mice (mRNA expression of oxidative stress-related, apoptosis-related and autophagy-related genes) or 6 mice (mitochondrial staining, measurement of mitochondrial membrane potential). This narrow source of oocytes limits the robustness of certain conclusions. Furthermore, there are insufficient details reported in the methods to establish whether mice were of the same age before oocyte harvesting or the purity of the glyphosate tested.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because of the poor characterization of the glyphosate tested, no cytotoxicity testing, the lack of a positive control and insufficient dose-response characterization at biologically relevant doses.

Reliability criteria for *in vitro* toxicology studies

Publication: Zhang JW <i>et al.</i> , 2019.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y?	
Test substance		

Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	Purity and source not reported. Chemical analysis was performed but the results were not clear.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	NA	
Test concentrations in physiologically acceptable range (< 1 mM)	Y	50, 100, 200, 500 µM. Most of the assays were carried out at 500 µM which is a concentration that cannot be reached systemically in the rat at 2000 mg/kg bw after oral intake.
Cytotoxicity tests reported	N	
Positive and negative controls	N	No positive control used.
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because of the poor characterisation of the glyphosate tested, no cytotoxicity testing and the lack of a positive control.		

検索期間：2010～2019年

区分 a に分類された文献とその理由

農作物及び畜産物への残留

1. Information on the study

Data point	CA 6.10.1
Report author	Berg C.J. et al.
Report year	2018
Report title	Glyphosate residue concentrations in honey attributed through geospatial analysis to proximity of large-scale agriculture and transfer off-site by bees
Document No.	PLoS ONE 13(7): e0198876
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The publication provides residue levels for glyphosate in honey produced in Hawaii (majority of samples) but also Argentina, Brazil, Canada, Mexico, Uruguay and USA (mainland). It is considered relevant to the setting of a suitable MRL for glyphosate in honey since according to SANTE/11956/2016 rev. 9 it is possible to derive MRLs in honey based on monitoring data. As honey available to European consumers may originate from outside the EU, it is appropriate to consider honey residue data from outside the EU to derive the EU MRL.

The samples were analysed by means of an ELISA method which was validated indirectly by comparison with an LC-MS/MS method. A total of 14 honey samples were analysed with the two methods and the results were shown to be similar. The publication, however, does not provide validation data for the LC-MS/MS method (recovery rates from fortified samples).

The study showed a higher detection rate of glyphosate than in the EU-monitoring for 2016-2017. Besides the different origin of the samples, this may also be due to the use of different analytical methods with different LOQs. In line with the EU-monitoring the publication shows that glyphosate can occur in honey at levels > 0.05 mg/kg and that it is, therefore, appropriate to increase the existing EU-MRL. The highest measured residue level was 0.342 mg/kg, which is less than the maximum value found during the EU-monitoring for 2016-2017.

1. Information on the study

Data point	KCA 6.10.1
Report author	Chiesa L.M. et al.
Report year	2019
Report title	Detection of glyphosate and its metabolites in food of animal origin based on ion-chromatography-high resolution mass spectrometry (IC-HRMS)
Document No.	Food Additives & Contaminants: Part A, 2019, Vol. 36, No. 4, 592-600
Guidelines followed in study	SANTE/11813/2017
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The purpose of the publication is to describe and discuss the performance of a residue analytical method for glyphosate, AMPA and glufosinate in, food of animal origin. As such, the publication is not relevant to risk assessment. However, since it also reports residue levels for the investigated compounds in 10 honey samples and since according to SANTE/11956/2016 rev. 9 it is possible to derive EU MRLs in honey based on monitoring data, the publication may be considered relevant to risk assessment and MRL setting. Based on the provided validation results, the method is considered reliable. The LOQ (defined as the lowest fortification level yielding acceptable recoveries) was 0.010 mg/kg for both glyphosate and AMPA (although different values, presumably estimated from the signal to noise ratio, are stated in Table 2). None of the 10 analysed honey samples showed residues of glyphosate or AMPA above the LOQ. However, it is important to note that all the samples were from organic production and this may need to be taken into account in the evaluation.

1. Information on the study

Data point	CA 6.10.1
Report author	El Agrebi N. et al.
Report year	2020
Report title	Honeybee and consumer's exposure and risk characterisation to glyphosate-based herbicide (GBH) and its degradation product (AMPA): Residues in beebread, wax, and honey
Document No.	Science of the Total Environment 704 (2020) 135312
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes a survey of pesticide residues (glyphosate/AMPA) in various bee-related matrices (beebread, wax, honey) from Belgium. While the representativeness of the sampling procedures may be questioned and although the results of the analytical method validations are not provided in a high level of details, the results are considered reliable. A considerable number of samples of beebread/pollen (n = 82) and beeswax (n = 100) were analysed for parent glyphosate and its metabolite AMPA. However, according to the guideline SANTE/11956/2016 rev. 9 the intake of pollen and wax by consumers is negligible and, therefore, it is not a regulatory requirement to investigate the residue levels in these commodities. The publication also provides analytical results for 10 honey samples. Only one of these samples was found to contain residues of parent glyphosate above the LOQ of 0.010 mg/kg (at 0.011 mg/kg). None of the honey samples showed detectable residues of AMPA (i.e. these residues were < 0.001 mg/kg). Since according to SANTE/11956/2016 rev. 9 it is possible to derive MRLs in honey based on monitoring data, these results are deemed relevant.

The publication concludes that, based on the observed residue levels, the intake of pollen, beeswax and honey by consumers does not cause any health issue. While this conclusion is certainly correct some of the details of the risk assessment are questionable. For instance, the considered ADI of 0.3 mg/kg bw/day for parent glyphosate is obsolete (and was already obsolete at the time when the publication was issued). Furthermore, the long-term residue intakes were calculated based on maximum residue levels and high percentile consumption figures, which does not correspond to the standard approach.

The publication also includes extensive considerations on bee safety, which, however, are not relevant to this section of the dossier and, therefore, are not discussed here.

1. Information on the study

Data point	CA 6.10.1
Report author	Karise R. <i>et al.</i>
Report year	2017
Report title	Are pesticide residues in honey related to oilseed rape treatments?
Document No.	Chemosphere 188 (2017) 389-396
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The publication is considered relevant to the setting of a suitable MRL for glyphosate in honey since according to SANTE/11956/2016 rev. 9 it is possible to derive MRLs in honey based on monitoring data. Although only limited information is given about the validation of the method for the determination of glyphosate residues, the analytical results are most likely reliable. The residue levels found for glyphosate are consistent with the EU-monitoring data published by EFSA for 2016-2017 in that: 1. Most of the samples do not show quantifiable residues of glyphosate. 2. Some samples show residues > 0.05 mg/kg, which indicates that it is appropriate to increase the existing MRL. 3. The measured residue levels are far below the levels found in the tunnel residue study.

1. Information on the study

Data point	CA 6.10.1
Report author	Rubio, R. et al.
Report year	2014
Report title	Survey of glyphosate residues in honey, corn and soy products
Document No.	J Environ Anal Toxicol 2014, Vol 5(1): 249
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes a survey of glyphosate residues in honey (n = 69), pancake and corn syrup (n = 26), soy sauce (n = 28), soy milk (n = 11) and tofu (n = 20) purchased in USA, but originating from various countries around the globe. In the context of the dossier for the renewal of the EU approval of glyphosate and with regard to the supported representative uses, the residue data for pancake and corn syrup, soy sauce, soy milk and tofu are not considered relevant. However, the residue data for glyphosate in honey are potentially relevant since according to the guideline SANTE/11956/2016 rev. 9 it is possible to derive MRLs in honey based on monitoring data. Only few of the analysed honey samples originated from Europe but, as honey available to European consumers may originate from outside the EU, it is appropriate to consider honey residue data from outside the EU to derive the EU MRL.

The samples were analysed by means of an ELISA method which was validated by determining the recovery rates from fortified samples. The validation results are not provided in detail, but the average recoveries and relative standard deviations were satisfactory, although the validation was not conducted exactly in accordance with EU or OECD guidelines (i.e. with at least 5 replicates at the LOQ and 5 replicates at a higher level). The limit of quantification was estimated at 0.015 mg/kg. The specificity of the method was investigated by assessing the response of the ELISA test to a series of substances chemically related to glyphosate and it was shown that the response of these substances was at least 1000 times less than that of glyphosate. While this experiment allows to exclude some possible sources of false-positive results, it does not allow to completely rule out that other (not tested compounds) may yield false positive results. Despite these limitations, the obtained analytical results are considered fairly reliable.

59% percent of the 69 honey samples contained glyphosate residues above the method LOQ (0.015 mg/kg) with a concentration range between 0.017 and 0.163 mg/kg and a mean of 0.064 mg/kg. While the individual results are not provided, it seems that about 31% of the samples (22 from 69) showed residues of glyphosate above the EU MRL of 0.05 mg/kg. The samples originating from the EU all showed residues < 0.05 mg/kg. Overall, the findings reported in the publication are in line with the results of the EU-monitoring since the publication shows that glyphosate can occur in honey at levels > 0.05 mg/kg and that it is, therefore, appropriate to increase the existing EU-MRL. The highest measured residue level was 0.163 mg/kg, which is less than the maximum value found during the EU-monitoring for 2016-2017.

1. Information on the study

Data point	CA 6.4.2
Report author	Schnabel K. <i>et al.</i>
Report year	2017
Report title	Effects of glyphosate residues and different concentrate feed proportions on performance, energy metabolism and health characteristics in lactating dairy cows
Document No.	Archives of Animal Nutrition, 2017, Vol. 71, No. 6, 413-427
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

About 30 cows (distributed in two subgroups) were fed with glyphosate-treated commodities for 17 weeks. During this period the exposure of these cows to parent glyphosate residues via feed was about 0.110-0.120 mg/kg bw/day (Figure 1). None of the analysed milk samples (presumably about 60 pooled samples from the two subgroups fed with glyphosate-treated commodities) showed residues of parent glyphosate or AMPA above the limit of quantification of 0.01 mg/kg. This is fully in line with the results of the GLP cow feeding studies submitted in the dossier, which also show that the transfer (if any) of glyphosate-derived residues in cow milk is extremely low. Although the residue analytical method and residue analyses are not reported with a high level of detail, the results are considered reliable since the general principle of the described analytical procedures is well known and the validity of the residue determination was obviously demonstrated by suitable fortification trials. The publication, therefore, is considered relevant and reliable.

However, the main objective of the publication was to investigate the impact of glyphosate residues in feed on health and performance of dairy cows. No significant effects were identified but this part of the publication is not considered relevant to the residue section.

1. Information on the study

Data point	CA 6.4.1
Report author	Shehata A.A. <i>et al.</i>
Report year	2014
Report title	Distribution of Glyphosate in Chicken Organs and its Reduction by Humic Acid Supplementation
Document No.	J. Poult. Sci., 2014, 51: 333-337
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/ reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The publication provides information about the levels of parent glyphosate residues in feed and tissues of broiler chicken (including edible tissues such as muscle and liver). This may allow to estimate residue transfer factors from poultry feed to poultry meat. Therefore, the publication is considered relevant. The authors further investigated the impact of a feed supplementation with humic acid on the transfer of glyphosate residues in poultry tissues. It was concluded that the supplementation with humic acid allows to significantly decrease the residues of glyphosate in poultry tissues (-63% in muscle and -28% in liver). Thus, the control group (which received feed without humic acid supplementation) represents a worst case in terms of residues and is more relevant from a regulatory perspective. The highest residues found in chicken muscle and liver were extremely low (ca. 0.005 mg/kg and 0.018 mg/kg, respectively). This is consistent with the results of the submitted poultry feeding studies (which were conducted at dose levels far above the dietary exposure of the broiler chickens in the publication). However, both the experimental procedures and the obtained results are not described with a sufficient level of accuracy and it is difficult to figure out exactly what was done and how the presented results were generated. The sample preparation procedure (with consecutive steps at 100°C and -80°C) is quite unusual and no method validation data are presented. Because of that, the publication is reliable with restrictions.

1. Information on the study

Data point	CA 6.4.2
Report author	Shelver W.L. <i>et al.</i>
Report year	2018
Report title	Distribution of chemical residues among fat, skim, curd, whey, and protein fractions in fortified, pasteurized milk
Document No.	ACS Omega 2018, 3, 8697 – 8708
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The purpose of the described work was to investigate the partitioning of 12 environmental chemicals of diverse polarities into various milk fractions. One of the tested chemicals was glyphosate. The experiments were conducted with radio-labelled test materials which were fortified to raw (unpasteurized, non-homogenized) cow milk (3 fortification levels were investigated for each compound). Thereafter, the milk was processed into skim milk, milk fat, curd, whey, whey retentate and whey permeate. A linear model predicting the distribution of chemicals between skim milk and milk fat based on their lipophilicity was established. The distribution between curd and whey was also correlated with lipophilicity. Phenolic compounds had less predictable distribution patterns based on their lipophilicities.

During processing of whole milk to skim milk and milk fat, glyphosate partitioned essentially to skim milk (> 99%). Only about 1% of the glyphosate fortified to whole milk was recovered in milk fat. Following curding of the skim milk, most glyphosate remained in the whey fraction (> 80%). The associations of glyphosate with whey protein (calculated by subtracting the amount present in permeate from the amount present in retentate) was very low (< 5%). As expected due to its hydrophilicity, glyphosate primarily distributes into aqueous products, such as skim milk and whey. The distribution pattern between the various milk fractions was similar for the various amounts of glyphosate fortified to whole milk (range of ca. 0.004 mg/L to 0.348 mg/L).

Although the distribution of residues between skim milk and milk fat is not a data requirement for hydrophilic compounds like glyphosate, this information is considered relevant to risk assessment. Overall, the publication is deemed reliable. Normally, the distribution of residues between skim milk and milk fat should be investigated with raw milk containing incurred residues (in the context of metabolism or feeding studies) and not by (artificially) fortifying raw milk. However, due to the very low transfer of glyphosate-derived residues in milk, the approach used in the publication seems to be the best option to determine the distribution of parent glyphosate residues between skim milk and milk fat.

1. Information on the study

Data point	CA 6.10.1
Report author	Thompson T.S. et al.
Report year	2019
Report title	Determination of glyphosate, AMPA, and glufosinate in honey by online solid-phase extraction-liquid chromatography-tandem mass spectrometry
Document No.	Food Additives & Contaminants: Part A, 2019, Vol. 36, No. 3, 434-446
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes the development and validation of a method for the analysis of glyphosate, AMPA, and glufosinate in honey. Aqueous honey solutions were derivatised offline prior to direct analysis of the target analytes using online solid-phase extraction coupled to liquid chromatography-tandem mass spectrometry (LC-MS/MS). Method validation fulfil EU requirements. The method showed good performance for all analytes with a LOQ of 1 µg/kg for each analyte.

The method can be considered valid for monitoring purposes and has been applied for the analysis of two hundred randomly chosen honey samples from Canada. Virtually all the samples were found to contain measurable residues of glyphosate and/or AMPA, which is at least in part due to the extremely LOQ (1 µg/kg). The ratio between parent glyphosate and AMPA was very variable, which is also in contrast to the findings of the EU monitoring (where no measurable residues of AMPA were found) but may also be accounted for by the very low LOQ. In spite of the large number of samples analysed, none showed residues of parent glyphosate exceeding the current EU MRL of 0.05 mg/kg.

According to SANTE/11956/2016 rev. 9 it is possible to derive MRLs in honey based on monitoring data. As honey available to European consumers may originate from outside the EU, it is appropriate to consider honey residue data from outside the EU to derive the EU MRL. Therefore, the publication is considered relevant and reliable. It also includes a useful discussion of the residue levels of glyphosate in honey reported by other authors.

1. Information on the study

Data point	CA 6.4.2
Report author	Von Soosten D. <i>et al.</i>
Report year	2016
Report title	Excretion pathways and ruminal disappearance of glyphosate and its degradation product aminomethylphosphonic acid in dairy cows
Document No.	J. Dairy Sci. 99 :5318–5324
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The publication describes a series of 6 experiments in which dairy cows (n = 4-6 per experiment) were fed with glyphosate-treated feed for 26 days and where the excretion of parent glyphosate and AMPA residues via feces, urine and milk was investigated during the last 5 days of the experiments (i.e. at a time when steady state can be assumed). The intake of parent glyphosate residues ranged between < 0.001 mg/kg bw/day (experiments 4, 5 and 6) and 0.011 mg/kg bw/day (experiment 1) while the intake of AMPA residues ranged between < 0.001 mg/kg bw/day (experiments 4, 5 and 6) and about 0.008 mg/kg bw/day (experiment 1). These intake levels are far below the dose levels investigated in the goat metabolism studies and cow feeding studies submitted in the dossier (since the applicable guidelines require that the dose levels be higher) but are likely to reflect “typical” intake levels of dietary cows. In the experiments it was found that 50-73% of ingested glyphosate was excreted in feces and 4-8% in urine. Similarly, 44-50% of ingested AMPA was excreted in feces and 8-12% in urine (these figures assume that no glyphosate is metabolized to AMPA in the cows). These results are consistent with the results of the submitted goat metabolism studies which show that 47-78% of the administered radioactivity is excreted via feces and 4.7-23% via urine. The residues of parent glyphosate and AMPA in milk were below the limit of quantification of 0.01 mg/kg, which is consistent with the results of the GLP cow feeding studies submitted in the dossier. Although the residue analytical method and residue analyses are not reported with a high level of detail, the results are considered reliable since the general principle of the described analytical procedures is well known and the validity of the residue determination was obviously demonstrated by suitable fortification trials. The publication, therefore, is considered relevant and reliable.

1. Information on the study

Data point	CA 6.9
Report author	Zoller O. et al.
Report year	2018
Report title	Glyphosate residues in Swiss market foods: monitoring and risk evaluation
Document No.	Food Additives & Contaminants: Part B, 2018, Vol. 11, No. 2, 83-91
Guidelines followed in study	None stated
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (literature publication)
Acceptability/Reliability:	Yes/Uncertain reliability

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes the results of monitoring analyses for residues of glyphosate and AMPA in food conducted by Swiss authorities between 2012 and 2017. A total of 243 samples of diverse food commodities were analysed for glyphosate and AMPA using an LC-MS/MS method that was developed specifically by the Swiss monitoring laboratory. According to the authors the method has a limit of quantification of 0.001 mg/kg for parent glyphosate and 0.0025 mg/kg for AMPA in solid matrices and 0.0005 mg/kg and 0.001 mg/kg, respectively, in liquid matrices (beer, fruit juice, wine). While it seems that these LOQs were established according to recognized procedures, details are missing and it is, therefore, difficult to evaluate the reliability of the provided analytical results. This would be especially important since the reported LOQs are far below the LOQs achieved by most of the other official monitoring laboratories.

As stated by the authors the publication is not intended to provide a representative picture of the residues of glyphosate and AMPA in food commodities placed on the market in Switzerland since the commodities showing high residues were over-represented. In spite of that, the samples relevant to the uses supported in the renewal dossier (e.g. fruits, vegetables, fruit juice, wine, food of animal origin) all showed residues of glyphosate and AMPA far below 0.05 mg/kg (LOQ of most enforcement method so far).

In total, 16 honey samples from Europe and the Americas were analysed. They showed residues of parent glyphosate between < 0.001 mg/kg and 0.0159 mg/kg while the residues of AMPA were always < 0.0025 mg/kg (details are provided as supplementary data). Since according to SANTE/11956/2016 rev. 9 it is possible to derive EU MRLs in honey based on monitoring data and since honey marketed in Switzerland is likely to be also marketed in the EU, these results are deemed relevant to the setting of an EU MRL for glyphosate in honey. The fact that all the samples showed residues of AMPA < 0.0025 mg/kg is in contrast to another publication in which the analyses were also conducted with a very sensitive analytical method and where the residues of AMPA were often found at levels comparable to or even greater than the levels of parent glyphosate residues.

検索期間：2020年1月～6月

区分 a に分類された文献とその理由

ヒトに対する毒性

1. Information on the study

Data point:	CA 5.5/026
Report author	Crump, K. et al.
Report year	2020
Report title	Accounting for Multiple Comparisons in Statistical Analysis of the Extensive Bioassay Data on Glyphosate.
Document No	https://doi.org/10.1093/toxsci/kfaa039
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	-/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Ten cancer bioassays of sufficient quality and which allowed the analysis of individual animal data was selected for the application of a multi-response permutation procedure that adjusts for the large number of tumors eligible for statistical testing and provides valid false-positive probabilities. The statistical tests applied in the analysis were functions of p-values obtained from conventional continuity-corrected poly-3 tests for trend applied to each type of tumor or combination of tumor types in each bioassay. Results from 3 multi-response permutation tests are reported and discussed: the “min-test”, the “05-test” and the “01-test”. In the min-test, the test statistic is the smallest p-value obtained from applying the poly-3 test to all tumor types in all bioassays investigated. Animals are randomly reassigned to dose groups in a Monte Carlo analysis, keeping the total numbers of animals in each dose group equal to the number in the original data. The tumors in each such reassignment are analyzed using the poly-3 test in exactly the same way as in the original data. Males and females are permuted separately. The false positive rate is the proportion of random reassignments that result in a smallest poly-3 p-value that is smaller than or equal to the smallest poly-3 p-value obtained from the original data. The test statistics for the 05-test and the 01-test are the number of poly-3 tests of tumors in the original data for which the p-value is less than or equal to the critical value of 0.05 or 0.01, respectively. In all applications of the poly-3 test, the test is applied only to data from one sex in a single study and the p-values from the poly-3 tests of all the studies are combined to create the “global” tests (min-test, 05-test and 01-test) to give the correct false positive rates. In addition to the randomization procedures for testing for positive dose-response trends in tumor incidence, the same procedures were repeated after reconfiguring the poly-3 test for negative trends. When the frequency of poly-3 p-values for positive trend computed from all tumors in all 10 bioassays in which at least two tumors occurred are considered there is an excess of large p-values (close to 1.0) compared to small p-values (close to 0.0). Since the version of the poly-3 trend test applied is a one-sided test for a positive trend, p-values close to 1.0 would translate into p-values near 0.0 for one-sided trend tests for anti-carcinogenicity. Results of tests for a dose-related decrease in survival in each study show that in none of the bioassays analyzed this test was statistically significant. Moreover, 4 of the datasets had p-values in excess of 0.95 which indicates a significant positive trend in survival with increasing dose. The most significant poly-3 trend in all 10 bioassays was found in the [REDACTED] *et al.* (1993) study for hemangiosarcoma in male mice with a p-value of 0.0013. The actual significance of this smallest p-value, which is the false positive rate for the min-test, was 0.26 based on the primary analysis, rather than the naive value of 0.0013. This means that 26 % of the randomizations of the 10 datasets gave a smallest p-value less than or equal to the smallest p-value obtained from the original data. Besides, the incidence in hemangiosarcomas (8 %) remained within the historical control range and no such tumors were identified in another mouse study at a dose level nearly 5 times of that used in the [REDACTED] *et al.* (1993) study. Overall, these findings suggest that, after accounting for the

number of statistical tests performed, there was no clear evidence of a positive dose-related trend in tumor occurrence. The 01-test for a negative trend was highly significant with a p-value of 0.002. These findings suggest stronger evidence for negative rather than positive dose-response trends in tumor occurrence. In all 10 bioassays investigated, the analysis made in this paper identified 24 tumors that exhibited a poly-3 positive trend with a p-value of less than or equal to 0.05. Nevertheless, after accounting for the multitude of statistical tests this analysis did not find that number statistically significant ($p = 0.08$). The statistical analysis of 10 glyphosate bioassays presented in this paper found no strong statistical evidence that glyphosate is carcinogenic. This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because state-of-the-art statistical methods were employed to a selected set of cancer bioassays to demonstrate false-positive probabilities.

Reliability criteria for *in vivo* toxicology studies

Publication: Crump <i>et al.</i> , 2020.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N.A.	
Study performed according to GLP	N.A.	
Study completely described and conducted following scientifically acceptable standards	Y	Statistical re-analysis of 10 selected bioassays for which individual animal data are available.
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Provided in the original bioassays.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	Provided in the original bioassays.
Test conditions clearly and completely described	Y	Provided in the original bioassays.
Route and mode of administration described	Y	Oral <i>via</i> the diet.
Dose levels reported	Y	Provided in the original assays. The maximum doses reported are 5,873 mg/kg bw/day and 4,841 mg/kg bw/day in female and male mice, respectively.
Number of animals used per dose level reported	Y	50 – 64 animals per dose group.
Method of analysis described for analysis test media	N	Should be provided in original bioassays.
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	N.A.	Statistical re-analysis of all tumor sites.
Statistical methods described	Y	Application of a multi-response permutation procedure providing valid false-positive probabilities.
Historical control data of the laboratory reported	Y	For some tumors.
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because state-of-the-art statistical methods were employed to a selected set of cancer bioassays to demonstrate false-positive probabilities.		

1. Information on the study

Data point:	CA 5.6
Report author	Ganesan S. <i>et al.</i>
Report year	2020
Report title	Absence of glyphosate-induced effects on ovarian folliculogenesis and steroidogenesis
Document No	Reproductive Toxicology, (2020) 96, 156-164 DOI: 10.1016/j.reprotox.2020.06.011
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In vivo study on post natal day 42, glyphosate administered to C57BL/6 J female mice at 0 or 2 mkd (10 mice/dose). Cyclicity, follicle number, circulating ovarian steroid hormone levels and ovarian intracellular signaling parameters were tested in adult female mice during 5 or 10 weeks. Glyphosate exposure for five or ten weeks did not affect the ovarian and endocrine endpoints examined.

The article is classified as reliable with restrictions for the following reasons: only 1 dose tested (no dose relationship can be evaluated), purity of glyphosate is not clear, method of analysis for analysis test media & no validation of the analytical method was described, no GLP status stated, no OECD guideline followed. Although no HCD were available in order to compare with the equivalent concurrent controls and test groups results, the results were negative and therefore did not require HCD to interpret or provide context to any findings.

Reliability Criteria: <i>In Vivo</i> Toxicology Studies		
Publication: Ganesan S. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	Use of control group, 10 female mice/group, 1 dose + 1 negative control, statistical analysis performed, no randomisation of animals mentioned, no HCD
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate No Purity, no storage condition stated
Only glyphosate acid or one of its salts is the tested substance	N	Glyphosate
AMPA is the tested substance	N	
Study		

Reliability Criteria: <i>In Vivo</i> Toxicology Studies		
Publication: Ganesan S. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Test species clearly and completely described	Y	C57BL/6 J mice, age, origin stated but initial BW not included
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Per os
Dose levels reported	Y	0 and 2 mg/kg/d; 5 days/week for 5 and 10 weeks
Number of animals used per dose level reported	Y	10 mice/group 5 weeks (n = 10 control; n = 10 GLY) and 10 weeks (n = 10 control; n = 10 GLY)
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	N	Only 1 dose tested
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	only 1 dose tested (no dose relationship can be evaluated), purity of glyphosate is not clear, method of analysis for analysis test media & no validation of the analytical method was described, no GLP status stated, no OECD guideline followed. Although no HCD were available in order to compare with the equivalent concurrent controls and test groups results, the results were negative and therefore did not require HCD to interpret or provide context to any findings.
Not reliable	N	

1. Information on the study

Data point:	CA 5.8.3
Report author	Gastiazoro M.P. <i>et al.</i>
Report year	2020
Report title	Glyphosate induces epithelial mesenchymal transition-related changes in human endometrial Ishikawa cells via estrogen receptor pathway
Document No	Molecular and cellular endocrinology, (2020), Vol. 510, Art. No. 110841
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Ishikawa endometrial cancer cells were treated with glyphosate at 0.2 µM and 2 µM. Glyphosate caused cell migration, invasion ability and down regulated E-cadherin mRNA expression. 17β-estradiol, which was included as a positive control caused similar epithelial mesenchymal transition related changes, while treatment with fulvestrant (estrogen receptor antagonist) reversed the effects caused by glyphosate. The findings suggest that glyphosate has the ability to trigger the estrogen receptor-dependant pathway.

The relevance to human health risk assessment of this unvalidated *in vitro* research model in an immortal adenocarcinoma cell line containing estrogen and progesterone receptors is not clear. The results contradict a number of higher tier studies conducted across a variety of test systems,

The article is classified as reliable with restrictions for the following reason : glyphosate was tested at two different concentrations only, no test guideline was used and no historical control data were provided in order to compare with the equivalent concurrent controls and test groups results. Further, the study was not performed according to GLP.

Reliability criteria for <i>in vitro</i> toxicology studies		
Publication: Gastiazoro M.P. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate (purity ≤ 100%)
Only glyphosate acid or one of its salts is the tested substance	N	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Ishikawa cells

Reliability criteria for <i>in vitro</i> toxicology studies		
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	Not necessary
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.2 µM and 2 µM
Cytotoxicity tests reported	Y	Viability was assessed with trypan blue dye exclusion assay
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	Y	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Glyphosate was tested at two different concentrations only, no test guideline was used and no historical control data were provided in order to compare with the equivalent concurrent controls and test groups results. Further, the study was not performed according to GLP.
Not reliable	N	

1. Information on the study

Data point:	CA 5.2.6
Report author	Lindberg T. <i>et al.</i>
Report year	2020
Report title	An integrated transcriptomic- and proteomic-based approach to evaluate the human skin sensitization potential of glyphosate and its commercial agrochemical formulations
Document No	Journal of proteomics, (2020) Vol. 217, pp. 103647
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Investigation of molecular mechanisms in the skin sensitization process specifically focusing on DC activation using an integrated transcriptomic- and proteomic approach.

First, Mutz-3-derived cells were exposed to PPD, DMSO, unexposed sample and glyphosate. No cytotoxicity was observed for glyphosate and glyphosate was classified as non-sensitising.

Second, PPD, DMSO, unexposed sample and glyphosate were assembled to protein groups. A clear separation between sensitizers (PPD) and non-sensitizers (unexposed, DMSO, glyphosate) was observed. Data on glyphosate are consistent with other available validated assay results.

The article is classified as reliable with restrictions for the following reason: This is a non-validated test system. The purity and origin of glyphosate is unclear. only 1 dose tested (no dose relationship can be evaluated), no HCD were available in order to compare with the equivalent concurrent controls and test groups results.

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Lindberg T. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Not applicable because there is no OECD guideline for this type of test
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	The only information is that glyphosate's input concentration was 500 µM. The purity, origin etc. is unclear.
Only glyphosate acid or one of its salts is the tested substance	N	Glyphosate alone and EU non-representative formulations were tested (summary above is provided only for glyphosate)
AMPA is the tested substance	N	

Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	n.a.	Not applicable as no metabolic activation system used
Test concentrations in physiologically acceptable range (< 1 mM)	Y	
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Not applicable as only 1 concentration was used
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	This is a non-validated test system. The purity and origin of glyphosate is unclear. Only 1 dose tested (no dose relationship can be evaluated). No HCD were available in order to compare with the equivalent concurrent controls and test groups results.
Not reliable	N	

1. Information on the study

Data point:	CA 5.5/027
Report author	Portier, C.J.
Report year	2020
Report title	A comprehensive analysis of the animal carcinogenicity data for glyphosate from chronic exposure rodent carcinogenicity studies
Document No	Environ Health (2020) Vol. 19, 18. https://doi.org/10.1186/s12940-020-00574-1
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	-/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Thirteen glyphosate cancer bioassays considered acceptable for this re-analysis were selected from the published literature, the EPA review, the review from the German Institute for Risk Analysis, the JMPR review, and full laboratory reports. For twelve of them full study reports were available. Individual tumour counts for the individual studies were re-analyzed using the exact Cochran-Armitage one-sided linear trend test. Re-analyses were conducted on all primary tumours where there were at least 3 tumours in all of the animals in a sex/species/strain combination. In addition, any tumour where a significant positive trend ($p \leq 0.05$) was found in at least one study was also evaluated in all the other studies of the same sex/species/strain combination, regardless of the number of animals with the tumour. Pairwise comparisons between individual exposed groups and the control group were conducted using Fisher's exact test. To evaluate the consistency of a tumour finding across multiple studies using the same sex-species-strain combinations, logistic regression with individual background responses and dose trends are fit to the pooled data using maximum likelihood estimation. The same methods of analysis were used to evaluate the incidence of non-neoplastic lesions in tissues where tumours were observed. In cases of rare tumours where the increase in incidence didn't reach statistical significance the test proposed by Tarone (1982) was applied using an appropriate historical control group. To summarize the results of the strength-of-evidence analysis, each tumour is placed in any of the following categories: Clear evidence (CE), some evidence (SE), equivocal evidence (EE), and no evidence (NE). The factors used to place tumours into these categories include the analyses of the individual studies, the consistency of the data across studies (pooled analyses), the analyses using historical control data, the analyses of non-neoplastic lesions, and mechanistic evidence with the associated scientific literature. The author's weight-of-evidence analysis indicates that there is clear evidence (CE) that oral exposure to glyphosate *via* the diet produces adrenal cortical carcinoma in the female SD rat, hemangioma in the female mouse (CD-1 and Swiss albino), hemangiosarcoma in the male CD-1 mouse, kidney tumours in the male CD-1 mouse and SD rat, liver adenoma in the male rat (SD and Wistar), malignant lymphoma in the male and female CD-1 mouse, skin basal cell tumour in the male SD rat and skin keratoacanthoma in male rats (SD and Wistar). Some evidence (SE) for a causal relationship was put forth for kidney tumours in the male Swiss albino mouse, mammary tumours in the female Wistar rat, malignant lymphoma in the male and female Swiss albino mouse, pituitary adenoma in the male and the female Wistar rat, and testicular interstitial cell tumours in the male SD rat.

After thorough analysis and considering all factors that are important in the interpretation of cancer studies none of the tumours identified by the author as indicating clear evidence (CE) or some evidence (SE) of carcinogenicity were found relevant for reconsideration under the necessary due diligence of the European AIR5 review of glyphosate. Most of the tumours selected by the author were previously dismissed by the EU experts as not relevant even before the last review of glyphosate

in 2017, and the applicant believes that there is no solid toxicological evidence for glyphosate exposure related carcinogenicity in the mouse and the rat that warrants any science-based concerns for human health. The discussion of each of the suspect tumours is given below.

Clear evidence (CE) for carcinogenicity:

Adrenal cortical carcinoma in the female SD rat (██████████ study):

The tumour incidences were 0/60, 0/60, 0/60, 3/60 at 0, 113, 457, and 1183 mg/kg bw/day, respectively. This tumour has not been considered treatment related by the authors of the study. There is no dose-related increase in adrenal cortical adenoma (1/60, 3/60, 2/60, 1/60), no dose-related increase in pre-neoplastic lesions and this tumour was not found in the males of the same study or in other rat studies. Therefore, this tumour has been considered not relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hemangioma in female CD-1 mice (██████████ study):

In the ██████████ study hemangiomas were observed in different tissues:

- In liver with an incidence of 0/50, 0/50, 1/50, 1/50;
- In the ovary with an incidence of 0/50, 0/50, 0/50, 1/50;
- In the uterus with an incidence of 0/50, 0/50, 1/50, 2/50;
- In the spleen with an incidence of 0/50, 0/50, 1/50, 0/50;
- In the abdominal cavity with an incidence of 0/8, 0/9, 0/9, 1/9;

At 0, 153.2, 786.8, and 4116 mg/kg bw/day, respectively. Taken together as systemic tumours a significant positive trend is obtained. However, hemangiomas have also been observed in males (liver and testes) but without any dose-response relationship and the highest incidence found was in the control group (1/50). These tumours have not been confirmed in the other carcinogenicity studies in the CD-1 mouse. Moreover, the dose level (4116 mg/kg bw/day) at which the incidence was statistically significantly increased when compared against the control, is more than 4-fold the limit dose for the testing of carcinogens in rodent species. If that dose is ignored there is no significant positive trend. Therefore, this tumour has been considered not relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hemangioma in female Swiss albino mice (██████████ study):

In the re-analysis of the tumour data of the ██████████ study by ██████████ (report submitted in 2017) no statistically significant trend was found for systemic neoplasms using the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Hemangiosarcoma in the male CD-1 mouse (██████████ study):

The tumour incidences were 0/50, 0/50, 0/50, 4/50 (3 in liver and 1 in prostate) at 0, 98, 297, and 988 mg/kg bw/day, respectively. The incidence at the highest dose (8 %) was still within the historical control range of the test laboratory (0-8 %, 300 male mice in 6 studies up to 1993). This tumour was not confirmed in other mouse studies of which one (██████████ study) with a dose level nearly 5-fold that of the ██████████ study (4841 mg/kg bw/day). Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Kidney tumours in the male CD-1 mouse (██████████ study, as reported by JMPR, 2016):

Renal cell adenoma (3/50) and renal cell carcinoma (1/50) were observed in males at 7470 mg/kg bw/day, but, according to the authors, there was no statistically significant difference with the control group. It is of note that the high dose considered in this study for males is extraordinarily high, more than 7-fold the limit dose for the testing of carcinogens in rodent species. If this dose is ignored there is no significant positive trend. These tumours were re-examined by the original study pathologist in 2012 because the Pesticide Expert Panel of the Food Safety Commission of Japan requested more information on historical control data and association with the non-neoplastic renal findings. After re-examination, the incidences for renal cell adenoma were 1/50, 1/50, and 1/50 at 167.6, 685, and

7470 mg/kg bw/day, showing no dose-response relationship. The incidence for renal cell carcinoma was confirmed to be 1/50 at 7470 mg/kg bw/day. The historical control data for the [REDACTED] study were not available, but the historical control values described in the re-examination document for renal cell carcinoma were 1/725 (0.13 %) in males and 0/725 (0 %) in females and for renal cell adenoma were 3/564 (0.53 %) in males and 0/564 (0 %) in females. The re-examination report also provides reference data of 0-1.8 % in males and 0 % for all doses in females for renal cell carcinoma, and 0-1.8 % in males and females for renal cell adenoma. The results of the re-examination revealed also that the tubular epithelial cell hypertrophy was localized with an incidence in each treatment group that did not significantly differ from that in the control group. There was no association between the tubular epithelial cell hypertrophy and the development of renal tumours. The renal cell tumours observed in this study are thus not relevant for the human risk assessment of glyphosate because (1) the incidence of renal tumours in males at 7470 mg/kg bw/day did not significantly differ from that in the control group upon re-evaluation; (2) none of the females had neoplastic or non-neoplastic lesions; and (3) the high dose considered in this study for males is more than 7-fold the limit dose for the testing of carcinogens in rodent species. Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Kidney tumours in the male SD rat ([REDACTED] study):

The incidences of kidney adenoma were 0/76, 0/75, 0/80, 4/78 at 0, 104, 354, and 1127 mg/kg bw/day. An increasing trend in the incidence of adenomas in the kidney was observed in males of the high dose group (animal 193: killed in extremis at week 92, animal 167: found dead at week 94, animal 159: found dead at week 101, and animal 169: killed by design after 104 weeks of treatment) and this incidence was greater than the historical control range referred to in the study report (0-2.9 %). However, according to the authors of this study, the increase observed was not statistically significant. No kidney tumours were found in the females and nearly all male rats at all dose levels suffered from chronic nephropathy (62/76, 63/75, 56/80, 67/78). This tumour in this study was not considered relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hepatocellular adenomas in the male SD rat ([REDACTED]):

The tumour incidences for adenomas were 3/60, 2/60, 3/60, 8/60 and of carcinomas were 3/60, 2/60, 1/60, 2/60 at 0, 89, 362, and 940 mg/kg bw/day, respectively. The incidence of adenomas at the high dose (13.3 %) is still within the historical control range of the test laboratory (1.4-18.3 %). Foci of cellular alteration were observed at all dose levels without any dose-response relationship and there were no signs of hepatocellular hypertrophy, a prerequisite for hepatocellular carcinogenesis. Beside the [REDACTED] study no increase in hepatocellular adenomas was noted in the other rat studies. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Hepatocellular adenomas in the male Wistar rat ([REDACTED] study):

The tumour incidences were 0/64, 2/64, 0/64, 5/64 at 0, 121, 361, 1214 mg/kg bw/day, respectively. The positive trend is significant and the incidence at the high dose is significantly different from the control. However, the incidence at the high dose (7.8 %) is still within the historical control range of the test laboratory (0-11.5 %, 26 studies in 1984-2003). There were no histopathological signs of liver enzyme induction or pre-neoplastic lesions. The high dose animals in this study survived longer when compared to the other groups. This may also influence the spontaneous tumour rate. Beside the [REDACTED] study no increase in hepatocellular adenomas was noted in the other rat studies. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the male CD-1 mouse ([REDACTED] study):

The tumour incidences were 2/50, 2/50, 0/50, 6/50 at 0, 165, 838, 4348 mg/kg bw/day, respectively. The positive trend is significant but the incidence at the high dose is not significantly different from the control. Moreover, the incidence at the high dose (12 %) is still within the historical control range of the test laboratory (3.6-19.2 %, 458 male mice in 12 studies in 1993-1998). The trend has been found significantly positive because of the elevated incidence at a dose level that is over 4-fold the limit dose for carcinogenicity studies in rodents. If this dose is ignored the trend is not positive. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the female CD-1 mouse (██████ study):

The tumour incidences were 3/50, 1/50, 4/50, 6/50 at 0, 93.2, 909, and 8690 mg/kg bw/day, respectively. The increased incidence of lymphoma at the high dose was statistically significant in the trend test but not in a pairwise comparison. The trend has been found significantly positive because of the elevated incidence at an extraordinarily high dose level, more than 8-fold the limit dose for carcinogenicity studies in rodents. If this dose is ignored the trend is no longer significant. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Skin basal cell tumour in the male SD rat (██████ study):

The tumour incidences were 0/78, 0/75, 0/80, 3/78 for adenoma and 0/78, 0/75, 0/80, 1/78 for carcinoma at 0, 104, 354, and 1127 mg/kg bw/day. No increased incidence of this tumour was observed in the females or other rat studies and may be associated with other skin lesions (follicular hyperkeratosis and/or folliculitis/follicular abscess) observed in this study. Although there is a significant positive trend for the adenomas, the increase in incidence at the high dose level was not considered relevant for the risk assessment of glyphosate by the authors of this study. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (██████ study):

The tumour incidences were 1/60, 3/60, 4/60, 5/60 at 0, 89, 362, and 940 mg/kg bw/day. Although there is a significant positive trend the incidence at the high dose was not statistically significantly different from the control and considered not related to treatment. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats. Therefore, this tumour was not considered relevant for the risk assessment of glyphosate by the authors of this study. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (██████ study):

The combined incidences of intracutaneous cornifying epithelioma (keratoacanthoma) were 1/50, 2/25, 0/19, 0/21, 5/50 at 0, 11, 112, 320, and 1147 mg/kg bw/day. Although the trend was significant, the incidence at the high dose was not statistically significantly different from the control and considered not related to treatment by the authors of this study. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (██████ study):

The incidences of the tumour were 4/76, 3/75, 0/80, 7/78 at 0, 104, 354, and 1127 mg/kg bw/day. The increased incidence of this skin tumour at the high dose may be associated with other skin lesions (follicular hyperkeratosis and/or folliculitis/follicular abscess) observed in this study. Although there is a significant positive trend for this tumour, the increase in incidence at the high dose level was not statistically significantly different from the control. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats and considered by the authors of this study not relevant for the risk assessment of glyphosate. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male Wistar rat (██████ study):

There were no treatment-related conditions seen in the skin or in subcutaneous tissues, but several spontaneous lesions were observed. Epidermal ulceration and scab formation, inflammatory lesions, abscess formation, focal acanthosis, focal mineralisation, focal dermal thickening, and focal necrosis were seen, occasionally or rarely and without significance. This tumour was not discussed further in the previous EU review of glyphosate.

Some evidence for carcinogenicity (SE)

Kidney tumours in the male Swiss albino mouse (██████ study):

In the re-analysis of the tumour data of the ████████ study by ████████ (submitted in 2017) no statistically significant trend was found for systemic neoplasms in the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise

comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Mammary tumour in the female Wistar rat (██████ study):

At interim and terminal sacrifice combined mammary neoplasia was seen in 6 female mice. There were no mammary neoplasms in the control group but carcinomas were seen with incidences of 2/51, 3/51, and 1/51 at 153.2, 786.8, and 4116 mg/kg bw/day, respectively. All neoplasms were adenocarcinomas with the exception of one adenosquamous carcinoma seen in a low dose group animal. No increase in the incidence of these tumours was reported in the females of other rat studies. The authors concluded that there was no effect of treatment upon the incidence of mammary neoplasia in this study. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the male Swiss albino mouse (██████ study):

In the re-analysis of the tumour data of the ██████ study by ██████ (2017) no statistically significant trend was found for systemic neoplasms in the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour was not considered as relevant for the assessment of glyphosate.

Pituitary adenomas in the male and the female Wistar rat (██████ study):

Pituitary adenomas were only seen in female mice with incidences of 0/51, 1/51, 0/51, 2/52 at 0, 104.5, 348.6, and 1381.9 mg/kg bw/day. The group distribution was unrelated to treatment. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Testicular interstitial cell tumour in the male SD rat (██████ study):

The incidences of this tumour were 0/50, 3/50, 1/50, 6/50 at 0, 3.05, 10.30, and 31.49 mg/kg bw/day, respectively. The positive trend is statistically significant and the incidence at the high dose level (12 %) is statistically significantly different from the control and greater than the historical control rate of the test laboratory (3.4-6.6 %). However, there was no dose-response relationship for interstitial cell hyperplasia (1/50, 1/50, 1/50, 0/50). Since the dose range considered in this study (0-31.5 mg/kg bw/day) is approximately at least 30-fold lower than that of all the other studies in rats where no increase of such tumours was found this finding should be considered as spontaneous in nature. Therefore, this tumour was not considered relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the statistical methods employed were not described in sufficient detail. Besides, the results of this study are not in agreement with the findings of Crump *et al.* 2020 in relation to the estimation of false positives and the overall evaluation of the significance of the tumours by the EU regulatory authorities. All the tumours that were identified by the author as providing clear evidence for the carcinogenicity of glyphosate have been previously dismissed in the EU regulatory process.

Reliability criteria for *in vivo* toxicology studies

Publication: Portier, 2020.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N.A.	
Study performed according to GLP	N. A.	Most of the study reports analysed were GLP compliant.

Study completely described and conducted following scientifically acceptable standards	Y	Re-analysis of the tumour data of 13 selected glyphosate cancer bioassays.
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of glyphosate used in every cancer bioassay mentioned.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	N.A.	Described in the test reports of 12 of the selected studies. The data from one study were derived from a JMPR review.
Route and mode of administration described	Y	Oral <i>via</i> the diet.
Dose levels reported	Y	Dose range from 71.4 to 8690 mg/kg bw in the mouse and from 3.05 to 4348 mg/kg bw in the rat.
Number of animals used per dose level reported	Y	About 50 per dose group.
Method of analysis described for analysis test media	N.A.	Described in the original test reports.
Validation of the analytical method	N.A.	
Analytical verifications of test media	N.A.	
Complete reporting of effects observed	Y	
Statistical methods described	Y	All statistical methods used in the re-analysis of the tumour data were reported, however sometimes not in sufficient detail.
Historical control data of the laboratory reported	N.A.	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the statistical methods employed were not described in sufficient detail. Besides, the results of this study are not in agreement with the findings of Crump <i>et al.</i> 2020 in relation to the estimation of false positives and the overall evaluation of the significance of the tumours by the EU regulatory authorities. All the tumours that were identified by the author as providing clear evidence for the carcinogenicity of glyphosate have been dismissed in the EU regulatory process.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Xia Y. <i>et al.</i>
Report year	2020
Report title	The endoplasmic reticulum stress and related signal pathway mediated the glyphosate-induced testosterone synthesis inhibition in TM3 cells
Document No	Environmental Pollution, (2020) 260, 113949 DOI: 10.1016/j.envpol.2020.113949
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In vitro study on the effects of glyphosate on testosterone secretion and the role of endoplasmic reticulum stress in the process were investigated in TM3 cells. Results showed that exposure to glyphosate at concentrations below 200 mg/L had no effect on cell viability, while glyphosate at concentrations above 0.5 mg/L could inhibit the testosterone secretion in TM3 cells. Treatment of TM3 cells with glyphosate at 5 mg/L not only reduced the protein levels of testosterone synthase StAR and CYP17A1 but also inhibited testosterone secretion.

The article is classified as reliable with restrictions for the following reason: not enough information on the tested material (purity) was provided, no positive controls were used, and no statistical methods were described. Furthermore, no OECD guidelines were followed, no GLP status was stated, and no historical control data (HCD) were provided to compare the relevance of data. In addition, key literature in disagreement with the authors' findings appear to have been disregarded, suggesting bias within the research and the following publications: Hecker (2011), OECD validation of the H295R steroidogenesis assay with glyphosate; Levine (2007), demonstrating a lack of effect of glyphosate on the StAR protein; US EPA (2015), glyphosate EDSP weight of evidence evaluation; and EFSA (2017), peer review of glyphosate potential endocrine-disrupting properties.

Hecker M et al (2011), The OECD validation program of the H295R steroidogenesis assay: Phase 3. Final inter-laboratory validation study, Environmental Science and Pollution Research 18(3):503-15

Levine S. L. Et al. (2007), Disrupting mitochondrial function with surfactants inhibits MA-10 Leydig cell steroidogenesis, Cell Biol Toxicol (2007) 23:385-400

US EPA (2015), EDSP Weight of Evidence Conclusions on the Tier 1 Screening Assays for the List 1 Chemicals - EDSP: WEIGHT OF EVIDENCE ANALYSIS OF POTENTIAL INTERACTION WITH THE ESTROGEN, ANDROGEN OR THYROID PATHWAYS - CHEMICAL: GLYPHOSATE

EFSA (2017): Peer review of the pesticide risk assessment of the potential endocrine disrupting properties of glyphosate, Question number: EFSA-Q-2016-00663

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Xia Y. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate Purity not stated
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	N	TM3 cells (no purity stated)
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	Not necessary
Test concentrations in physiologically acceptable range (<1 mM)	N	0.01 to 200 mg/L
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive controls
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Not enough information on the tested material (purity), no positive controls were used, no statistical methods were described. Furthermore, no OECD guideline followed, no GLP status was stated. In addition, no HCD were available in order to compare the relevance of the data. In addition, key literature in disagreement with the authors' findings appear to have been disregarded, suggesting bias within the research and publication: Hecker (2011) OECD validation of the H295R steroidogenesis assay with glyphosate; Levine (2007) demonstrating a lack of effect of glyphosate on the StAR protein; US EPA (2015) glyphosate EDSP weight of evidence evaluation; EFSA (2017) peer review of glyphosate potential endocrine-disrupting properties.

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Xia Y. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Not reliable	N	

1. Information on the study

Data point:	CA 5.8.2
Report author	Yahfoufi Z. A. <i>et al.</i>
Report year	2020
Report title	Glyphosate Induces Metaphase II Oocyte Deterioration and Embryo Damage by Zinc Depletion and Overproduction of Reactive Oxygen Species
Document No	Toxicology, (2020) Vol. 439, Art. No. 152466
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The quality of metaphase II noncumulus oocytes and embryos from mice were investigated following glyphosate exposure at different concentrations (max 300 µM). The concentrations were in the range of those found in human blood following accidental acute exposure or suicidal attempts.

Results indicate that glyphosate provokes disruption of the microtubule organizing center and chromosomal disorganization at the mid-position of the spindle due to spindle disappearance, and defective chromosomal alignment as well as depletion of intracellular zinc bioavailability and enhancement of reactive oxygen species (ROS) accumulation in the mouse oocytes. In the embryos (not specified the source and the embryonal stage) zinc depletion and accumulation of ROS was also observed in a dose-related manner.

The article is classified as *reliable with restrictions* for the following reason: Not performed according to GLP or an OECD test guideline. No purity of the test substance stated. No information of the source and the embryonal stage of the embryos were provided. There were no concurrent positive control or substances known to deteriorates oocyte quality through disassembly of microtubule organizing centers (like peroxyntrite) or ROS accumulation (like hydrogen peroxide, and hypochlorous acid) or dimercapto-1-propanesulfonic acid (DMPS) for zinc depletion.

Reliability criteria for <i>in vitro</i> toxicology studies		
Publication: Yahfoufi Z. A. et al. 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	No GLP or OECD test guideline followed
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	No purity, content, storage conditions
Only glyphosate acid or one of its salts is the tested substance	Unknown	
AMPA is the tested substance	N	
Study		

Reliability criteria for <i>in vitro</i> toxicology studies		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	No metabolic activation system present
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Max. concentration 300 µM
Cytotoxicity tests reported	N	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Not performed according to GLP or an OECD test guideline. No purity of the test substance stated. No appropriate information on the tested embryos was provided. Tested dose correspond to level of glyphosate that may be found in human blood following human accidental acute exposure intoxication. No reference compound were tested in parallel to confirm the appropriateness of the testing procedures and the relevance of the results.
Not reliable	N	

検索期間：2020年1月～6月

区分 a に分類された文献とその理由

農作物及び畜産物への残留

1. Information on the study

Data point:	CA 5.5/026
Report author	Crump, K. et al.
Report year	2020
Report title	Accounting for Multiple Comparisons in Statistical Analysis of the Extensive Bioassay Data on Glyphosate.
Document No	https://doi.org/10.1093/toxsci/kfaa039
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	-/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Ten cancer bioassays of sufficient quality and which allowed the analysis of individual animal data was selected for the application of a multi-response permutation procedure that adjusts for the large number of tumors eligible for statistical testing and provides valid false-positive probabilities. The statistical tests applied in the analysis were functions of p-values obtained from conventional continuity-corrected poly-3 tests for trend applied to each type of tumor or combination of tumor types in each bioassay. Results from 3 multi-response permutation tests are reported and discussed: the “min-test”, the “05-test” and the “01-test”. In the min-test, the test statistic is the smallest p-value obtained from applying the poly-3 test to all tumor types in all bioassays investigated. Animals are randomly reassigned to dose groups in a Monte Carlo analysis, keeping the total numbers of animals in each dose group equal to the number in the original data. The tumors in each such reassignment are analyzed using the poly-3 test in exactly the same way as in the original data. Males and females are permuted separately. The false positive rate is the proportion of random reassignments that result in a smallest poly-3 p-value that is smaller than or equal to the smallest poly-3 p-value obtained from the original data. The test statistics for the 05-test and the 01-test are the number of poly-3 tests of tumors in the original data for which the p-value is less than or equal to the critical value of 0.05 or 0.01, respectively. In all applications of the poly-3 test, the test is applied only to data from one sex in a single study and the p-values from the poly-3 tests of all the studies are combined to create the “global” tests (min-test, 05-test and 01-test) to give the correct false positive rates. In addition to the randomization procedures for testing for positive dose-response trends in tumor incidence, the same procedures were repeated after reconfiguring the poly-3 test for negative trends. When the frequency of poly-3 p-values for positive trend computed from all tumors in all 10 bioassays in which at least two tumors occurred are considered there is an excess of large p-values (close to 1.0) compared to small p-values (close to 0.0). Since the version of the poly-3 trend test applied is a one-sided test for a positive trend, p-values close to 1.0 would translate into p-values near 0.0 for one-sided trend tests for anti-carcinogenicity. Results of tests for a dose-related decrease in survival in each study show that in none of the bioassays analyzed this test was statistically significant. Moreover, 4 of the datasets had p-values in excess of 0.95 which indicates a significant positive trend in survival with increasing dose. The most significant poly-3 trend in all 10 bioassays was found in the Atkinson *et al.* (1993) study for hemangiosarcoma in male mice with a p-value of 0.0013. The actual significance of this smallest p-value, which is the false positive rate for the min-test, was 0.26 based on the primary analysis, rather than the naive value of 0.0013. This means that 26 % of the randomizations of the 10 datasets gave a smallest p-value less than or equal to the smallest p-value obtained from the original data. Besides, the incidence in hemangiosarcomas (8 %) remained within the historical control range and no such tumors were identified in another mouse study at a dose level nearly 5 times of that used in the Atkinson *et al.* (1993) study. Overall, these findings suggest that, after accounting for the

number of statistical tests performed, there was no clear evidence of a positive dose-related trend in tumor occurrence. The 01-test for a negative trend was highly significant with a p-value of 0.002. These findings suggest stronger evidence for negative rather than positive dose-response trends in tumor occurrence. In all 10 bioassays investigated, the analysis made in this paper identified 24 tumors that exhibited a poly-3 positive trend with a p-value of less than or equal to 0.05. Nevertheless, after accounting for the multitude of statistical tests this analysis did not find that number statistically significant ($p = 0.08$). The statistical analysis of 10 glyphosate bioassays presented in this paper found no strong statistical evidence that glyphosate is carcinogenic. This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because state-of-the-art statistical methods were employed to a selected set of cancer bioassays to demonstrate false-positive probabilities.

Reliability criteria for *in vivo* toxicology studies

Publication: Crump <i>et al.</i> , 2020.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N.A.	
Study performed according to GLP	N.A.	
Study completely described and conducted following scientifically acceptable standards	Y	Statistical re-analysis of 10 selected bioassays for which individual animal data are available.
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Provided in the original bioassays.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	Provided in the original bioassays.
Test conditions clearly and completely described	Y	Provided in the original bioassays.
Route and mode of administration described	Y	Oral <i>via</i> the diet.
Dose levels reported	Y	Provided in the original assays. The maximum doses reported are 5,873 mg/kg bw/day and 4,841 mg/kg bw/day in female and male mice, respectively.
Number of animals used per dose level reported	Y	50 – 64 animals per dose group.
Method of analysis described for analysis test media	N	Should be provided in original bioassays.
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	N.A.	Statistical re-analysis of all tumor sites.
Statistical methods described	Y	Application of a multi-response permutation procedure providing valid false-positive probabilities.
Historical control data of the laboratory reported	Y	For some tumors.
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	Y	
Reliable with restrictions		
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate and reliable without restrictions because state-of-the-art statistical methods were employed to a selected set of cancer bioassays to demonstrate false-positive probabilities.		

1. Information on the study

Data point:	CA 5.6
Report author	Ganesan S. <i>et al.</i>
Report year	2020
Report title	Absence of glyphosate-induced effects on ovarian folliculogenesis and steroidogenesis
Document No	Reproductive Toxicology, (2020) 96, 156-164 DOI: 10.1016/j.reprotox.2020.06.011
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In vivo study on post natal day 42, glyphosate administered to C57BL/6 J female mice at 0 or 2 mkd (10 mice/dose). Cyclicity, follicle number, circulating ovarian steroid hormone levels and ovarian intracellular signaling parameters were tested in adult female mice during 5 or 10 weeks. Glyphosate exposure for five or ten weeks did not affect the ovarian and endocrine endpoints examined.

The article is classified as reliable with restrictions for the following reasons: only 1 dose tested (no dose relationship can be evaluated), purity of glyphosate is not clear, method of analysis for analysis test media & no validation of the analytical method was described, no GLP status stated, no OECD guideline followed. Although no HCD were available in order to compare with the equivalent concurrent controls and test groups results, the results were negative and therefore did not require HCD to interpret or provide context to any findings.

Reliability Criteria: <i>In Vivo</i> Toxicology Studies		
Publication: Ganesan S. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	Use of control group, 10 female mice/group, 1 dose + 1 negative control, statistical analysis performed, no randomisation of animals mentioned, no HCD
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate No Purity, no storage condition stated
Only glyphosate acid or one of its salts is the tested substance	N	Glyphosate
AMPA is the tested substance	N	
Study		

Reliability Criteria: <i>In Vivo</i> Toxicology Studies		
Publication: Ganesan S. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Test species clearly and completely described	Y	C57BL/6 J mice, age, origin stated but initial BW not included
Test conditions clearly and completely described	Y	
Route and mode of administration described	Y	Per os
Dose levels reported	Y	0 and 2 mg/kg/d; 5 days/week for 5 and 10 weeks
Number of animals used per dose level reported	Y	10 mice/group 5 weeks (n = 10 control; n = 10 GLY) and 10 weeks (n = 10 control; n = 10 GLY)
Method of analysis described for analysis test media	N	
Validation of the analytical method	N	
Analytical verifications of test media	N	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical control data of the laboratory reported	N	
Dose-effect relationship reported	N	Only 1 dose tested
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	only 1 dose tested (no dose relationship can be evaluated), purity of glyphosate is not clear, method of analysis for analysis test media & no validation of the analytical method was described, no GLP status stated, no OECD guideline followed. Although no HCD were available in order to compare with the equivalent concurrent controls and test groups results, the results were negative and therefore did not require HCD to interpret or provide context to any findings.
Not reliable	N	

1. Information on the study

Data point:	CA 5.8.3
Report author	Gastiazoro M.P. <i>et al.</i>
Report year	2020
Report title	Glyphosate induces epithelial mesenchymal transition-related changes in human endometrial Ishikawa cells via estrogen receptor pathway
Document No	Molecular and cellular endocrinology, (2020), Vol. 510, Art. No. 110841
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Ishikawa endometrial cancer cells were treated with glyphosate at 0.2 µM and 2 µM. Glyphosate caused cell migration, invasion ability and down regulated E-cadherin mRNA expression. 17β-estradiol, which was included as a positive control caused similar epithelial mesenchymal transition related changes, while treatment with fulvestrant (estrogen receptor antagonist) reversed the effects caused by glyphosate. The findings suggest that glyphosate has the ability to trigger the estrogen receptor-dependant pathway.

The relevance to human health risk assessment of this unvalidated *in vitro* research model in an immortal adenocarcinoma cell line containing estrogen and progesterone receptors is not clear. The results contradict a number of higher tier studies conducted across a variety of test systems,

The article is classified as reliable with restrictions for the following reason : glyphosate was tested at two different concentrations only, no test guideline was used and no historical control data were provided in order to compare with the equivalent concurrent controls and test groups results. Further, the study was not performed according to GLP.

Reliability criteria for <i>in vitro</i> toxicology studies		
Publication: Gastiazoro M.P. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate (purity ≤ 100%)
Only glyphosate acid or one of its salts is the tested substance	N	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	Y	Ishikawa cells

Reliability criteria for <i>in vitro</i> toxicology studies		
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	Not necessary
Test concentrations in physiologically acceptable range (< 1 mM)	Y	0.2 µM and 2 µM
Cytotoxicity tests reported	Y	Viability was assessed with trypan blue dye exclusion assay
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	Y	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Glyphosate was tested at two different concentrations only, no test guideline was used and no historical control data were provided in order to compare with the equivalent concurrent controls and test groups results. Further, the study was not performed according to GLP.
Not reliable	N	

1. Information on the study

Data point:	CA 5.2.6
Report author	Lindberg T. <i>et al.</i>
Report year	2020
Report title	An integrated transcriptomic- and proteomic-based approach to evaluate the human skin sensitization potential of glyphosate and its commercial agrochemical formulations
Document No	Journal of proteomics, (2020) Vol. 217, pp. 103647
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Investigation of molecular mechanisms in the skin sensitization process specifically focusing on DC activation using an integrated transcriptomic- and proteomic approach.

First, Mutz-3-derived cells were exposed to PPD, DMSO, unexposed sample and glyphosate. No cytotoxicity was observed for glyphosate and glyphosate was classified as non-sensitising.

Second, PPD, DMSO, unexposed sample and glyphosate were assembled to protein groups. A clear separation between sensitizers (PPD) and non-sensitizers (unexposed, DMSO, glyphosate) was observed. Data on glyphosate are consistent with other available validated assay results.

The article is classified as reliable with restrictions for the following reason: This is a non-validated test system. The purity and origin of glyphosate is unclear. only 1 dose tested (no dose relationship can be evaluated), no HCD were available in order to compare with the equivalent concurrent controls and test groups results.

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Lindberg T. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	Not applicable because there is no OECD guideline for this type of test
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	The only information is that glyphosate's input concentration was 500 µM. The purity, origin etc. is unclear.
Only glyphosate acid or one of its salts is the tested substance	N	Glyphosate alone and EU non-representative formulations were tested (summary above is provided only for glyphosate)
AMPA is the tested substance	N	

Study		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	n.a.	Not applicable as no metabolic activation system used
Test concentrations in physiologically acceptable range (< 1 mM)	Y	
Cytotoxicity tests reported	Y	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	N	Not applicable as only 1 concentration was used
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	This is a non-validated test system. The purity and origin of glyphosate is unclear. Only 1 dose tested (no dose relationship can be evaluated). No HCD were available in order to compare with the equivalent concurrent controls and test groups results.
Not reliable	N	

1. Information on the study

Data point:	CA 5.5/027
Report author	Portier, C.J.
Report year	2020
Report title	A comprehensive analysis of the animal carcinogenicity data for glyphosate from chronic exposure rodent carcinogenicity studies
Document No	Environ Health (2020) Vol. 19, 18. https://doi.org/10.1186/s12940-020-00574-1
Guidelines followed in study	Not applicable
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	-/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Thirteen glyphosate cancer bioassays considered acceptable for this re-analysis were selected from the published literature, the EPA review, the review from the German Institute for Risk Analysis, the JMPR review, and full laboratory reports. For twelve of them full study reports were available. Individual tumour counts for the individual studies were re-analyzed using the exact Cochran-Armitage one-sided linear trend test. Re-analyses were conducted on all primary tumours where there were at least 3 tumours in all of the animals in a sex/species/strain combination. In addition, any tumour where a significant positive trend ($p \leq 0.05$) was found in at least one study was also evaluated in all the other studies of the same sex/species/strain combination, regardless of the number of animals with the tumour. Pairwise comparisons between individual exposed groups and the control group were conducted using Fisher's exact test. To evaluate the consistency of a tumour finding across multiple studies using the same sex-species-strain combinations, logistic regression with individual background responses and dose trends are fit to the pooled data using maximum likelihood estimation. The same methods of analysis were used to evaluate the incidence of non-neoplastic lesions in tissues where tumours were observed. In cases of rare tumours where the increase in incidence didn't reach statistical significance the test proposed by Tarone (1982) was applied using an appropriate historical control group. To summarize the results of the strength-of-evidence analysis, each tumour is placed in any of the following categories: Clear evidence (CE), some evidence (SE), equivocal evidence (EE), and no evidence (NE). The factors used to place tumours into these categories include the analyses of the individual studies, the consistency of the data across studies (pooled analyses), the analyses using historical control data, the analyses of non-neoplastic lesions, and mechanistic evidence with the associated scientific literature. The author's weight-of-evidence analysis indicates that there is clear evidence (CE) that oral exposure to glyphosate *via* the diet produces adrenal cortical carcinoma in the female SD rat, hemangioma in the female mouse (CD-1 and Swiss albino), hemangiosarcoma in the male CD-1 mouse, kidney tumours in the male CD-1 mouse and SD rat, liver adenoma in the male rat (SD and Wistar), malignant lymphoma in the male and female CD-1 mouse, skin basal cell tumour in the male SD rat and skin keratoacanthoma in male rats (SD and Wistar). Some evidence (SE) for a causal relationship was put forth for kidney tumours in the male Swiss albino mouse, mammary tumours in the female Wistar rat, malignant lymphoma in the male and female Swiss albino mouse, pituitary adenoma in the male and the female Wistar rat, and testicular interstitial cell tumours in the male SD rat.

After thorough analysis and considering all factors that are important in the interpretation of cancer studies none of the tumours identified by the author as indicating clear evidence (CE) or some evidence (SE) of carcinogenicity were found relevant for reconsideration under the necessary due diligence of the European AIR5 review of glyphosate. Most of the tumours selected by the author were previously dismissed by the EU experts as not relevant even before the last review of glyphosate

in 2017, and the applicant believes that there is no solid toxicological evidence for glyphosate exposure related carcinogenicity in the mouse and the rat that warrants any science-based concerns for human health. The discussion of each of the suspect tumours is given below.

Clear evidence (CE) for carcinogenicity:

Adrenal cortical carcinoma in the female SD rat (Stout and Ruecker study):

The tumour incidences were 0/60, 0/60, 0/60, 3/60 at 0, 113, 457, and 1183 mg/kg bw/day, respectively. This tumour has not been considered treatment related by the authors of the study. There is no dose-related increase in adrenal cortical adenoma (1/60, 3/60, 2/60, 1/60), no dose-related increase in pre-neoplastic lesions and this tumour was not found in the males of the same study or in other rat studies. Therefore, this tumour has been considered not relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hemangioma in female CD-1 mice (Sugimoto study):

In the Sugimoto study hemangiomas were observed in different tissues:

- In liver with an incidence of 0/50, 0/50, 1/50, 1/50;
- In the ovary with an incidence of 0/50, 0/50, 0/50, 1/50;
- In the uterus with an incidence of 0/50, 0/50, 1/50, 2/50;
- In the spleen with an incidence of 0/50, 0/50, 1/50, 0/50;
- In the abdominal cavity with an incidence of 0/8, 0/9, 0/9, 1/9;

At 0, 153.2, 786.8, and 4116 mg/kg bw/day, respectively. Taken together as systemic tumours a significant positive trend is obtained. However, hemangiomas have also been observed in males (liver and testes) but without any dose-response relationship and the highest incidence found was in the control group (1/50). These tumours have not been confirmed in the other carcinogenicity studies in the CD-1 mouse. Moreover, the dose level (4116 mg/kg bw/day) at which the incidence was statistically significantly increased when compared against the control, is more than 4-fold the limit dose for the testing of carcinogens in rodent species. If that dose is ignored there is no significant positive trend. Therefore, this tumour has been considered not relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hemangioma in female Swiss albino mice (Kumar study):

In the re-analysis of the tumour data of the Kumar study by K. Weber (report submitted in 2017) no statistically significant trend was found for systemic neoplasms using the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Hemangiosarcoma in the male CD-1 mouse (Atkinson study):

The tumour incidences were 0/50, 0/50, 0/50, 4/50 (3 in liver and 1 in prostate) at 0, 98, 297, and 988 mg/kg bw/day, respectively. The incidence at the highest dose (8 %) was still within the historical control range of the test laboratory (0-8 %, 300 male mice in 6 studies up to 1993). This tumour was not confirmed in other mouse studies of which one (Knezevich and Hogan study) with a dose level nearly 5-fold that of the Atkinson study (4841 mg/kg bw/day). Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Kidney tumours in the male CD-1 mouse (Takahashi study, as reported by JMPR, 2016):

Renal cell adenoma (3/50) and renal cell carcinoma (1/50) were observed in males at 7470 mg/kg bw/day, but, according to the authors, there was no statistically significant difference with the control group. It is of note that the high dose considered in this study for males is extraordinarily high, more than 7-fold the limit dose for the testing of carcinogens in rodent species. If this dose is ignored there is no significant positive trend. These tumours were re-examined by the original study pathologist in 2012 because the Pesticide Expert Panel of the Food Safety Commission of Japan requested more information on historical control data and association with the non-neoplastic renal findings. After re-examination, the incidences for renal cell adenoma were 1/50, 1/50, and 1/50 at 167.6, 685, and

7470 mg/kg bw/day, showing no dose-response relationship. The incidence for renal cell carcinoma was confirmed to be 1/50 at 7470 mg/kg bw/day. The historical control data for the Takahashi study were not available, but the historical control values described in the re-examination document for renal cell carcinoma were 1/725 (0.13 %) in males and 0/725 (0 %) in females and for renal cell adenoma were 3/564 (0.53 %) in males and 0/564 (0 %) in females. The re-examination report also provides reference data of 0-1.8 % in males and 0 % for all doses in females for renal cell carcinoma, and 0-1.8 % in males and females for renal cell adenoma. The results of the re-examination revealed also that the tubular epithelial cell hypertrophy was localized with an incidence in each treatment group that did not significantly differ from that in the control group. There was no association between the tubular epithelial cell hypertrophy and the development of renal tumours. The renal cell tumours observed in this study are thus not relevant for the human risk assessment of glyphosate because (1) the incidence of renal tumours in males at 7470 mg/kg bw/day did not significantly differ from that in the control group upon re-evaluation; (2) none of the females had neoplastic or non-neoplastic lesions; and (3) the high dose considered in this study for males is more than 7-fold the limit dose for the testing of carcinogens in rodent species. Therefore, this tumour has been considered not relevant for the assessment of glyphosate.

Kidney tumours in the male SD rat (Enemoto study):

The incidences of kidney adenoma were 0/76, 0/75, 0/80, 4/78 at 0, 104, 354, and 1127 mg/kg bw/day. An increasing trend in the incidence of adenomas in the kidney was observed in males of the high dose group (animal 193: killed in extremis at week 92, animal 167: found dead at week 94, animal 159: found dead at week 101, and animal 169: killed by design after 104 weeks of treatment) and this incidence was greater than the historical control range referred to in the study report (0-2.9 %). However, according to the authors of this study, the increase observed was not statistically significant. No kidney tumours were found in the females and nearly all male rats at all dose levels suffered from chronic nephropathy (62/76, 63/75, 56/80, 67/78). This tumour in this study was not considered relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

Hepatocellular adenomas in the male SD rat (Stout and Ruecker study):

The tumour incidences for adenomas were 3/60, 2/60, 3/60, 8/60 and of carcinomas were 3/60, 2/60, 1/60, 2/60 at 0, 89, 362, and 940 mg/kg bw/day, respectively. The incidence of adenomas at the high dose (13.3 %) is still within the historical control range of the test laboratory (1.4-18.3 %). Foci of cellular alteration were observed at all dose levels without any dose-response relationship and there were no signs of hepatocellular hypertrophy, a prerequisite for hepatocellular carcinogenesis. Beside the Brammer study no increase in hepatocellular adenomas was noted in the other rat studies. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Hepatocellular adenomas in the male Wistar rat (Brammer study):

The tumour incidences were 0/64, 2/64, 0/64, 5/64 at 0, 121, 361, 1214 mg/kg bw/day, respectively. The positive trend is significant and the incidence at the high dose is significantly different from the control. However, the incidence at the high dose (7.8 %) is still within the historical control range of the test laboratory (0-11.5 %, 26 studies in 1984-2003). There were no histopathological signs of liver enzyme induction or pre-neoplastic lesions. The high dose animals in this study survived longer when compared to the other groups. This may also influence the spontaneous tumour rate. Beside the Stout and Ruecker study no increase in hepatocellular adenomas was noted in the other rat studies. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the male CD-1 mouse (Sugimoto study):

The tumour incidences were 2/50, 2/50, 0/50, 6/50 at 0, 165, 838, 4348 mg/kg bw/day, respectively. The positive trend is significant but the incidence at the high dose is not significantly different from the control. Moreover, the incidence at the high dose (12 %) is still within the historical control range of the test laboratory (3.6-19.2 %, 458 male mice in 12 studies in 1993-1998). The trend has been found significantly positive because of the elevated incidence at a dose level that is over 4-fold the limit dose for carcinogenicity studies in rodents. If this dose is ignored the trend is not positive. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the female CD-1 mouse (Takahashi study):

The tumour incidences were 3/50, 1/50, 4/50, 6/50 at 0, 93.2, 909, and 8690 mg/kg bw/day, respectively. The increased incidence of lymphoma at the high dose was statistically significant in the trend test but not in a pairwise comparison. The trend has been found significantly positive because of the elevated incidence at an extraordinarily high dose level, more than 8-fold the limit dose for carcinogenicity studies in rodents. If this dose is ignored the trend is no longer significant. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Skin basal cell tumour in the male SD rat (Enemoto study):

The tumour incidences were 0/78, 0/75, 0/80, 3/78 for adenoma and 0/78, 0/75, 0/80, 1/78 for carcinoma at 0, 104, 354, and 1127 mg/kg bw/day. No increased incidence of this tumour was observed in the females or other rat studies and may be associated with other skin lesions (follicular hyperkeratosis and/or folliculitis/follicular abscess) observed in this study. Although there is a significant positive trend for the adenomas, the increase in incidence at the high dose level was not considered relevant for the risk assessment of glyphosate by the authors of this study. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (Stout and Ruecker study):

The tumour incidences were 1/60, 3/60, 4/60, 5/60 at 0, 89, 362, and 940 mg/kg bw/day. Although there is a significant positive trend the incidence at the high dose was not statistically significantly different from the control and considered not related to treatment. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats. Therefore, this tumour was not considered relevant for the risk assessment of glyphosate by the authors of this study. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (Atkinson study):

The combined incidences of intracutaneous cornifying epithelioma (keratoacanthoma) were 1/50, 2/25, 0/19, 0/21, 5/50 at 0, 11, 112, 320, and 1147 mg/kg bw/day. Although the trend was significant, the incidence at the high dose was not statistically significantly different from the control and considered not related to treatment by the authors of this study. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male SD rat (Enemoto study):

The incidences of the tumour were 4/76, 3/75, 0/80, 7/78 at 0, 104, 354, and 1127 mg/kg bw/day. The increased incidence of this skin tumour at the high dose may be associated with other skin lesions (follicular hyperkeratosis and/or folliculitis/follicular abscess) observed in this study. Although there is a significant positive trend for this tumour, the increase in incidence at the high dose level was not statistically significantly different from the control. Skin keratoacanthoma is one of the most common spontaneous benign neoplasms in male Sprague Dawley rats and considered by the authors of this study not relevant for the risk assessment of glyphosate. This tumour was not discussed further in the previous EU review of glyphosate.

Skin keratoacanthoma in the male Wistar rat (Wood study):

There were no treatment-related conditions seen in the skin or in subcutaneous tissues, but several spontaneous lesions were observed. Epidermal ulceration and scab formation, inflammatory lesions, abscess formation, focal acanthosis, focal mineralisation, focal dermal thickening, and focal necrosis were seen, occasionally or rarely and without significance. This tumour was not discussed further in the previous EU review of glyphosate.

Some evidence for carcinogenicity (SE)

Kidney tumours in the male Swiss albino mouse (Kumar study):

In the re-analysis of the tumour data of the Kumar study by K. Weber (submitted in 2017) no statistically significant trend was found for systemic neoplasms in the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise

comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Mammary tumour in the female Wistar rat (Wood study):

At interim and terminal sacrifice combined mammary neoplasia was seen in 6 female mice. There were no mammary neoplasms in the control group but carcinomas were seen with incidences of 2/51, 3/51, and 1/51 at 153.2, 786.8, and 4116 mg/kg bw/day, respectively. All neoplasms were adenocarcinomas with the exception of one adenosquamous carcinoma seen in a low dose group animal. No increase in the incidence of these tumours was reported in the females of other rat studies. The authors concluded that there was no effect of treatment upon the incidence of mammary neoplasia in this study. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Malignant lymphoma in the male Swiss albino mouse (Kumar study):

In the re-analysis of the tumour data of the Kumar study by K. Weber (2017) no statistically significant trend was found for systemic neoplasms in the Peto test. When analyzed using the Fischer's exact test no statistically significant increase in incidence was found in pair-wise comparisons of all dose groups with the control group. It is important to emphasize that this study was compromised by non-identified ecto-and endoparasites in a large number of animals. Therefore, this tumour was not considered as relevant for the assessment of glyphosate.

Pituitary adenomas in the male and the female Wistar rat (Wood study):

Pituitary adenomas were only seen in female mice with incidences of 0/51, 1/51, 0/51, 2/52 at 0, 104.5, 348.6, and 1381.9 mg/kg bw/day. The group distribution was unrelated to treatment. Therefore, this tumour was not considered relevant for the assessment of glyphosate.

Testicular interstitial cell tumour in the male SD rat (Lankas study):

The incidences of this tumour were 0/50, 3/50, 1/50, 6/50 at 0, 3.05, 10.30, and 31.49 mg/kg bw/day, respectively. The positive trend is statistically significant and the incidence at the high dose level (12 %) is statistically significantly different from the control and greater than the historical control rate of the test laboratory (3.4-6.6 %). However, there was no dose-response relationship for interstitial cell hyperplasia (1/50, 1/50, 1/50, 0/50). Since the dose range considered in this study (0-31.5 mg/kg bw/day) is approximately at least 30-fold lower than that of all the other studies in rats where no increase of such tumours was found this finding should be considered as spontaneous in nature. Therefore, this tumour was not considered relevant for the risk assessment of glyphosate and was not discussed further in the previous EU review of glyphosate.

This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the statistical methods employed were not described in sufficient detail. Besides, the results of this study are not in agreement with the findings of Crump *et al.* 2020 in relation to the estimation of false positives and the overall evaluation of the significance of the tumours by the EU regulatory authorities. All the tumours that were identified by the author as providing clear evidence for the carcinogenicity of glyphosate have been previously dismissed in the EU regulatory process.

Reliability criteria for *in vivo* toxicology studies

Publication: Portier, 2020.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N.A.	
Study performed according to GLP	N. A.	Most of the study reports analysed were GLP compliant.

Study completely described and conducted following scientifically acceptable standards	Y	Re-analysis of the tumour data of 13 selected glyphosate cancer bioassays.
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity of glyphosate used in every cancer bioassay mentioned.
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test species clearly and completely described	Y	
Test conditions clearly and completely described	N.A.	Described in the test reports of 12 of the selected studies. The data from one study were derived from a JMPR review.
Route and mode of administration described	Y	Oral <i>via</i> the diet.
Dose levels reported	Y	Dose range from 71.4 to 8690 mg/kg bw in the mouse and from 3.05 to 4348 mg/kg bw in the rat.
Number of animals used per dose level reported	Y	About 50 per dose group.
Method of analysis described for analysis test media	N.A.	Described in the original test reports.
Validation of the analytical method	N.A.	
Analytical verifications of test media	N.A.	
Complete reporting of effects observed	Y	
Statistical methods described	Y	All statistical methods used in the re-analysis of the tumour data were reported, however sometimes not in sufficient detail.
Historical control data of the laboratory reported	N.A.	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions		
Reliable with restrictions	Y	
Reliability not assignable		
Not reliable		
This publication is considered relevant for the risk assessment of glyphosate but reliable with restrictions because some of the statistical methods employed were not described in sufficient detail. Besides, the results of this study are not in agreement with the findings of Crump <i>et al.</i> 2020 in relation to the estimation of false positives and the overall evaluation of the significance of the tumours by the EU regulatory authorities. All the tumours that were identified by the author as providing clear evidence for the carcinogenicity of glyphosate have been dismissed in the EU regulatory process.		

1. Information on the study

Data point:	CA 5.8.3
Report author	Xia Y. <i>et al.</i>
Report year	2020
Report title	The endoplasmic reticulum stress and related signal pathway mediated the glyphosate-induced testosterone synthesis inhibition in TM3 cells
Document No	Environmental Pollution, (2020) 260, 113949 DOI: 10.1016/j.envpol.2020.113949
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes/Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In vitro study on the effects of glyphosate on testosterone secretion and the role of endoplasmic reticulum stress in the process were investigated in TM3 cells. Results showed that exposure to glyphosate at concentrations below 200 mg/L had no effect on cell viability, while glyphosate at concentrations above 0.5 mg/L could inhibit the testosterone secretion in TM3 cells. Treatment of TM3 cells with glyphosate at 5 mg/L not only reduced the protein levels of testosterone synthase StAR and CYP17A1 but also inhibited testosterone secretion.

The article is classified as reliable with restrictions for the following reason: not enough information on the tested material (purity) was provided, no positive controls were used, and no statistical methods were described. Furthermore, no OECD guidelines were followed, no GLP status was stated, and no historical control data (HCD) were provided to compare the relevance of data. In addition, key literature in disagreement with the authors' findings appear to have been disregarded, suggesting bias within the research and the following publications: Hecker (2011), OECD validation of the H295R steroidogenesis assay with glyphosate; Levine (2007), demonstrating a lack of effect of glyphosate on the StAR protein; US EPA (2015), glyphosate EDSP weight of evidence evaluation; and EFSA (2017), peer review of glyphosate potential endocrine-disrupting properties.

Hecker M et al (2011), The OECD validation program of the H295R steroidogenesis assay: Phase 3. Final inter-laboratory validation study, Environmental Science and Pollution Research 18(3):503-15

Levine S. L. Et al. (2007), Disrupting mitochondrial function with surfactants inhibits MA-10 Leydig cell steroidogenesis, Cell Biol Toxicol (2007) 23:385-400

US EPA (2015), EDSP Weight of Evidence Conclusions on the Tier 1 Screening Assays for the List 1 Chemicals - EDSP: WEIGHT OF EVIDENCE ANALYSIS OF POTENTIAL INTERACTION WITH THE ESTROGEN, ANDROGEN OR THYROID PATHWAYS - CHEMICAL: GLYPHOSATE

EFSA (2017): Peer review of the pesticide risk assessment of the potential endocrine disrupting properties of glyphosate, Question number: EFSA-Q-2016-00663

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Xia Y. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	
Study performed according to GLP	N	Not stated
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Glyphosate Purity not stated
Only glyphosate acid or one of its salts is the tested substance	Y	
AMPA is the tested substance	N	
Study		
Test system clearly and completely described	N	TM3 cells (no purity stated)
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	Not necessary
Test concentrations in physiologically acceptable range (<1 mM)	N	0.01 to 200 mg/L
Cytotoxicity tests reported	Y	
Positive and negative controls	N	No positive controls
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Not enough information on the tested material (purity), no positive controls were used, no statistical methods were described. Furthermore, no OECD guideline followed, no GLP status was stated. In addition, no HCD were available in order to compare the relevance of the data. In addition, key literature in disagreement with the authors' findings appear to have been disregarded, suggesting bias within the research and publication: Hecker (2011) OECD validation of the H295R steroidogenesis assay with glyphosate; Levine (2007) demonstrating a lack of effect of glyphosate on the StAR protein; US EPA (2015) glyphosate EDSP weight of evidence evaluation; EFSA (2017) peer review of glyphosate potential endocrine-disrupting properties.

Reliability Criteria: <i>In Vitro</i> Toxicology Studies		
Publication: Xia Y. <i>et al.</i> 2020	Criteria met? Y/N/?	Comments
Not reliable	N	

1. Information on the study

Data point:	CA 5.8.2
Report author	Yahfoufi Z. A. <i>et al.</i>
Report year	2020
Report title	Glyphosate Induces Metaphase II Oocyte Deterioration and Embryo Damage by Zinc Depletion and Overproduction of Reactive Oxygen Species
Document No	Toxicology, (2020) Vol. 439, Art. No. 152466
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The quality of metaphase II noncumulus oocytes and embryos from mice were investigated following glyphosate exposure at different concentrations (max 300 µM). The concentrations were in the range of those found in human blood following accidental acute exposure or suicidal attempts.

Results indicate that glyphosate provokes disruption of the microtubule organizing center and chromosomal disorganization at the mid-position of the spindle due to spindle disappearance, and defective chromosomal alignment as well as depletion of intracellular zinc bioavailability and enhancement of reactive oxygen species (ROS) accumulation in the mouse oocytes. In the embryos (not specified the source and the embryonal stage) zinc depletion and accumulation of ROS was also observed in a dose-related manner.

The article is classified as *reliable with restrictions* for the following reason: Not performed according to GLP or an OECD test guideline. No purity of the test substance stated. No information of the source and the embryonal stage of the embryos were provided. There were no concurrent positive control or substances known to deteriorates oocyte quality through disassembly of microtubule organizing centers (like peroxyntrite) or ROS accumulation (like hydrogen peroxide, and hypochlorous acid) or dimercapto-1-propanesulfonic acid (DMPS) for zinc depletion.

Reliability criteria for <i>in vitro</i> toxicology studies		
Publication: Yahfoufi Z. A. et al. 2020	Criteria met? Y/N/?	Comments
Guideline-specific		
Study in accordance to valid internationally accepted testing guidelines	N	No GLP or OECD test guideline followed
Study performed according to GLP	N	
Study completely described and conducted following scientifically acceptable standards	Y	
Test substance		
Test material (Glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	N	No purity, content, storage conditions
Only glyphosate acid or one of its salts is the tested substance	Unknown	
AMPA is the tested substance	N	
Study		

Reliability criteria for <i>in vitro</i> toxicology studies		
Test system clearly and completely described	Y	
Test conditions clearly and completely described	Y	
Metabolic activation system clearly and completely described	N	No metabolic activation system present
Test concentrations in physiologically acceptable range (< 1 mM)	Y	Max. concentration 300 µM
Cytotoxicity tests reported	N	
Positive and negative controls	Y	
Complete reporting of effects observed	Y	
Statistical methods described	Y	
Historical negative and positive control data reported	N	
Dose-effect relationship reported	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	Not performed according to GLP or an OECD test guideline. No purity of the test substance stated. No appropriate information on the tested embryos was provided. Tested dose correspond to level of glyphosate that may be found in human blood following human accidental acute exposure intoxication. No reference compound were tested in parallel to confirm the appropriateness of the testing procedures and the relevance of the results.
Not reliable	N	

検索期間：2020年1月～6月

区分 a に分類された文献とその理由

環境動態

1. Information on the study

Data point:	CA 7.5
Report author	De Polo, A. <i>et al.</i>
Report year	2019
Report title	From the traces in the wells of the urban aqueduct network to the subsequent prohibition of the use of glyphosate: the case of an area of high-intensity wine production in the province of Treviso, Veneto. Original Title: Dai residui nei pozzi della rete acquedottistica urbana al successivo divieto di utilizzo del glifosate: il caso di un'area ad alta intensità vitivinicola in provincia di Treviso, Veneto.
Document No	Igiene e sanità pubblica, (2019) Vol. 75, No. 6, pp. 451-460
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article reports concentrations of glyphosate and AMPA found in 12 wells used for drinking water consumption in Northern Italy, situated within a wine growing area. Traces of glyphosate (maximum reached 0.08 µg/L) and AMPA (maximum reached 0.25 µg/L) were detected in 2 wells supplying an urban area. The article is therefore considered as reliable with restrictions. Sampling and analytical methods are not described. Nature of groundwater wells not described, point sources could be possible. No information on precipitation is reported. No description of monitoring sites other than very rough map of area and aqueduct names.

1. Information on the study

Data point:	CA 7.1.4.2
Report author	Gros, P. <i>et al.</i>
Report year	2020
Report title	Leaching and degradation of $^{13}\text{C}_2\text{-}^{15}\text{N}$ -glyphosate in field lysimeters
Document No	Environmental monitoring and assessment, (2020) Vol. 192, No. 2, pp. 127 DOI 10.1007/s10661-019-8045-4
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article reports results of a lysimeter experiment with $^{13}\text{C}_2\text{-}^{15}\text{N}$ -glyphosate in Germany. Besides analysis of lysimeter leachate, also soil and plant (maize) samples were analyzed. Although, the methods and results are well described, no endpoint can be derived due to some deviations from the relevant guideline (OECD 22). For example, it is not clear whether an undisturbed soil monolith has been used, and the origin and storage of soil is not reported. Amounts of precipitation are not reported in sufficient detail (only for 2 months) and amounts of leachate are only given as overall sum and weekly averages. glyphosate, the sensitivity of the analytical method is not reported (AMPA was analyzed only qualitatively), and the stability of analytes in leachates and extracts during frozen storage was not shown. Results of leachate analysis were not reported in $\mu\text{g/L}$ (only as $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$), and results of soil analysis were only given in % of initial concentration.

The article is therefore considered as reliable with restrictions.

検索期間：2020年1月～6月

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

1. Information on the study

Data point:	CA 8.6.2
Report author	Rogacz D. <i>et al.</i>
Report year	2020
Report title	Ecotoxicological effects of new C-substituted derivatives of <i>N</i> -phosphonomethylglycine (glyphosate) and their preliminary evaluation towards herbicidal application in agriculture.
Document No	Ecotoxicology and environmental safety, (2020) Vol. 194, Art. No. 110331.
Guidelines followed in study	OECD 208 (for NTTPs)
Deviations from current test guideline	None
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study investigated the effects of glyphosate on the seedling emergence and growth of non-target terrestrial plants (oat and radish) based on OECD 208 guideline. Plants were exposed to glyphosate mixed into sandy soil at 5 concentrations between 100 and 100 mg a.s./kg of soil dry weight with 3 replicates each. There were 20 seeds of each plant species per test concentration sown into the soil. Evaluations were based on fresh mass, root length and shoot height of plants after 14 days of exposure.

The test design was adequately described, but the application of the test item into the soil is not specified. The seedling emergence was acceptable as recommended in the guideline (100 and 95 % in the control for oat and radish, respectively). However, the phytotoxic effects and the survival of the control plants during the study is not reported.

Reliable endpoints for the risk assessment of NTTPs can be obtained for glyphosate: EC₅₀ value of 373.7 mg a.s./kg s.d.w. for oat based on shoot height and an EC₅₀ value of 357.8 mg a.s./kg s.d.w. for radish based on shoot height.

The article is classified as reliable for NTTPs.

1. Information on the study

Data point:	CA 8.1.4
Report author	Turhan D. Ö <i>et al.</i>
Report year	2020
Report title	Developmental and lethal effects of glyphosate and a glyphosate-based product on <i>Xenopus laevis</i> embryos and tadpoles
Document No	Bulletin of Environmental Contamination and Toxicology, (2020) Vol. 104, No. 2, pp. 173-179
Guidelines followed in study	ASTM (2003) American Society for Testing and Materials, Standard guide for conducting the Frog Embryo Teratogenesis Assay- <i>Xenopus</i> (FETAX), E1439-98
Deviations from current test guideline	Jelly coats should be removed from developing embryos mid blastula stage embryos – ca. stage 8, prior to 96 hour exposure well plates. The removal is achieved using 2% cysteine solution followed by rinsing. No reference is provided in the article to see whether this step was completed (it is a relevant as it informs on ion-exchange and impacts from concentrated solution / osmotic and diffuse pressures on the embryos in the increasing concentrations of test media.) Test guideline followed for the late development stage 46 (96 hr test) exposure test was not stated. The FETAX assay runs until 80-90% of the control tadpoles reach developmental stage 47. This cannot be confirmed. Water quality at test start appears to be within specification, although after 96 hrs now water quality data appeared to have been determined.
GLP/Officially recognised testing facilities	No
Acceptability/Reliability:	Yes / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Effects of pure glyphosate and a glyphosate-based product Roundup® Star (containing glyphosate in a form of a potassium salt and including 6% surfactant as ethoxylated alkylamine based, were evaluated comparatively using two embryonic development stages of the amphibian *Xenopus laevis* as model system. As the glyphosate-based product Roundup® Star is not the representative formulation for the European renewal of glyphosate, the summary only provides information for pure glyphosate.

However, this publication confirms a general trend that toxic effects caused by glyphosate-based products, compared to pure glyphosate, are increased mainly due to additives present in glyphosate formulations and that it may be a result of synergistic effects between glyphosate and adjuvant in the formulations.

In this study, no lethality >17 % or developmental effects (growth inhibition) were observed in embryos or tadpoles with pure glyphosate at any glyphosate concentration tested (282-500 mg/L for stage 8 embryos) and (250-403 mg/L stage 46 tadpoles)

In addition, no effect was observed with regards to enzymatic activity of stage 46 tadpoles at any glyphosate concentration tested (50-250 mg/L).

The article is classified as reliable with restrictions for the following reason : The specific purity of the test item was not reported. No OECD guidance has been followed. The American Society for Testing and Materials, Standard guide for conducting the Frog Embryo Teratogenesis Assay-Xenopus (FETAX test), E1439-98 has been followed with some deviations to the recognised approach (see deviations above). The FETAX assay is a developmental toxicity screening test, which for the most part has been superseded by amphibian metamorphosis and developmental toxicity assays using *Xenopus laevis* (OECD 231 and OECD 241). Studies performed according to both of these recognised test guidelines were submitted with the Annex I dossier (M-CA Section 8.2.3/002 and M-CA Section 8.2.3/003). Whilst the FETAX assay is not directly recognised at the EU level, elements of the FETAX assay are considered in the conduct of the OECD 231 test guideline.

Control mortalities were not reported (only LC₅₀ final results). Analytical verifications of the concentrations in the test medium were reported only before starting the test, but exposure medium was changed every 24 h to maintain the desired concentrations.

検索期間：2020年7月～12月

区分 a に分類された文献とその理由

ヒトに対する毒性

1. Information on the study

Data point:	CA 5.8.3
Report author	Ferramosca A. <i>et al.</i>
Report year	2021
Report title	Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.
Document No	Reproductive Toxicology (2021), Vol. 99, pp. 48-55
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under not conducted under GLP/Officially recognised testing facilities. However, all experiments were performed according to principles of good laboratory practice.
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Glyphosate was reported to reduce mitochondrial functionality, by decreasing the oxygen consumption rate in the active and in the passive state of mitochondrial respiration. The mitochondrial respiration efficiency was negatively affected only at concentrations of ≥ 100 nM. In the presence of the sex steroid hormone di-hydroxytestosterone (DHT), the negative effect on mitochondria functionality caused by glyphosate was observed from ≥ 0.1 nM. The passive state of mitochondrial respiration was found to be increased, suggesting a stimulus of mitochondrial respiration independent of ADP phosphorylation. In the presence of the mitochondria-targeting flavonoid quercetin, an increase in oxygen consumption rate was observed at concentrations in the range of 0.1 – 10 nM, reaching the highest levels at glyphosate and quercetin concentrations at 10 nM. Glyphosate was concluded to target mitochondria by using a mechanism that is different from that of DHT and quercetin but not described.

The study did not follow any OECD guideline and was not performed under GLP. No information on the test item with regard to purity was given, however, the supplier and batch number were reported. Cytotoxicity tests were not included, but a broad concentration range from 0.1 - 1000 nM was tested to cover the sexual hormones physiologically relevant concentrations (10 nM), triggering endogenously hormone-dependent signalling pathways, and the estimated (nM range) QRC dietary intake. However, it is not clear how these concentrations may be relevant in term of exposure to glyphosate. The authors stated that these concentration are below the NOAEL and acceptable daily intake (ADI) for the glyphosate (50 and 0.5 mg/kg bw per day, respectively). But no calculations have been presented to show whether spermatozoa could be exposed under the normal condition of glyphosate use. Given the novel study type and underlying assumptions, evaluation of other comparator molecules to which humans are regularly systemically exposed (e.g. in the diet) would provide context to the relevance of these results and credibility to the assay's predictive capacity for effects in humans.

It was not clear from the publication which solvent has been used for which chemical. As solvent controls were included for all solvents used, the weakness was considered to be of minor degree. The criteria for a biological response were not provided.

Overall, the study is sufficiently documented to generally accepted scientific principles. It is considered to be reliable with restriction, but the information provided are not robust enough to impact the risk assessment.

Reliability criteria for *in vitro* toxicology studies

Publication: Ferramosca, 2021: Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.	Criteria met? Y/N/Uncertain	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines.	N	
Study is performed according to GLP.	N	
Study is completely described and conducted following scientifically acceptable standards.	Y	
Test substance		
Test material (glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity for glyphosate not reported but batch No. given (#45521, Sigma Aldrich)
Only glyphosate acid or one of its salts is the tested substance.	N	Glyphosate alone and in combination with steroid hormones.
AMPA or other glyphosate metabolites is the tested substance.	N	
Study		
Test system is clearly and completely described.	Y	
Test conditions are clearly and completely described.	Y	
Metabolic activation system is clearly and completely described.	N	
Test concentrations is in physiologically acceptable range (< 1 mM).	Y	0.1-1000 nM
Cytotoxicity tests are reported.	N	Concentration range covers both the sexual hormones physiologically relevant concentrations (10 nM), triggering endogenously hormone-dependent signaling pathways, and the estimated (nM range) QRC dietary intake.
Positive and negative controls.	Y	
Complete reporting of effects observed.	Y	
Statistical methods described.	Y	
Historical negative and positive control data reported.	N	Criteria for a biological relevant response not provided.
Dose-effect relationship reported.	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	No information on the test item with regard to purity was given, however, the supplier and batch number were reported. Cytotoxicity tests were not included, but a broad concentration range from 0.1 - 1000 nM was tested. Historical control data were not reported. Results contradict higher tier <i>in vivo</i> multigenerational studies dosed at several orders of magnitude higher, which do not report any adverse outcomes in fecundity or reproductive outcome. No information on whether the tested concentration may reflect physiological exposure to human spermatozoa <i>in vivo</i> following exposure to the accepted regulatory dose levels following

Publication: Ferramosca, 2021: Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.	Criteria met? Y/N/Uncertain	Comments
		glyphosate use as herbicide.
Not reliable	N	

1. Information on the study

Data point:	CA 5.9.4
Report author	Shrestha S. <i>et al.</i>
Report year	2020
Report title	Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.
Document No	Environmental Research (2020), Vol. 191, Article No. 110186 https://doi.org/10.1016/j.envres.2020.110186
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes (Relevance Category A)/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Glyphosate was not associated with PD in analyses based on ever use or in analyses based on IWLDS of use. Given that there is no plausible mechanism for glyphosate causing PD and that glyphosate systemic dose has been found to be minimal for applicators and spouses (Acquavella et al. 2004), those results are considered to be a valid.

References

Acquavella JF, Alexander BH, Mandel JS, et al. Glyphosate biomonitoring for farmers and their families: Results from the farm family exposure study. *Environ. Health Perspect.* 2004; 112:321-326.

Reliability criteria for epidemiology studies

Publication: Shrestha S. et al., 2020, Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines/practices.	n/a	Not applicable
Study is completely described and conducted following scientifically acceptable standards.	Yes	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Yes	
Exposure to formulations with glyphosate combined with other a.i.	No	
Exposure to various formulations of pesticides.	Yes	50 pesticides total
Study		
Study design – epidemiological method followed.	Yes	
Description of population is investigated.	Yes	
Description of exposure circumstances.	Yes	
Description of results.	Yes	
Have confounding factors been considered.	Yes	
Statistical analysis.	Yes	
Overall assessment		

Publication: Shrestha S. et al., 2020, Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.	Criteria met? Y/N/?	Comments
Reliable without restrictions	Yes	The finding of no association between glyphosate and Parkinson's disease risk in this study is considered to be valid. The results fit with what is known about glyphosate toxicology and exposure potential.
Reliable with restrictions	No	
Reliability not assignable	No	
Not reliable	No	

1. Information on the study

Data point:	CA 5.9.4
Report author	Werder E. J. <i>et al.</i>
Report year	2020
Report title	Herbicide, fumigant, and fungicide use and breast cancer risk among farmers' wives.
Document No	Environmental Epidemiology (2020), Vol. 4, No. 3, Art. No. e097
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes (Relevance Category A)/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study was undertaken based on the assumption that the properties of pesticides – on the endocrine disruption and estrogenic activity scales – are such that an increase in breast cancer risk is possible from direct use of specific pesticides by female AHS spouses or from presumed indirect exposure related to their husbands' use of specific pesticides. The presumed biologic properties of pesticides underlying the study's hypotheses do not apply to glyphosate, at systemic doses from direct or indirect exposure (10^{-4} mg/kg direct, 10^{-5} mg/kg indirect – see Acquavella et al. 2004). The results of the study did not find clear associations between pesticide use and breast cancer risk and results for glyphosate were consistent across the various analyses in indicating no association with breast cancer.

We conclude that this study provides evidence that glyphosate is not related to breast cancer risk.

References

Acquavella JF, Alexander BH, Mandel JS, et al. Glyphosate biomonitoring for farmers and their families: Results from the farm family exposure study. *Environ. Health Perspect.* 2004; 112:321-326.

Reliability criteria for epidemiology studies

Publication: Werder E. J. et al., 2020, Herbicide, fumigant, and fungicide use and breast cancer risk among farmers' wives.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines/practices.	n/a	Not applicable
Study is completely described and conducted following scientifically acceptable standards.	Yes	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Yes	
Exposure to formulations with glyphosate combined with other a.i.	Uncertain	
Exposure to various formulations of pesticides.	Yes	26 pesticides
Study		

Study design – epidemiological method followed.	Yes	
Description of population is investigated.	Yes	
Description of exposure circumstances.	Uncertain	No description of how farm spouses applied pesticides.
Description of results.	Yes	
Have confounding factors been considered.	Yes	
Statistical analysis.	Yes	Good.
Overall assessment		
Reliable without restrictions	Yes	This study did not show a relationship between glyphosate and breast cancer. That result is consistent with glyphosate's exposure and toxicological properties.
Reliable with restrictions	No	
Reliability not assignable	No	
Not reliable	No	

検索期間：2020年7月～12月

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

1. Information on the study

Data point:	CA 8.2.2 and CP 10.2.2
Report author	Du-Carree J.L. <i>et al.</i>
Report year	2021
Report title	Impact of chronic exposure of rainbow trout, <i>Oncorhynchus mykiss</i> , to low doses of glyphosate or glyphosate-based herbicides.
Document No	Aquatic toxicology (2021), Vol. 230, Art No. 105687
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Rainbow trouts were exposed daily to glyphosate (1 µg a.s./L) for 10 month under flow-through conditions. Mortality, reproduction and growth showed no statistical differences between the glyphosate treatment and the control group.

In this study only one concentration was tested (1 µg a.s./L; low-dose). The characteristics and composition of the media used (water) were not fully described. The data on the technical material supports low chronic exposure risk. The test design is such that the fish were too big when used in the study and there is some uncertainty over the influence of the body size on the outcome of the study.

This study has been classified as relevant (Category A acc. EFSA GD 2092, Point 5.4.1) and reliable with restrictions.

1. Information on the study

Data point:	CA 8.2.2 and CA 8.2.2.1 and CP 10.2.2
Report author	Forner-Piquer I. <i>et al.</i>
Report year	2021
Report title	Differential impact of dose-range glyphosate on locomotor behavior, neuronal activity, glio-cerebrovascular structures, and transcript regulations in zebrafish larvae.
Document No	Chemosphere (2021), Vol. 267, Art. No. 128986
Guidelines followed in study	OECD TG 236 partially
Deviations from current test guideline	Deviations from OECD TG 236: - Indicators of lethality as coagulation of fertilised eggs, lack of somite formation, lack of detachment of the tail-bud from the yolk sac and lack of heartbeat not reported as recommended in the OECD TG, but growth, cardiac and brain edema, general and brain necrosis, curled tail, pigmentation, tail fin, notochord, eyes, optic capsule and muscles indicators are reported instead. - Validity criteria of overall fertilisation rate, water temperature in test chambers, exposure to positive control and dissolved oxygen at the end of the 96 hrs exposure are not reported. - Apical observations of embryos 24 - 96 hrs post fertilisation are not reported - Water quality (pH, total hardness and conductivity in the control) is not reported - Glyphosate concentration in the lowest test concentration is not reported - Tested concentrations are not spaced by a factor not exceeding 2.2
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Zebrafish (*Danio rerio*) larvae were exposed to glyphosate concentrations between 0.05 and 10.000 µg/L from 1.5 to 120 h post fertilization (hpf). Mortality, cumulative hatching rate and morphological changes showed no significant effects at any glyphosate concentration. Behavioural changes in locomotor were observed at concentrations equal and higher 1000 µg a.s./L. No significant behavioural changes were observed at concentrations lower than 10 µg/L.

A wide range of concentrations (8 between 0.05 and 10.000 µg/L) were tested, which does not allow the estimation of EC_xs. Not all validity criteria according to OECD TG 236 (Fish Embryo Acute Toxicity Test) can be evaluated. Analytical verifications of the test concentrations and some methodological data are not fully reported. In addition, water quality parameters were not reported. The study is partially compliant with the OECD TG 236: Fish Embryo Acute Toxicity Test. Several LOEC and/or NOEC (hatching rate, morphological and behavioural parameters, etc.) can be obtained from the study.

This study has been classified as relevant (Category A acc. EFSA GD 2092, Point 5.4.1) and reliable with restrictions.

1. Information on the study

Data point:	CA 8.3.1.4, CP 10.3.1.5, CP 10.3.1.6
Report author	Odemer R. <i>et al.</i>
Report year	2020
Report title	Chronic High Glyphosate Exposure Delays Individual Worker Bee (<i>Apis mellifera</i> L.) Development under Field Conditions.
Document No	Insects (2020), Vol. 11, No. 10, Art. No. 664
Guidelines followed in study	OECD TG 75 modified and partially followed in Experiment 1.
Deviations from current test guideline	Deviations to OECD TG 75: • The temperature during the field experiments is only reported as an average of 18.9 °C without knowing if the recommended range of min. 15°C and max. 30°C was kept, to enable a sufficient flight activity of the bees. • Relative humidity and rainfall is not reported for the field experiments. • An assessment of control performance and acceptability of the study has not been stated despite the study appearing to have been conducted according to recognized approaches e.g. OECD 75 semi-field and tunnel test and the Oomen (1992) brood feeding approaches.
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study three field and one semi-field tests were conducted in Germany to assess the effect of glyphosate based herbicides (Glyfos Unkraut-Frei® 360 g a.i./L and Roundup® Power Flex 480 g a.i./L) to honey bees (*A. mellifera*). The field studies assessed the effect on the brood and colony development, adult survival, and overwintering success of honey bees, while residues were measured, whereas the semi-field study determined residues of glyphosate based herbicides in different bee relevant matrices.

Glyfos Unkraut-Frei® showed no significant differences in bee survival between the treatments of 4.8 (T1) and 137.6 mg a.i./kg diet (T2) and the control, but hatching weight of adult worker bees was significantly lower (16.7% reduction) and the brood termination (BFD+21) significantly increased when treated with 137.6 mg a.i./kg diet, compared to the control. Roundup® Power Flex did not significantly affect colony development either in summer or during overwintering.

Therefore, the study shows that the tested glyphosate based herbicides did not affect the lifespan of individuals, colony conditions, and overwintering, but delayed worker brood development when applied at a chronic high concentration (137.6 mg a.i./kg diet).

This study has been classified as relevant (Category A acc. EFSA GD 2092, Point 5.4.1) and reliable without restrictions.

検索期間：2020年7月～12月

区分 a に分類された文献とその理由

環境動態

1. Information on the study

Data point:	CA 7.1.4.2
Report author	Albers C. N. <i>et al.</i>
Report year	2020
Report title	Leaching of herbicidal residues from gravel surfaces - A lysimeter-based study comparing gravels with agricultural topsoil.
Document No	Environmental pollution (2020), Vol. 266, Art. No. 115225
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes mini-lysimeter experiments with glyphosate in agricultural soil as well as in gravel used for construction of gravel paths or driveways. The experiments and results are well described. The LOQ value of 0.13 µg/L for glyphosate is above the current regulatory limit concentration. Glyphosate was not applied as active substance only, but as a product with another strong sorbing active (diflufenican). Therefore, the article is considered reliable with restrictions.

1. Information on the study

Data point:	CA 7.5
Report author	Papagiannaki D. <i>et al.</i>
Report year	2020
Report title	Effect of UV-A, UV-B and UV-C irradiation of glyphosate on photolysis and mitigation of aquatic toxicity.
Document No	Scientific Reports (2020), Vol. 10, No. 1, Article No. 20247
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with regard to photolysis experiments

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes experiments on the effects of UV-A, UV-B and UV-C irradiation on glyphosate photolysis. Experiments on aquatic toxicity were neglected in this evaluation as not found relevant. The photolysis experiments and results are well described. Therefore, the article is considered reliable with regard to the photolysis experiments.

With regards to aquatic toxicity, the publication was considered not relevant.

1. Information on the study

Data point:	CA 7.1.1.2, CA 7.1.3, CA 7.5
Report author	Tauchnitz N. <i>et al.</i>
Report year	2020
Report title	Assessment of pesticide inputs into surface waters by agricultural and urban sources - A case study in the Querne/Weida catchment, central Germany.
Document No	Environmental pollution (2020), Vol. 267, Art No. 115186
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Degradation experiments: not reliable Adsorption experiments: not reliable Monitoring data: reliable

2. Assessment and conclusion

Assessment and conclusion by applicant:

The article describes pesticide analyses, amongst them glyphosate, in surface waters and in soil samples within a German catchment area. Additionally, batch adsorption and anaerobic soil degradation experiments were conducted.

For the analyses in surface waters and soil samples, methods and results are well described and conclusive. The respective results are therefore considered reliable.

Maximum concentrations found in composite weekly water samples were 0.90 µg/L for glyphosate and 0.21 µg/L for AMPA. In soil, maximum concentrations comprised of 0.09 mg/kg for glyphosate and 0.17 mg/kg for AMPA.

For the batch adsorption experiment, the methods are well described, however the experimental design is not in agreement with the relevant guideline (OECD 106), e.g. due to use of synthetic rainwater instead of CaCl₂ solution, insufficient information on the test concentrations and a temperature of 10 °C. From the information provided, it cannot be concluded on the representativeness of the soils used. Further, besides the final adsorption parameters, no detailed results are reported. Thus, no conclusion can be made on the quality of the results. The adsorption results are therefore considered not reliable.

For the anaerobic degradation experiment, the methods are well described, however the experimental design is not in agreement with the relevant guideline (OECD 307), e.g. due to use of synthetic rainwater, insufficient information on the test concentrations, use of slurry of a liquid-solid ratio of 0.3:1, air-tight incubation and analysis of pore water, only. From the information provided, it cannot be concluded on the representativeness of the soils used. Further, besides the final half-live, no detailed results are reported. Thus, no conclusion can be made on the quality of the results. The results from the anaerobic degradation experiment are therefore considered not reliable.

検索期間：2021年1月～5月

区分 a に分類された文献とその理由

ヒトに対する毒性

1. Information on the study

Data point:	CA 5.8.3
Report author	Ferramosca A. <i>et al.</i>
Report year	2021
Report title	Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.
Document No	Reproductive Toxicology (2021), Vol. 99, pp. 48-55
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under not conducted under GLP/Officially recognised testing facilities. However, all experiments were performed according to principles of good laboratory practice.
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Glyphosate was reported to reduce mitochondrial functionality, by decreasing the oxygen consumption rate in the active and in the passive state of mitochondrial respiration. The mitochondrial respiration efficiency was negatively affected only at concentrations of ≥ 100 nM. In the presence of the sex steroid hormone di-hydroxytestosterone (DHT), the negative effect on mitochondria functionality caused by glyphosate was observed from ≥ 0.1 nM. The passive state of mitochondrial respiration was found to be increased, suggesting a stimulus of mitochondrial respiration independent of ADP phosphorylation. In the presence of the mitochondria-targeting flavonoid quercetin, an increase in oxygen consumption rate was observed at concentrations in the range of 0.1 – 10 nM, reaching the highest levels at glyphosate and quercetin concentrations at 10 nM. Glyphosate was concluded to target mitochondria by using a mechanism that is different from that of DHT and quercetin but not described.

The study did not follow any OECD guideline and was not performed under GLP. No information on the test item with regard to purity was given, however, the supplier and batch number were reported. Cytotoxicity tests were not included, but a broad concentration range from 0.1 - 1000 nM was tested to cover the sexual hormones physiologically relevant concentrations (10 nM), triggering endogenously hormone-dependent signalling pathways, and the estimated (nM range) QRC dietary intake. However, it is not clear how these concentrations may be relevant in term of exposure to glyphosate. The authors stated that these concentration are below the NOAEL and acceptable daily intake (ADI) for the glyphosate (50 and 0.5 mg/kg bw per day, respectively). But no calculations have been presented to show whether spermatozoa could be exposed under the normal condition of glyphosate use. Given the novel study type and underlying assumptions, evaluation of other comparator molecules to which humans are regularly systemically exposed (e.g. in the diet) would provide context to the relevance of these results and credibility to the assay's predictive capacity for effects in humans.

It was not clear from the publication which solvent has been used for which chemical. As solvent controls were included for all solvents used, the weakness was considered to be of minor degree. The criteria for a biological response were not provided.

Overall, the study is sufficiently documented to generally accepted scientific principles. It is considered to be reliable with restriction, but the information provided are not robust enough to impact the risk assessment.

Reliability criteria for *in vitro* toxicology studies

Publication: Ferramosca, 2021: Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.	Criteria met? Y/N/Uncertain	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines.	N	
Study is performed according to GLP.	N	
Study is completely described and conducted following scientifically acceptable standards.	Y	
Test substance		
Test material (glyphosate) is sufficiently documented and reported (i.e. purity, source, content, storage conditions)	Y	Purity for glyphosate not reported but batch No. given (#45521, Sigma Aldrich)
Only glyphosate acid or one of its salts is the tested substance.	N	Glyphosate alone and in combination with steroid hormones.
AMPA or other glyphosate metabolites is the tested substance.	N	
Study		
Test system is clearly and completely described.	Y	
Test conditions are clearly and completely described.	Y	
Metabolic activation system is clearly and completely described.	N	
Test concentrations is in physiologically acceptable range (< 1 mM).	Y	0.1-1000 nM
Cytotoxicity tests are reported.	N	Concentration range covers both the sexual hormones physiologically relevant concentrations (10 nM), triggering endogenously hormone-dependent signaling pathways, and the estimated (nM range) QRC dietary intake.
Positive and negative controls.	Y	
Complete reporting of effects observed.	Y	
Statistical methods described.	Y	
Historical negative and positive control data reported.	N	Criteria for a biological relevant response not provided.
Dose-effect relationship reported.	Y	
Overall assessment		
Reliable without restrictions	N	
Reliable with restrictions	Y	No information on the test item with regard to purity was given, however, the supplier and batch number were reported. Cytotoxicity tests were not included, but a broad concentration range from 0.1 - 1000 nM was tested. Historical control data were not reported. Results contradict higher tier <i>in vivo</i> multigenerational studies dosed at several orders of magnitude higher, which do not report any adverse outcomes in fecundity or reproductive outcome. No information on whether the tested concentration may reflect physiological exposure to human spermatozoa <i>in vivo</i> following exposure to the accepted regulatory dose levels following

Publication: Ferramosca, 2021: Herbicides glyphosate and glufosinate ammonium negatively affect human sperm mitochondria respiration efficiency.	Criteria met? Y/N/Uncertain	Comments
		glyphosate use as herbicide.
Not reliable	N	

1. Information on the study

Data point:	CA 5.9.4
Report author	Shrestha S. <i>et al.</i>
Report year	2020
Report title	Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.
Document No	Environmental Research (2020), Vol. 191, Article No. 110186 https://doi.org/10.1016/j.envres.2020.110186
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes (Relevance Category A)/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

Glyphosate was not associated with PD in analyses based on ever use or in analyses based on IWLDS of use. Given that there is no plausible mechanism for glyphosate causing PD and that glyphosate systemic dose has been found to be minimal for applicators and spouses (Acquavella et al. 2004), those results are considered to be a valid.

References

Acquavella JF, Alexander BH, Mandel JS, et al. Glyphosate biomonitoring for farmers and their families: Results from the farm family exposure study. *Environ. Health Perspect.* 2004; 112:321-326.

Reliability criteria for epidemiology studies

Publication: Shrestha S. et al., 2020, Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines/practices.	n/a	Not applicable
Study is completely described and conducted following scientifically acceptable standards.	Yes	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Yes	
Exposure to formulations with glyphosate combined with other a.i.	No	
Exposure to various formulations of pesticides.	Yes	50 pesticides total
Study		
Study design – epidemiological method followed.	Yes	
Description of population is investigated.	Yes	
Description of exposure circumstances.	Yes	
Description of results.	Yes	
Have confounding factors been considered.	Yes	
Statistical analysis.	Yes	
Overall assessment		

Publication: Shrestha S. et al., 2020, Pesticide use and incident Parkinson's disease in a cohort of farmers and their spouses.	Criteria met? Y/N/?	Comments
Reliable without restrictions	Yes	The finding of no association between glyphosate and Parkinson's disease risk in this study is considered to be valid. The results fit with what is known about glyphosate toxicology and exposure potential.
Reliable with restrictions	No	
Reliability not assignable	No	
Not reliable	No	

1. Information on the study

Data point:	CA 5.9.4
Report author	Werder E. J. <i>et al.</i>
Report year	2020
Report title	Herbicide, fumigant, and fungicide use and breast cancer risk among farmers' wives.
Document No	Environmental Epidemiology (2020), Vol. 4, No. 3, Art. No. e097
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	Not applicable
Acceptability/Reliability:	Yes (Relevance Category A)/Reliable without restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study was undertaken based on the assumption that the properties of pesticides – on the endocrine disruption and estrogenic activity scales – are such that an increase in breast cancer risk is possible from direct use of specific pesticides by female AHS spouses or from presumed indirect exposure related to their husbands' use of specific pesticides. The presumed biologic properties of pesticides underlying the study's hypotheses do not apply to glyphosate, at systemic doses from direct or indirect exposure (10^{-4} mg/kg direct, 10^{-5} mg/kg indirect – see Acquavella et al. 2004). The results of the study did not find clear associations between pesticide use and breast cancer risk and results for glyphosate were consistent across the various analyses in indicating no association with breast cancer.

We conclude that this study provides evidence that glyphosate is not related to breast cancer risk.

References

Acquavella JF, Alexander BH, Mandel JS, et al. Glyphosate biomonitoring for farmers and their families: Results from the farm family exposure study. *Environ. Health Perspect.* 2004; 112:321-326.

Reliability criteria for epidemiology studies

Publication: Werder E. J. et al., 2020, Herbicide, fumigant, and fungicide use and breast cancer risk among farmers' wives.	Criteria met? Y/N/?	Comments
Guideline-specific		
Study is in accordance to valid internationally accepted testing guidelines/practices.	n/a	Not applicable
Study is completely described and conducted following scientifically acceptable standards.	Yes	
Test substance		
Exposure to formulations with only glyphosate as a.i.	Yes	
Exposure to formulations with glyphosate combined with other a.i.	Uncertain	
Exposure to various formulations of pesticides.	Yes	26 pesticides
Study		

Study design – epidemiological method followed.	Yes	
Description of population is investigated.	Yes	
Description of exposure circumstances.	Uncertain	No description of how farm spouses applied pesticides.
Description of results.	Yes	
Have confounding factors been considered.	Yes	
Statistical analysis.	Yes	Good.
Overall assessment		
Reliable without restrictions	Yes	This study did not show a relationship between glyphosate and breast cancer. That result is consistent with glyphosate's exposure and toxicological properties.
Reliable with restrictions	No	
Reliability not assignable	No	
Not reliable	No	

検索期間：2021年1月～5月

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

1. Information on the study

Data point:	CP 10.2.1
Report author	Gustinasari K. <i>et al.</i>
Report year	2021
Report title	Acute toxicity and morphology alterations of glyphosate-based herbicides to <i>Daphnia magna</i> and <i>Cyclops vicinus</i>
Document No	Toxicological Research, 2021, 37, 197-207
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (no indication)
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study provides regulatory relevant endpoints, specifically the LC₅₀ for *D. magna* and *C. vicinus* after 48-hours exposure. However, the study cannot be deemed fully reliable due to the following aspects: First, the exposure concentrations were not analytically verified. Furthermore, previous exposure of *C. vicinus* to contaminants cannot be excluded as they were collected from a river with unknown contamination history. In addition, the exposure medium was not specified (possibly distilled water, but the phrasing is ambiguous) and important info on the culturing conditions is missing (i.e. temperature, etc.). Life-stage and size of the organisms at test start were not documented. Finally, for the morphological alterations, the control values were not reported.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
Key criteria		
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes (<i>D. magna</i>) and No (<i>C. vicinus</i>)	<i>D. magna</i> were obtained from a culture, <i>C. vicinus</i> were sampled from a river
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in distilled water, no solvent used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Source and content reported
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	Invertebrate study

6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	No	Reported: Source, feeding, aeration Not reported: Culturing conditions (incl. type of medium, O ₂ -content, temperature, pH, conductivity), life-stage or size of test organisms
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	Test with glyphosate formulation SUMIN ATUT 360 SL
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Uncertain	Doses are reported but constitution of exposure medium not clear, no dilution scheme provided
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Concentrations were not analytically verified
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoints reported: LC ₅₀ (12, 24 and 48-h) and NOEC (but not correctly determined)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	5 treatment levels and a negative control
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Exposure concentrations were not analytically verified.
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	3 replicates of 10 organisms per treatment group and control; control data reported
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study

20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	No	No information on test medium
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	Yes	Temperature roughly between 21-22 °C at the end of the test, not reported for acclimation period
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	No	
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.	No	No residue measurements
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.	No	No analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.	Uncertain	Underlying equation of the probit curve was reported but no confidence intervals for the LC ₅₀ or raw data to calculate confidence intervals retroactively
Overall assessment		
Reliable without restrictions	No	

Reliable with restrictions	Yes	The study provides regulatory relevant endpoints, specifically the LC₅₀ for <i>D. magna</i> and <i>C. vicinus</i> after 48-hours exposure. However, the study cannot be deemed fully reliable due to the following aspects: First of, the exposure concentrations were not analytically verified. Furthermore, previous exposure of <i>C. vicinus</i> to contaminants cannot be excluded as they were collected from a river with unknown contamination history. In addition, the exposure medium was not specified (possibly distilled water, but the phrasing is ambiguous) and important info on the culturing conditions is missing. Life-stage and size of the organisms at test start were not documented. For the morphological alterations, the control values were not reported
Not reliable	No	

1. Information on the study

Data point:	CP 10.3.1
Report author	Luo Q.H. <i>et al.</i>
Report year	2021
Report title	Effects of a commercially formulated glyphosate solutions at recommended concentrations on honeybee (<i>Apis mellifera</i> L.) behaviours
Document No	Scientific Reports, 2021, 11, 2115
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (no indication)
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports on possibly relevant endpoints for the acute bee risk assessment, specifically a 48-hour oral LD₅₀ value, as well as behavioural assessments on bees after glyphosate exposure. However, the study has to be deemed reliable with restrictions based on the following aspects: The colonies used for this study were obtained from an apiary about which no further information was provided. This pertains especially to possible pre-existent contaminant exposure of the colonies as well as health aspects regarding bee specific illnesses and treatments. As stated in OECD Guideline 213 (Honeybees, Acute Oral Toxicity Test), "... bees treated with chemical substances, such as antibiotics, anti-varroa, etc., should not be used for toxicity test for four weeks from the time of the end of the last treatment". This aspect cannot be adequately assessed as information on the bee colonies health or possible contaminant contact points is missing from the study report. The reported temperature during the test was 30 ± 1°C, which is outside the temperature range of 25 ± 2 °C recommended in OECD 213. The study report states an observation timeframe of 48 hours, however exact time-points of observation are not reported. Test concentrations were not analytically verified. Lastly, the LD₅₀ value was reported without confidence intervals. The certainty on the level of protection offered by the median LD₅₀ value can hence not be assessed. Based on the above mentioned aspects, the reliability of the study is restricted.

Assessment and conclusion by RMS:

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
Key criteria		
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study

2. No previous exposure to other chemicals is documented (where relevant).	No	Bees were acquired from a forest apiary, previous contact of the colony with contaminants is unknown
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	-	No carrier was used, test substance was directly dissolved in sucrose solution
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Uncertain	Content reported, Source and purity not reported
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	Non-vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	Source, life-stage and haltering conditions reported
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	Roundup formulation; 356 g/L
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Concentrations were not analytically verified
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	An oral LD ₅₀ (48-hours) is reported
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	3 treatment levels and a negative control were tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Exposure concentrations were not analytically verified
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	Increased mortality with increased test item concentration was observed
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	70 individuals per treatment group per experiment, experiment was repeated 6 times in total

17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error as well as curve equation are reported but no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical methods were described incl. level of power
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Uncertain	Mortality was observed over 48-hours but exact time-points of observations not mentioned
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, Bee study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, Bee study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, Bee study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, Bee study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, Bee study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, Bee study
20.6. Data on precipitation is recorded.	-	Not applicable, Bee study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	No	According to OECD 213 (Honeybees, Acute Oral Toxicity Test) the temperature should be 25 ± 2 °C; the reported temperature was 30 ± 1 °C
22. For bee studies, temperature of the study should be appropriate to species.	No	See above
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	-	Not applicable, Bee study
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	-	Not applicable, Bee study
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	No	
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.	No	No residue measurements

26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.	No	No analytical measurements conducted
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.	No	LC ₅₀ reported but not the corresponding confidence interval; no raw data to re-calculate retroactively
Overall assessment		
Reliable without restrictions	No	
Reliable with restrictions	Yes	The study reports on possibly relevant endpoints for the acute bee risk assessment, specifically a 48-hour oral LD ₅₀ value, as well as behavioural assessments on bees after glyphosate exposure. However, the study has to be deemed reliable with restrictions based on the following aspects: The colonies used for this study were obtained from an apiary about which no further information was provided. This pertains especially to possible pre-existent contaminant exposure of the colonies as well as health aspects regarding bee specific illnesses and treatments. As stated in OECD Guideline 213 (Honeybees, Acute Oral Toxicity Test), "... bees treated with chemical substances, such as antibiotics, anti-varroa, etc., should not be used for toxicity test for four weeks from the time of the end of the last treatment". This aspect cannot be adequately assessed as information on the bee colonies health or possible contaminant contact points is missing from the study report. The reported temperature during the test was 30 ± 1 °C, which is outside the temperature range of 25 ± 2 °C recommended in OECD 213. The study reports states an observation timeframe of 48 hours, however exact time-points of observation are not reported. Test concentrations were not analytically verified. Lastly, the LD ₅₀ value was reported without confidence intervals. The certainty on the level of protection offered by the median LD ₅₀ value can hence not be assessed. Based on the above mentioned aspects, the reliability of the study is restricted.
Not reliable	No	

1. Information on the study

Data point:	CA 8.2.6.1 and CA 8.2.7
Report author	Tajnaiová L. <i>et al.</i>
Report year	2020
Report title	Determination of the Ecotoxicity of Herbicides Roundup® Classic Pro and Garlon New in Aquatic and Terrestrial Environments
Document No	Plants, 2020, 9, 1203
Guidelines followed in study	No OECD guideline mentioned. Modified EN ISO 8692, EN ISO 20079 and EN ISO 23753-1
Deviations from current test guideline	No OECD guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities (no indication)
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The study reports on endpoints with possible relevance to the EU-level risk assessment for aquatic organisms, specifically freshwater algae (*Desmodesmus subspicatus*) and aquatic plants (*Lemna minor*) for the glyphosate metabolite AMPA. For *D. subspicatus*, a regulatory relevant endpoint is reported (IC₅₀ for inhibition of growth rate, usually described as ErC₅₀). For the *Lemna* test, no regulatory relevant endpoint was reported but the assessed parameters (growth rate, front area and chlorophyll content) could potentially serve as supporting information in a weight of evidence approach.

As the tests differed both in design as in the reported endpoints, assessments of reliability should be looked at separately.

Test with *D. subspicatus*: The report states that the test was conducted according to ISO 8692 with not further specified modifications. Furthermore, it is reported, that the test fulfilled the validity criteria laid down by OECD test guideline for freshwater algae. There are however important information missing from the report. Specifically, no data of the negative control are presented not even in the supplementary material. No raw data are provided so, the validity criteria could not be checked. Furthermore, the IC₅₀ value was calculated without confidence intervals and no parameters to judge the fit of the curve used for calculating the IC₅₀ are presented. The certainty of the level of protection can therefore not be fully assessed.

Test with *L. minor*: While relevant parameters were assessed (such as growth rate and front area), no regulatory relevant endpoints, such as ECx values, were calculated. No justifications are provided. Furthermore, control data are only presented for the parameters front area and chlorophyll content, and only in a graphical format. Due to the lack of raw data, no regulatory relevant endpoints can be calculated retroactively.

For both tests: The purity of the test material was not reported. Furthermore, exposure concentrations were not analytically verified. Especially for the *Lemna* test, which lasted 7 days without renewal of the test substance, actual exposure concentrations could vary significantly from the nominal concentrations.

Based on the above mentioned issues for both tests, the study can only be deemed reliable with restrictions.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
Key criteria		
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	Uncertain	The study states that tests were conducted according to standardized test guidelines with modifications (not specified); EN ISO 8692 (growth inhibition of green algae) and EN ISO 20079 (duckweed growth inhibition test) with modifications. For algae: validity criteria according to OECD guidelines for freshwater algae were met For <i>Lemna</i> : no validity criteria mentioned
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Test cultures were obtained from research institutes in Germany and Czech Republic
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Uncertain	Not reported whether a solvent was used to prepare the test solutions
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Uncertain	Source of the test material was reported but no information on purity
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	Non-vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	Uncertain	Standardized test guidelines were inferred (see point 1.); validity criteria were met for the freshwater algae assay, for the <i>Lemna</i> assay validity was not discussed
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Uncertain	Glyphosate metabolite (AMPA) was tested but the preparation of test solutions was not described

9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	No	Missing information on preparation of test solutions (no info on use of solvent)
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Concentrations were not analytically verified
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes and No	Algae: Endpoints reported: IC ₅₀ <i>Lemna</i> : no regulatory relevant endpoint reported
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	<i>Lemna</i> : 10 levels and a control; 5 levels pH adjusted assay Algae: 15 levels and a control; 5 levels pH adjusted assay 3 replicates for all treatment and control levels
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Exposure concentrations were not analytically verified.
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Uncertain	Sufficient number of organisms and treatments was included but control results were not sufficiently reported for all endpoints (only for front area and chlorophyll content for the <i>Lemna</i> test)
17. Assessment of the statistical power of the assay is possible with reported data.	Uncertain	No raw data reported, however statistical test results are reported
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical methods were reported
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study

20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	Uncertain	Medium type mentioned: Bolds Basel Medium (BBM) and Steinberg medium; composition not mentioned
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	Yes	Algae: 23 ± 2 °C <i>Lemna</i> : 24 ± 1 °C.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	No	-
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.	No	No residue measurements
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.	No	No analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.	No	IC ₅₀ value reported without C.I.
Overall assessment		
Reliable without restrictions	No	

Reliable with restrictions	Yes	The study reports on endpoints with possible relevance to the EU-level risk assessment for aquatic organisms, specifically freshwater algae (<i>Desmodesmus subspicatus</i>) and aquatic plants (<i>Lemna minor</i>) and the glyphosate metabolite AMPA. For <i>D. subspicatus</i>, a regulatory relevant endpoint is reported (IC₅₀ for inhibition of growth rate, usually described as ErC₅₀). For the lemna test, no regulatory relevant endpoint was reported but the assessed parameters (growth rate, front area and chlorophyll content) could potentially serve as supporting information in a weight of evidence approach. As the tests differed both in design as in the reported endpoints, assessments of reliability should be looked at separately. <u>Test with <i>D. subspicatus</i>:</u> The report states that the test was conducted according to ISO 8692 with not further specified modifications. Furthermore, it is reported, that the test fulfilled the validity criteria laid down by OECD test guideline for freshwater algae. There are however important information missing from the report. Specifically, no data of the negative control are presented not even in the supplementary material. Furthermore, the IC₅₀ value was calculated without confidence intervals and no parameters to judge the fit of the curve used for calculating the IC₅₀ are presented. The certainty of the level of protection can therefore not be fully assessed. <u>Test with <i>L. minor</i>:</u> While relevant parameters were assessed (such as growth rate and front area), no regulatory relevant endpoints, such as ECx values, were calculated. No justifications is provided. Furthermore, control data are only presented for the parameters front area and chlorophyll content, and only in a graphical format. Due to the lack of raw data, no regulatory relevant endpoints can be calculated retroactively. For both tests: The purity of the test material was not reported. Furthermore, exposure concentrations were not analytically verified. Especially for the lemna test, which lasted 7 days without renewal of the test substance, actual exposure concentrations could vary significantly from the nominal concentrations. Based on the above listed limitations, the study can only be deemed reliable with restrictions.
Not reliable	No	

検索期間：2021年1月～5月

区分 a に分類された文献とその理由

環境動態

1. Information on the study

Data point:	CA 7.5/XX
Report author	Geissen, V. <i>et al.</i>
Report year	2021
Report title	Cocktails of pesticide residues in conventional and organic farming systems in Europe - Legacy of the past and turning point for the future
Document No	Environmental Pollution (2021):278, 116827
Guidelines followed in study	SANTE/11813/2017
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Relevant (Category A acc. to EFSA GD, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study several compounds, including glyphosate and AMPA, were analysed in 340 agricultural topsoil samples from 4 representative EU study sites in Spain, Portugal and the Netherlands. Soil samples were collected between 2015 and 2018 after harvest or before the start of the growing season.

No information on the sampling procedure and storage time of the topsoil samples is provided. This does not allow to assess the representativeness of the soil samples. Furthermore, only maximum and median values are reported and the results cannot be assigned to a respective sampling period. Therefore, the article is considered reliable with restrictions.

1. Information on the study

Data point:	CA 7.3.1/009
Report author	Holtomo O. <i>et al.</i>
Report year	2021
Report title	Insight of UV-vis spectra and atmospheric implication for the reaction of •OH radical towards glyphosate herbicide and its hydrates
Document No	RSC Advances (2021), 11(27), 16404-16418
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Relevant (Category A acc. to EFSA GD, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The aim of the study was the estimation of the atmospheric half-life of glyphosate considering reactions with OH-radical or Cl-atoms. The calculations yielded an atmospheric lifetime of glyphosate of 2.34 hours. The EU agreed method to determine the half-life of an active substance is the Atkinson approach. The calculation in the publication cannot be considered a common method and the endpoint should not supersede the endpoint calculated using the Atkinson method. The study is considered reliable with restrictions.

1. Information on the study

Data point:	CA 7.5/
Report author	Piel S. <i>et al.</i>
Report year	2021
Report title	Understanding the origins of herbicides metabolites in an agricultural watershed through their spatial and seasonal variations
Document No	Journal of environmental science and health. Part. B, Pesticides, food contaminants, and agricultural wastes, Part B (2021), Vol. 56(4), pp. 313-332
Guidelines followed in study	None
Deviations from current test guideline	Not applicable
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Relevant (Category A acc. to EFSA GD, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

The aim of this study was to understand the spatial and seasonal variations of glyphosate and AMPA and to determine their origins in the Vilaine River watershed, Brittany-France.

The sample storage time prior to analysis is not reported. Individual concentrations for glyphosate and AMPA assigned to sampling stations and sampling campaigns is presented graphically. Thus, no exact but narrative concentrations can be given for respective sampling locations and periods.

Therefore, the study is considered reliable with restrictions.

検索期間：2021年5月～8月

区分 a に分類された文献とその理由

生活環境動植物及び家畜に対する毒性

1. Information on the study

Data point:	CA 8.1.5
Report author	Diaz-Martín R. D. <i>et al.</i>
Report year	2021
Report title	Short exposure to glyphosate induces locomotor, craniofacial, and bone disorders in zebrafish (<i>Danio rerio</i>) embryos
Document No	Environmental toxicology and pharmacology (2021), Vol. 87, Article No. 103700
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Full summary of the study according to OECD format

3. Assessment and conclusion

Assessment and conclusion by applicant:

This article used the zebrafish model to assess the effects of early life glyphosate exposure on the development of cartilage and bone tissues and organismal responses. The evidence suggests functional alterations, including a reduction in the cardiac rate, significant changes in the spontaneous tail movement pattern, and defects in craniofacial development. These effects were concomitant with alterations in the level of the oestrogen receptor alpha osteopontin and bone sialoprotein. Embryos exposed to glyphosate presented spine deformities as adults. These developmental alterations are likely induced by changes in protein levels related to bone and cartilage formation.

This article is of importance for the assessment of the endocrine disrupting properties of glyphosate. It reports the acute and chronic effects on zebra fish. The study seems to have been well conducted and reports a regulatory relevant and reliable endpoint: 96 h NOEC = 1 mg/L (based on the effects on bone sialoprotein (BSPII) relative expression). The study is considered reliable with restrictions because it lacks of analytical verifications of the tested item in the test medium during the exposure phase. Temperature during the test is a bit high for the species tested.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Zebrafish embryos used for the present study were generated from individuals obtained from commercial

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		distributors and cultured in the lab.
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in the buffer solution, no solvent used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Source, purity and CAS number reported.
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	Batch specifications are not provided and the assessment of the ecotoxicological equivalence cannot be conducted
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Concentrations were analytically verified only in the stock solutions
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint derived: NOEC (96-h)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	No positive control tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Concentrations were analytically verified only in the stock solutions
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	-

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	Yes	-
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	Uncertain	Temperature set at 28.5°C for the tests.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	No	Concentrations were analytically verified only in the stock solutions, but not during the test
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.	No	Concentrations were analytically verified only in the stock solutions, but not during the test

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		Yes	The concentration of glyphosate in-stock solution was determined by liquid chromatography coupled to mass spectrometry (UHPLC-MS/MS)
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	No assessment of the ECX median values was conducted.
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This article is of importance for the assessment of the endocrine disrupting properties of glyphosate. It reports the acute and chronic effects on zebra fish. The study seems to have been well conducted and reports a regulatory relevant and reliable endpoint: 96-h NOEC = 1 mg/L (based on the effects on bone sialoprotein (BSPII) relative expression). The study is considered reliable with restrictions because it lacks of analytical verifications of the tested item in the test medium during the exposure phase. Temperature during the test is a bit high for the species tested.	
Not reliable	No	-	

1. Information on the study

Data point:	CP 10.2.1
Report author	Fernandez C. <i>et al.</i>
Report year	2021
Report title	Toxic effects of chlorpyrifos, cypermethrin and glyphosate on the non-target organism <i>Selenastrum capricornutum</i> (Chlorophyta)
Document No	An Acad Bras Cienc, 2021, 93(4), e20200233
Guidelines followed in study	OECD TG 201 (2011) partially
Deviations from current test guideline	Deviation from OECD TG 201 (2011): - No analytical verifications of the tested item in the test medium during the exposure phase - The test item is not fully documented.
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study evaluates the acute toxic effects of glyphosate on the growth, biovolume and ultrastructure of the green microalgae *Selenastrum capricornutum*. After 48 h, all tested concentrations reduced significantly the population growth. The regulatory relevant endpoint 96-h effective concentration 50 (EC₅₀) was 15.60 mg/L. Cells exposed to glyphosate showed an increase in the cellular size related to the increase in pesticide concentration and exposure time. The most significant damages observed on the ultrastructure of cells included thylakoids and mitochondria disruption, formation of electrodense bodies, accumulation of lipids and increase in the size and number of starch granules.

The study is considered reliable with restrictions because it lacks of analytical verifications of the tested item in the test medium during the exposure phase and the test item is not fully documented.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	Uncertain	Study conducted according to OECD TG 201 and Environment Canada Series Report EPS 1/RM/25, but not all validity criteria can be checked.
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Cultures were obtained from a culture collection at the Universidad

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		Federal de São Carlos (São Paulo) and were kept in Bold's Basic Medium.
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in the test medium, no solvent used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	No	Only the name of the product and glyphosate content were reported.
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	No vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	Uncertain	Study conducted according to OECD TG 201 and Environment Canada Series Report EPS 1/RM/25, but not all validity criteria can be checked.
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Analytical verifications were not conducted
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint derived: EC ₅₀ (96-h))
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	-
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Analytical verifications were not conducted
15. A clear concentration response relationship is reported – in	Yes	-

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
studies where the dose response test design is employed.		
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	-
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies:		
23.1. The source and / or composition of the media used should be described.	Yes	-
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	Yes	Temperature set at 24°C for the tests.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	No	Analytical verifications were not conducted
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate,	No	Analytical verifications

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
and where relevant its metabolites.			were not conducted
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		No	Analytical verifications were not conducted
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		Yes	95% CI values were reported
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This study evaluates the acute toxic effects of glyphosate on the growth, bio volume and ultrastructure of the green microalgae <i>Selenastrum capricornutum</i> . The 96-h effective concentration 50 (EC ₅₀) was 15.60 mg/L. The study is considered reliable with restrictions because it lacks of analytical verifications of the tested item in the test medium during the exposure phase and the test item is not fully documented.	
Not reliable	No	-	

1. Information on the study

Data point:	CP 10.1.3
Report author	Goodman R. M. <i>et al.</i>
Report year	2021
Report title	Influence of herbicide exposure and ranavirus infection on growth and survival of juvenile red-eared slider turtles (<i>Trachemys scripta elegans</i>)
Document No	Viruses, 2021, 13(8), 1440
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

In this study, hatchling red-eared slider turtles (*Trachemys scripta elegans*) were exposed to the formulated glyphosate herbicides Roundup ProMax[®] and Rodeo[®] to examine direct effects on growth and mortality. Turtles were exposed to herbicides via water bath during the first 3 weeks of a 5-week experiment. Exposure to a NOEC = 2 mg/L concentration of glyphosate (for both products) did not impact growth or survival time of hatchling turtles.

The study cannot be considered as fully reliable because it is uncertain whether and when the samples from the final herbicide solutions that were analysed to verify target concentrations, were taken from the experimental cages. In addition, the test items were not documented and only one concentration of each product was tested.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Individuals used for the present study were purchased from a commercial supplier and acclimatized for 3 days to laboratory conditions
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in water, no solvent used

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	No	Just the name of the supplier was reported.
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	Batch specifications are not provided and the assessment of the ecotoxicological equivalence cannot be conducted
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Uncertain	In two different weeks, samples from the final herbicide solutions were analysed to verify target concentrations, but it is not clear whether and when the samples were taken from the experimental cages.
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint reported: chronic NOEC (35-d))
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	No	Only 1 concentration of each product was tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Uncertain	Samples from the final herbicide solutions were

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		analysed to verify target concentrations, but it is not clear whether and when the samples were taken from the exposure cages.
15. A clear concentration response relationship is reported - in studies where the dose response test design is employed.	No	Only 1 concentration of each product was tested
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	20 replicates of 1 individual per treatment
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.		Yes	-
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.		Yes	Mean temperature set at 24°C (19.5-28°C).
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		Uncertain	Samples from the final herbicide solutions were analysed to verify target concentrations, but it is not clear whether and when the samples were taken from the exposure cages.
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Uncertain	Samples from the final herbicide solutions were analysed to verify target concentrations, but it is not clear whether and when the samples were taken from the exposure cages.
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		No	No analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	No ECx assessment was conducted
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This article reports the chronic effects of two glyphosate-based pesticides on growth and survival of juvenile Red-Eared Slider Turtles (<i>Trachemys scripta elegans</i>). The study seems to have been well conducted and reports a regulatory relevant endpoint: 35-d chronic NOEC = 2 mg/L (1.952 - 2.292). The study cannot be considered as fully reliable because it is uncertain whether and when the samples from the final herbicide solutions that were analysed to verify target concentrations, were taken from the experimental cages. In addition, the test items were not documented and only one concentration of each product was tested.	
Not reliable	No	-	

1. Information on the study

Data point:	CP 10.2.1, CP 10.2.2
Report author	Houssou A. M. <i>et al.</i>
Report year	2021
Report title	Acute and chronic effects of a glyphosate and a cypermethrin-based pesticide on a non-target species <i>Eucypris</i> sp. Vavra, 1891 (Crustacea, Ostracoda)
Document No	Processes, 2021, 9(4), 701
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This article reports the acute and chronic effects of a glyphosate-based pesticide on the fresh-water Ostracoda species *Eucypris* sp. (aquatic invertebrate species other than *Daphnia magna*). The study seems to have been well conducted and reports regulatory relevant and reliable endpoints: 48-h acute $LC_{50} = 9.03$ mg/L and 28-d chronic $LOEC = 0.903$ mg/L (10% of the estimated 48-h LC_{50}). However, the study cannot be considered as fully reliable because it lacks of analytical verifications of the tested item in the test medium. In addition, the culture/test medium is not described.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Individuals used for the present study are fifth generation of a lab culture from a natural sample. They may be considered as non-contaminated individuals by environmental pollutants.
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in distilled water, no solvent used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Uncertain	Source and content reported, but not clear if

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		the tested formulation Kumark® 480 g/L (Kumark Company Limited, Kumasi, Ghana) contains surfactants.
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	Batch specifications are not provided and the assessment of the ecotoxicological equivalence cannot be conducted
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Uncertain	Culture medium is not described
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	Concentrations were not analytically verified
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoints reported: acute LC ₅₀ (24 and 48-h) and chronic LOEC (28-d))
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes (acute test) No (chronic test)	For the chronic test only 2 concentrations were tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	No	Exposure concentrations were not analytically verified.
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	Four replicates with seven adults per tested concentration (acute), ten replicates of 1 adult female per concentration (chronic reproduction) and 3 replicates of 10 individuals per concentration (chronic growth)
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	No	No information on the composition of

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
			the culture/test medium
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.		Uncertain	Temperature set at 27°C for culture and acute tests. No data of the temperature of the chronic tests are reported.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		No	Exposure concentrations were not analytically verified
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		No	Exposure concentrations were not analytically verified
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		No	No analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		Yes	LC ₅₀ 95% confidence interval is reported
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This article reports the acute and chronic effects of a glyphosate-based pesticide on the fresh-water Ostracoda species <i>Eucypris</i> sp. The study seems to have been well conducted and reports regulatory relevant and reliable endpoints: 48-h acute LC ₅₀ = 9.03 mg/L and 28-d chronic LOEC = 0.903 mg/L (10% of the estimated 48-h LC ₅₀). However, the study cannot be considered as fully reliable because it lacks of analytical verifications of the tested item in the test medium. In addition, the culture/test medium is not described.	
Not reliable	No	-	

1. Information on the study

Data point:	CA 8.2.6.1
Report author	Kaeoboon S. <i>et al.</i>
Report year	2021
Report title	Toxicity response of <i>Chlorella</i> microalgae to glyphosate herbicide exposure based on biomass, pigment contents and photosynthetic efficiency
Document No	Plant Science Today, 2021, 8(2), 293-300
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This article reports the effects of glyphosate at different concentrations (50-500 mg/L) on three *Chlorella* species including *Chlorella ellipsoidea*, *Chlorella sorokiniana* and *Chlorella vulgaris* in relation to the biomass, pigment contents and photosynthetic efficiency. The study seems to have been well conducted and reports regulatory relevant endpoints: 24-h acute $EC_{50} = 449.34, 288.23$ and 174.28 mg/L for *Chlorella vulgaris*, *Chlorella ellipsoidea* and *Chlorella sorokiniana*, respectively. Chronic endpoints at 72-h could also be calculated.

The study cannot be considered as fully reliable because it lacks of analytical verifications of the tested item in the test medium and the temperature during the tests and culture are higher than recommended for green algae. Purity of the test item is not given.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	-
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	The culture medium was directly used as diluent
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	No	The producer is provided, but not the purity
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	No vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial)	Yes	-

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
species) incubation conditions, feeding etc.		
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Validity criteria cannot be assessed because no raw data are available
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	No	No analytical verifications of the concentration of glyphosate in the test media were conducted
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint reported: EC ₅₀ (24-h)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	5 concentrations tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Uncertain	No analytical verifications of the concentration of glyphosate in the test media were conducted
15. A clear concentration response relationship is reported - in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	3 replicates for each treatment group were tested
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard deviation were provided. No raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not relevant, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent	-	Not relevant, aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
representative for the European Agriculture.			
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).		-	Not relevant, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.		-	Not relevant, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.		-	Not relevant, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).		-	Not relevant, aquatic study
20.6. Data on precipitation is recorded.		-	Not relevant, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.		-	Not relevant, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.		-	No bee study
23. For lab aquatic studies:			
23.1. The source and / or composition of the media used should be described.		Yes	-
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.		No	Temperature was 30°C (should have been in the range 21-24°C)
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		Uncertain	No analytical verifications of the concentration of glyphosate in the test media were conducted
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Uncertain	No analytical verifications of the concentration of glyphosate in the test media were conducted
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		No	No analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	No ECx assessment was conducted
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This article reports the effects of glyphosate at different concentrations (50-500 mg/L) on three <i>Chlorella</i> species including <i>Chlorella ellipsoidea</i> , <i>Chlorella sorokiniana</i> and <i>Chlorella vulgaris</i> in relation to the biomass, pigment contents and photosynthetic efficiency. The study seems to have been well	

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria			Criteria met? Yes / No / Uncertain	Comment / Justification
		conducted and reports regulatory relevant endpoints: 24-h acute EC ₅₀ = 449.34, 288.23 and 174.28 mg/L for <i>Chlorella vulgaris</i> , <i>Chlorella ellipsoidea</i> and <i>Chlorella sorokiniana</i> , respectively. Chronic endpoints at 72-h could also be calculated. The study cannot be considered as fully reliable because it lacks of analytical verifications of the tested item in the test medium and the temperature during the tests and culture are higher than recommended for green algae. Purity of the test item is not given.		
Not reliable	No	-		

1. Information on the study

Data point:	CA 8.2.2, CP 10.2.2
Report author	Le Du -Carrée J. <i>et al.</i>
Report year	2021
Report title	Developmental effect of parental or direct chronic exposure to environmental concentration of glyphosate on the larvae of rainbow trout, <i>Oncorhynchus mykiss</i>
Document No	Aquatic Toxicology, 2021, 237, 105894
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study investigates the impact of parental and direct exposure to 1 µg/L of glyphosate using the active substance alone or one of two Glyphosate-Based Herbicide formulations (i.e. Roundup Innovert® and Viaglif Jardin®) in the early developmental stages of rainbow trout. Three different modes of exposure on the F1 generation were studied: (1) intergenerational (i.e. fish only exposed through their parents); (2) direct (i.e. fish exposed only directly) and (3) multigenerational (i.e. fish both exposed intergenerationally and directly). The impact of chemical treatments on embryo -larval development (survival, biometry and malformations), swimming behaviour, biochemical markers. Chemical exposure did not affect the survival of F1 embryos or malformation rates. Direct exposure to the a.s. induced some biometric changes, such as reduction in head size (with a 10% decrease in head length), independently of co -formulants. Intergenerational exposure to the a.s. or the Roundup GBH increased swimming activity of the larvae, with increase of between 78 and 102% in travel speeds. Therefore, 1 generation LOEC = 1 µg/L.

The study is not considered fully reliable because although it presents analytical verifications of the tested item in the water in the exposure phase, it does not fully follow any agreed guidance and only one concentration was tested. Temperature of the test could have been a bit low for the tested species at some time points of the experiment.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline -compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non -guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Individuals were cultured in the lab.
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non -toxic) and a carrier control / positive control is considered in the test design.	Uncertain	Pre -dilution of pure glyphosate was done in pure methanol in a concentration so

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		the final dose of methanol exposure was kept under 4 µL/L
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Source, purity, CAS number and content reported
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	The assessment of the ecotoxicological equivalence was not conducted
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non -guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Yes	Concentrations were analytically verified just before and 2-h after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint derived: LOEC (1 generation)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	No	Just 1 concentration was tested

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Yes	Concentrations were analytically verified just before and 2 h after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	No	Only 1 concentration was tested
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	-
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time -points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5 -8.0), cation exchange capacity, organic carbon (0.5 -2 -5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A -horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
20.6. Data on precipitation is recorded.		-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20 -25°C and soil moisture / relative humidity was reported.		-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.		-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.		Yes	River water filtered
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15 -25°C.		Uncertain	Temperature set at 8°C during the embryonic development and at 11°C for the swimming behaviour analysis. Main test temperature not reported
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		No	-
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Yes	Concentrations were analytically verified just before and 2 h after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		Yes	The concentration of glyphosate in water was determined by HPLC and fluorometric methods
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	No assessment of the ECX median values was conducted.
Overall assessment			
Reliable without restrictions	No	-	

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
Reliable with restrictions	Yes		This study investigates the impact of parental and direct exposure to 1 µg/L of glyphosate using the AS alone or one of two GBH formulations (i.e. Roundup Innovert® and Viaglif Jardin®) in the early developmental stages of rainbow trout. Three different modes of exposure on the F1 generation were studied: (1) intergenerational (i.e. fish only exposed through their parents); (2) direct (i.e. fish exposed only directly) and (3) multigenerational (i.e. fish both exposed intergenerationally and directly). The impact of chemical treatments on embryo -larval development (survival, biometry and malformations), swimming behaviour, biochemical markers. Chemical exposure did not affect the survival of F1 embryos or malformation rates. Direct exposure to the AS induced some biometric changes, such as reduction in head size (with a 10% decrease in head length), independently of co -formulants. Intergenerational exposure to the AS or the Roundup GBH increased swimming activity of the larvae, with increase of between 78 and 102% in travel speeds. Therefore, 1 generation LOEC = 1 µg/L. The study is not considered fully reliable because although it presents analytical verifications of the tested item in the water in the exposure phase, it does not fully follow any agreed guidance and only one concentration was tested. Temperature of the test could have been a bit low for the tested species at some time points of the experiment.
Not reliable	No		-

1. Information on the study

Data point:	CA 8.2.2, CP 10.2.2
Report author	Le Du-Carrée J. <i>et al.</i>
Report year	2021
Report title	Generational effects of a chronic exposure to a low environmentally relevant concentration of glyphosate on rainbow trout, <i>Oncorhynchus mykiss</i>
Document No	Science of the Total Environment, 2021, 801, 149462
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study investigates the impact of an environmentally relevant concentration of glyphosate on a F2 generation issued from exposed generations F0 and F1. Trans, inter and multigenerational toxicity of 1 µg/L of the active substance was evaluated on early stages of development and juvenile rainbow trout (*Oncorhynchus mykiss*) using different molecular, biochemical, immuno-hematologic, and biometric parameters, behaviour analysis, and a viral challenge. Reproductive parameters of generation F1 were not affected. However, developmental toxicity in generation F2 due to glyphosate alone or co-formulated was observed with head size changes (e.g. head surface up to +10%), and metabolic disruptions (e.g. 35% reduction in cytochrome -c -oxidase). Therefore, LOEC = 1 µg/L.

The study is not considered fully reliable because although it presents analytical verifications of the tested item in the water in the exposure phase, it does not fully follow any agreed guidance and only one concentration was tested. Temperature of the test could have been a bit low for the tested species at some time points of the experiment.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline -compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non -guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	Individuals were cultured in the lab.
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Uncertain	Pre -dilution of pure glyphosate was done in pure methanol in a concentration so the final dose of methanol exposure was

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		kept under 4 µL/L
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Source, purity, CAS number and content reported
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	No	The assessment of the ecotoxicological equivalence was not conducted
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non -guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Yes	Concentrations were analytically verified just before and 2 h after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint derived: LOEC (2 generations)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	No	Just 1 concentration was tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Yes	Concentrations were analytically verified just before and 2 h

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	No	Only 1 concentration was tested
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	-
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard error provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time -points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5 -8.0), cation exchange capacity, organic carbon (0.5 -2 -5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A -horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20 -25°C and soil moisture / relative humidity was reported.		-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.		-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.		Yes	River water filtered
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15 -25°C.		Uncertain	Temperature varied from 6 to 15°C (it should have been 12 to 15.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		No	-
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Yes	Concentrations were analytically verified just before and 2 h after restarting the water flow approximately two months after the beginning of the experiment and a standard curve of the mean glyphosate concentrations as a function of time was generated.
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		Yes	The concentration of glyphosate in water was determined by HPLC and fluorometric methods
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	No assessment of the ECX median values was conducted.
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This study investigates the impact of an environmentally relevant concentration of glyphosate on a F2 generation issued from exposed generations F0 and F1. Trans, inter and multigenerational toxicity of 1 µg/L of the active substance was evaluated on early stages of development and juvenile rainbow trout (<i>Oncorhynchus mykiss</i>) using different molecular,	

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full -text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
			biochemical, immuno-hematologic, and biometric parameters, behaviour analysis, and a viral challenge. Reproductive parameters of generation F1 were not affected. However, developmental toxicity in generation F2 due to glyphosate alone or co -formulated was observed with head size changes (e.g. head surface up to +10%), and metabolic disruptions (e.g. 35% reduction in cytochrome -c -oxidase). Therefore, 2 generations LOEC = 1 µg/L. The study is not considered fully reliable because although it presents analytical verifications of the tested item in the water in the exposure phase, it does not fully follow any agreed guidance and only one concentration was tested. Temperature of the test could have been a bit low for the tested species at some time points of the experiment.
Not reliable	No	-	

1. Information on the study

Data point:	CA 8.2.7
Report author	Mendes E. J. <i>et al.</i>
Report year	2021
Report title	Isolated and combined effects of glyphosate and its by-product aminomethylphosphonic acid on the physiology and water remediation capacity of <i>Salvinia molesta</i>
Document No	Journal of Hazardous Materials, 2021, 417, 125694
Guidelines followed in study	None (partially based on OECD TG 221)
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study evaluates the isolated and combined effects of glyphosate and its by-product aminomethylphosphonic acid (AMPA) on the aquatic macrophyte *Salvinia molesta*. Plants were exposed to environmentally relevant concentrations of glyphosate (0, 20, 40, 60, 80 and 100 µg/L) or AMPA (0, 10, 20, 30, 40 and 50 µg/L) for seven days. Then, based on the effective concentrations of glyphosate found to reduce photosynthetic rates by 10% (EC₁₀) and 50% (EC₅₀), the plants were exposed to combinations of 0, 16 and 63.5 µg glyphosate/L and 0, 5, 15, 25 µg AMPA/L. The EC₁₀ and EC₅₀ were lower for AMPA (6.1 µg/L and 28.4 µg/L, respectively) than for glyphosate (16 and 63.5 µg glyphosate/L, respectively). When occurring together, the deleterious effects of those chemicals to plants increased.

The study is considered not fully reliable because it is not possible to identify the number of plants tested for each treatment and because plants were collected from the field in Brazil with no record of previous pesticide exposure (although they were maintained in the lab for 60 days for depuration).

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	Uncertain	Study conducted according to OECD TG 221, but validity criteria cannot be verified because the measured variables (mainly photosynthetic rate) are different from those stated in the OECD GD (inhibition of growth).

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
2. No previous exposure to other chemicals is documented (where relevant).	Uncertain	Plants were collected from the field in Brazil with no record of previous pesticide exposure, but were maintained in the lab for 60 days for depuration
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Yes	Test item dissolved in water, no solvent used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Analytical grade glyphosate and AMPA (Pestanal®, Sigma-Aldrich, Canada) were used in all experiments
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	No vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	Uncertain	Study conducted according to OECD TG 221, but validity criteria cannot be verified
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Yes	The concentrations of glyphosate and AMPA in the water medium and plants (initial and final concentrations) were determined

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint derived: EC ₅₀ (7-d) for both glyphosate and AMPA
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	-
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Yes	Analytical verifications were conducted at the beginning and the end of the test
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Uncertain	A density of 15 g plant/L was used in the bioassays, but the number of replicates is not known.
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard deviation provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.		-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.		-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.		Yes	-
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.		Yes	Temperature set at 20°C for the tests.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		Yes	Analytical verifications were conducted at the beginning and the end of the test
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Yes	Analytical verifications were conducted at the beginning and the end of the test
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		Yes	Analytical methods were described
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	95% CI values were not reported
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This study evaluates the isolated and combined effects of glyphosate and its by-product aminomethylphosphonic acid (AMPA) on the aquatic macrophyte <i>Salvinia molesta</i>. Plants were exposed to environmentally relevant concentrations of glyphosate (0, 20, 40, 60, 80 and 100 µg/L) or AMPA (0, 10, 20, 30, 40 and 50 µg/L) for seven days. Then, based on the effective concentrations of glyphosate found to reduce photosynthetic rates by 10% (EC₁₀) and 50% (EC₅₀), the plants were exposed to combinations of 0, 16 and 63.5 µg glyphosate/L and 0, 5, 15, 25 µg AMPA/L. The EC₁₀ and EC₅₀ were lower for AMPA (6.1 µg/L and 28.4 µg/L, respectively) than for glyphosate (16 and 63.5 µg glyphosate/L, respectively). When occurring together, the deleterious effects of those chemicals to plants increased. The study is considered not fully reliable because it is not possible to identify the number of plants tested for each treatment and because plants were collected from the field in Brazil with no record of previous pesticide exposure (although they were maintained in the lab for 60 days for depuration).	

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria			Criteria met? Yes / No / Uncertain	Comment / Justification
Not reliable	No	-		

1. Information on the study

Data point:	CA 8.2.8
Report author	Vera M. S. <i>et al.</i>
Report year	2021
Report title	First evaluation of the periphyton recovery after glyphosate exposure
Document No	Environmental Pollution, 2021, 290, 117998
Guidelines followed in study	None
Deviations from current test guideline	No guideline was used / followed
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1 / Reliable with restrictions)

2. Assessment and conclusion

Assessment and conclusion by applicant:

This is a higher tier study for aquatic organisms with two glyphosate concentrations tested (0.4 and 4 mg/L) on aquatic microcosms. The study is structured in two phases: 7 days of exposure to treated water and 21 days of recovery in clean water (both of them under static conditions). It evaluates the potential of freshwater periphyton to recover from glyphosate exposure using microcosms under laboratory conditions. Dry weight, ash-free dry weight, chlorophyll *a*, and periphyton abundances were analysed. The periphyton affected with the lowest concentration recovered most of the structural parameters within 7 days in clean water, but the taxonomic structure did not entirely recover towards the control structure. Periphyton exposed to 4 mg/L could not recover during 21 days in herbicide-free water, reaching values almost four times higher in % of dead diatoms and four times lower in ash-free dry weight concerning the control at the end of the study. Results suggest a long lasting effect of the herbicide due to the persistence within the community matrix even after translocating periphyton to decontaminated water. The study concludes that the exposure concentration modulates the recovery potential of impacted periphyton. The study is considered reliable with restrictions. Analytical verifications of the tested item in the test medium were conducted at the beginning and the end of the exposure phase.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	No	Non-guideline study
2. No previous exposure to other chemicals is documented (where relevant).	Yes	The periphytic colonization was conducted in a pond that has never been contaminated with glyphosate or any other pesticide.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	Uncertain	It's not clear whether the test item dissolved in distilled water, filtered pond water or a solvent was used
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	Source, content and CAS number were reported.
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	No vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	No	Non-guideline study
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Yes	Glyphosate concentration was measured at the beginning and the end of the exposure period
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoints reported: LOEC immediately after the exposure phase (7-d) and after the recovery phase (28-d)
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	No	Only 2 concentrations were tested
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Yes	Glyphosate concentration was measured at the beginning and the end of

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		the exposure period
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	3 microcosms per treatment to determine physical, chemical and biological parameters
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard deviation provided; no raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	-	Not applicable, aquatic study
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Not applicable, aquatic study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	-	Not applicable, aquatic study
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	-	Not applicable, aquatic study
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Not applicable, aquatic study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Not applicable, aquatic study
20.6. Data on precipitation is recorded.	-	Not applicable, aquatic study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	-	Not applicable, aquatic study
22. For bee studies, temperature of the study should be appropriate to species.	-	Not applicable, aquatic study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	Yes	Water variables were continuously verified

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.		Yes	Temperature set at 25°C for culture and tests.
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).		Yes	Glyphosate concentration was measured at the beginning and the end of the exposure period
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.		Yes	Glyphosate concentration was measured at the beginning and the end of the exposure period
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.		Yes	Analytical methods reported (ion chromatography)
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.		No	LC ₅₀ 95% confidence interval is reported
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This is a higher tier study for aquatic organisms with two glyphosate concentrations tested (0.4 and 4 mg/L) on aquatic microcosms. The study is structured in two phases: 7 days of exposure to treated water and 21 days of recovery in clean water (both of them under static conditions). It evaluates the potential of freshwater periphyton (a complex of bacteria, fungi, algae and protozoa) to recover from glyphosate exposure using microcosms under laboratory conditions. Dry weight, ash-free dry weight, chlorophyll <i>a</i>, and periphyton abundances were analysed. The periphyton affected with the lowest concentration recovered most of the structural parameters within 7 days in clean water, but the taxonomic structure did not entirely recover towards the control structure. Periphyton exposed to 4 mg/L could not recover during 21 days in herbicide-free water, reaching values almost four times higher in % of dead diatoms and four times lower in ash-free dry weight concerning the control at the end of the study. Results suggest a long lasting effect of the herbicide due to the persistence within the community matrix even after translocating periphyton to decontaminated water. The study concludes that the exposure concentration modulates the recovery potential of impacted periphyton. The study is considered reliable. Analytical verifications of the tested item in the test medium were	

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria			Criteria met? Yes / No / Uncertain	Comment / Justification
		conducted at the beginning and the end of the exposure phase.		
Not reliable	No	-		

1. Information on the study

Data point:	CP 10.4.2.1
Report author	Wee J. <i>et al.</i>
Report year	2021
Report title	Temperature and Aging Affect Glyphosate Toxicity and Fatty Acid Composition in <i>Allonychiurus kimi</i> (Lee) (Collembola)
Document No	Toxics, 2021, 9, 126
Guidelines followed in study	None (partially based on OECD TG 232)
Deviations from current test guideline	OECD TG 232 validity criteria cannot be fully checked.
GLP/Officially recognised testing facilities	No, not conducted under GLP/Officially recognised testing facilities
Acceptability/Reliability:	Yes (Relevant, Category A acc. EFSA GD 2092, Point 5.4.1) / Reliable with restrictions

2. Assessment and conclusion

Assessment and conclusion by applicant:

This study examined the toxicity of glyphosate with the temperature (20°C and 25°C) and aging times (0 day and 7 days) in soil using a collembolan species, *Allonychiurus kimi* (Lee). The degradation of glyphosate in soil was investigated. Fatty acid composition of *A. kimi* was also investigated. The half-life of glyphosate was 2.38 days at 20°C and 1.69 days at 25°C. At 20°C with 0 day of aging, the EC₅₀ and NOEC were estimated to be 93.5 and 3.7 mg/kg, respectively. As the temperature and aging time increased, the glyphosate degradation also increased, so no significant toxicity was observed on juvenile production. The proportions of the arachidonic acid and stearic acid decreased and increased with the glyphosate treatment, respectively, even at 37.1 mg/kg, at which no significant effects on juvenile production were observed. The study was conducted according to OECD TG 232 Collembolan Reproduction Test in Soil and is considered reliable with restrictions, the validity criteria cannot be fully checked.

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
1. For guideline-compliant studies (GLP studies): OECD, OPPTS, ISO, and others. The validity/quality criteria listed in the corresponding guidelines are met.	Uncertain	As no raw data are provided not all validity criteria can be checked
2. No previous exposure to other chemicals is documented (where relevant).	Yes	The species has been cultured for years in the lab and the soil is according to guidance
3. For aquatic studies, the test substance is dissolved in water or where a carrier is required, it is appropriate (non-toxic) and a carrier control / positive control is considered in the test design.	-	No aquatic study

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
4. Glyphosate or its metabolite (test item) are sufficiently documented and reported (i.e. purity, source, content etc.).	Yes	-
5. For tests including vertebrates, there is a compliance of the batches used in toxicity studies compared to the technical specification.	-	No vertebrate study
6. Species used in the experiment are clearly reported, including source, experimental conditions (where relevant): strain, adequate age/life stage, body weight, acclimatization, temperature, pH, oxygen (dissolved oxygen for aquatic tests) content, housing, light conditions, humidity (terrestrial species) incubation conditions, feeding etc.	Yes	-
7. The validity criteria from relevant test guidelines can be extrapolated across different species but not necessarily across different test designs. If different, then the nature of the difference and impact should ideally be discussed.	Uncertain	As no raw data are provided not all validity criteria can be checked
8. Only glyphosate or its metabolite is the test substance (excluding mixture with other substances), and information on application of the test substance is described.	Yes	-
9. The endpoint measured can be considered a consequence of glyphosate (or a glyphosate metabolite).	Yes	-
10. Study design / test system is well described, including when relevant: concentration in exposure media (dose rates, volume applied, etc.), dilution/mixture of test item (solvent, vehicle) where relevant.	Yes	-
11. Analytical verifications are performed in test media (concentration) / collected samples, stability of the test substance in test medium should be documented.	Yes	Analytical verifications of the concentration of glyphosate in soil samples were conducted
12. An endpoint can be derived. Findings do deliver a regulatory endpoint, and/or is useful as supporting information.	Yes	Endpoint reported: 28-d EC ₅₀ and NOEC
13. The test has been tested in several dose levels (at least 3) including a positive/negative control where relevant.	Yes	-
14. Suitable exposure throughout the whole exposure period was demonstrated and reported.	Yes	Analytical verifications of the concentration of glyphosate in soil samples were conducted
15. A clear concentration response relationship is reported – in studies where the dose response test design is employed.	Yes	-
16. A sufficient number of animals per group was included to facilitate statistical analysis: mortality in control groups reported, observations/findings in positive/negative control clearly reported (where relevant).	Yes	5 replicates of 10 individuals for each treatment group
17. Assessment of the statistical power of the assay is possible with reported data.	Yes	Mean and standard deviation were provided. No raw data
18. If statistical methodology was applied for findings reported, then the data analysis applied should be clearly documented (e.g., checking the plots and confidence intervals).	Yes	Statistical analysis

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria	Criteria met? Yes / No / Uncertain	Comment / Justification
		sufficiently described
19. Description of the observations (including time-points), examinations, and analyses performed, with (where relevant) dissections being well documented.	Yes	-
20. For terrestrial ecotox studies in the lab or the field, the substrates used should be adequately described e.g. nature of substrate i.e. species of leaf or soil type.	Yes	OECD substrate
20.1. Field locations are relevant/comparable to European conditions. Soils do not completely match the OECD criteria but are from Europe or to some extent representative for the European Agriculture.	-	Lab study
20.2. Characterization of soil: texture (sandy loam, silty loam, loam, loamy sand), pH (5.5-8.0), cation exchange capacity, organic carbon (0.5-2-5%), bulk density, water retention, microbial biomass (~1% of organic carbon).	Yes	OECD artificial soil used
20.3. Other soils where information on characterization by the parameters: pH, texture, CEC, organic carbon, bulk density, water holding capacity, microbial biomass.	Yes	OECD artificial soil used
20.4. For tests including agricultural soils, they should not have been treated with test substance or similar substances for a minimum of 1 year.	-	Lab study
20.5. For soil samples, sampling from A-horizon, top 20 cm layers; soils freshly from field preferred (storage max 3 months at 4 +/- 2°C).	-	Lab study
20.6. Data on precipitation is recorded.	-	Lab study
21. For lab terrestrial studies, the temperature was appropriate to the species being tested and generally should fall within the range between 20-25°C and soil moisture / relative humidity was reported.	Yes	2 temperatures (20 and 25°C) set
22. For bee studies, temperature of the study should be appropriate to species.	-	No bee study
23. For lab aquatic studies: 23.1. The source and / or composition of the media used should be described.	-	Not aquatic study
23.2. The temperature of the water should be appropriate to the species being tested and generally fall within the 15-25°C.	-	Not aquatic study
24. The residue data can be linked to a clearly described GAP table appropriate in the context of the renewal of approval of glyphosate (crop, application method, doses, intervals, PHI).	Yes	Analytical verifications of the concentration of glyphosate in soil samples were conducted
25. Analytical results present residues measurements which can be correlated with the existing residues definition of glyphosate, and where relevant its metabolites.	Yes	Analytical verifications of the concentration of glyphosate in soil samples were conducted
26. Analytical methods are clearly described and adequate statement of specificity and sensitivity of the analytical methods is included.	Yes	Analytical methods reported
27. Assessment of the ECX for the width of the confidence interval around the median value; and the certainty on the level of protection offered by the median ECX.	Yes	95% confidence intervals of the

ECOTOXICOLOGY: Reliability criteria for the detailed assessment of full-text documents

Criteria		Criteria met? Yes / No / Uncertain	Comment / Justification
			EC ₅₀ were calculated
Overall assessment			
Reliable without restrictions	No	-	
Reliable with restrictions	Yes	This study examined the toxicity of glyphosate with the temperature (20°C and 25°C) and aging times (0 day and 7 days) in soil using a collembolan species, <i>Allonychiurus kimi</i> (Lee). The degradation of glyphosate in soil was investigated. Fatty acid composition of <i>A. kimi</i> was also investigated. The half-life of glyphosate was 2.38 days at 20°C and 1.69 days at 25°C. At 20°C with 0 day of aging, the EC₅₀ and NOEC were estimated to be 93.5 and 3.7 mg/kg, respectively. As the temperature and aging time increased, the glyphosate degradation also increased, so no significant toxicity was observed on juvenile production. The proportions of the arachidonic acid and stearic acid decreased and increased with the glyphosate treatment, respectively, even at 37.1 mg/kg, at which no significant effects on juvenile production were observed. The study was conducted according to OECD TG 232 Collembolan Reproduction Test in Soil and is considered reliable with restrictions, the validity criteria cannot be fully checked.	
Not reliable	No	-	