

Acetamiprid literature search summary

Search Keywords	Number of documents (before narrowing down by species)	Number of documents (after narrowing down by species) AND Part 3a-c	Number of documents (after Phase 1 conformity assessments) based on titles and abstracts	Number of category A documents (after Phase 2 conformity assessments) based on full text articles
Part 1 (active/product terms only)	1090	Not applicable	Not applicable	Not applicable
AND Part 2a. Toxicology to humans	642	122	27	0
			(+ 14 epidemiology)	(+ 14 epidemiology)
AND Part 2b. Residues in agricultural and livestock products	414	37	0	-
AND Part 2c. Toxicity to Living Environment Animals and Livestock (Ecotoxicology)	743	153	44	0
AND Part 2d. Environmental dynamics	685	203	0	-
Total		515	85	14
Total with duplicates removed		410	85	14

Search #	Result #	Title	Date	Database
1	4	Ultrasensitive and practical chemiluminescence sensing pesticide residue acetamiprid in agricultural products and environment: Combination of synergistically coupled co-amplifying signal and smart interface engineering	(Dec 1, 2021)	SciSearch®: a Cited Reference Science Database
1	6	Neonicotinoid insecticides triggers mitochondrial bioenergetic dysfunction via manipulating ROS-calcium influx pathway in the liver	(Nov 2021)	SciSearch®: a Cited Reference Science Database
1	9	Quantification of Pesticide Residues in Fresh Vegetables Available in Local Markets for Human Consumption and the Associated Health Risks	(Sep 2021)	SciSearch®: a Cited Reference Science Database
1	10	Cellular Stress Pathways Are Linked to Acetamiprid-Induced Apoptosis in SH-SY5Y Neural Cells	(Sep 2021)	SciSearch®: a Cited Reference Science Database
1	12	The human and ecological risks of neonicotinoid insecticides in soils of an agricultural zone within the Pearl River Delta, South China	(Sep 1, 2021)	SciSearch®: a Cited Reference Science Database
1	14	Occurrence and distribution of neonicotinoids and characteristic metabolites in paired urine and indoor dust from young adults: Implications for human exposure	(Aug 2021)	SciSearch®: a Cited Reference Science Database
1	15	Human Exposures to Neonicotinoids in Kumasi, Ghana	(Aug 2021)	SciSearch®: a Cited Reference Science Database
1	16	Serum concentrations of neonicotinoids, and their associations with lipid molecules of the general residents in Wuxi City, Eastern China	(Jul 5, 2021)	SciSearch®: a Cited Reference Science Database
1	17	Functional alterations by a subgroup of neonicotinoid pesticides in human dopaminergic neurons	(Jun 2021)	SciSearch®: a Cited Reference Science Database
1	18	Potential Environmental Health Risk Analysis of Neonicotinoids and a Synergist	(Jun 1, 2021)	SciSearch®: a Cited Reference Science Database
1	20	An orthogonal experimental design and QuEChERS based UFLC-MS/MS for multi-pesticides and human exposure risk assessment in Honeysuckle	(Jun 2021)	SciSearch®: a Cited Reference Science Database
1	22	Partial Agonist Activity of Neonicotinoids on Rat Nicotinic Receptors: Consequences over Epinephrine Secretion and In Vivo Blood Pressure	(May 2021)	SciSearch®: a Cited Reference Science Database
1	23	Health risks to dietary neonicotinoids are low for Chinese residents based on an analysis of 13 daily-consumed foods	(Apr 2021)	SciSearch®: a Cited Reference Science Database
1	24	Gut Flora-Mediated Metabolic Health, the Risk Produced by Dietary Exposure to Acetamiprid and Tebuconazole	(Apr 2021)	SciSearch®: a Cited Reference Science Database
1	26	Antioxidant, histopathological and biochemical outcomes of short-term exposure to acetamiprid in liver and brain of rat: The protective role of N-acetylcysteine and S-methylcysteine	(Mar 2021)	SciSearch®: a Cited Reference Science Database
1	29	Self-Assembled MoS2/ssDNA Nanostructures for the Capacitive Aptasensing of Acetamiprid Insecticide	(Feb 2021)	SciSearch®: a Cited Reference Science Database
1	30	Occurrence of neonicotinoid insecticides and their metabolites in tooth samples collected from south China: Associations with periodontitis	(Feb 2021)	SciSearch®: a Cited Reference Science Database
1	31	Degradation of neonicotinoid insecticide acetamiprid by two different nitrile hydratases of Pseudaminobacter salicylatoxidans CGMCC 1.17248	(Feb 2021)	SciSearch®: a Cited Reference Science Database
1	33	Interspecies differences in cytochrome P450-mediated metabolism of neonicotinoids among cats, dogs, rats, and humans	(Jan 2021)	SciSearch®: a Cited Reference Science Database
1	37	Nationwide Biomonitoring of Neonicotinoid Insecticides in Breast Milk and Health Risk Assessment to Nursing Infants in the Chinese Population	(Nov 25, 2020)	SciSearch®: a Cited Reference Science Database
1	38	Development of Artificial Urine Certified Reference Material for Quantification of Neonicotinoid Insecticides	(Nov 2020 - Dec 2020)	SciSearch®: a Cited Reference Science Database
1	39	Occurrence of pesticides residues in French beans, tomatoes, and kale in Kenya, and their human health risk indicators	(Oct 10, 2020)	SciSearch®: a Cited Reference Science Database
1	41	Serum concentrations of pesticides including organophosphates, pyrethroids and neonicotinoids in a population with osteoarthritis in Saudi Arabia	(Oct 1, 2020)	SciSearch®: a Cited Reference Science Database
1	43	Assessment of imidacloprid related exposure using imidacloprid-olefin and desnitro-imidacloprid: Neonicotinoid insecticides in human urine in Wuhan, China	(Aug 2020)	SciSearch®: a Cited Reference Science Database
1	44	Urinary Metabolites of Neonicotinoid Insecticides: Levels and Recommendations for Future Biomonitoring Studies in China	(Jul 7, 2020)	SciSearch®: a Cited Reference Science Database
1	46	Simultaneous determination of 98 pesticide residues in strawberries using UPLC-MS/MS and GC-MS/MS	(Jul 2020)	SciSearch®: a Cited Reference Science Database
1	47	Reproductive effects of subchronic exposure to acetamiprid in male rats	(Jun 2, 2020)	SciSearch®: a Cited Reference Science Database
1	49	A Feasible Approach to Detect Pesticides in Food Samples Using THz-FDS and Chemometrics	(May 31, 2020)	SciSearch®: a Cited Reference Science Database
1	51	A mechanistic study and in-vivo toxicity bioassay on acetamiprid photodegradation over the zeolite supported cerium-based photocatalyst	(May 15, 2020)	SciSearch®: a Cited Reference Science Database
1	52	Neonicotinoid insecticides exposure cause amino acid metabolism disorders, lipid accumulation and oxidative stress in ICR mice	(May 2020)	SciSearch®: a Cited Reference Science Database
1	53	Neonicotinoid trapping by the FA1 site of human serum albumin	(Apr 2020)	SciSearch®: a Cited Reference Science Database
1	54	Protective effects of melatonin and vitamin E in acetamiprid-induced nephrotoxicity	(Mar 2020)	SciSearch®: a Cited Reference Science Database
1	55	The expression of soluble functional alpha 7-nicotinic acetylcholine receptors in E. coli and its high-affinity binding to neonicotinoid pesticides	(Mar 2020)	SciSearch®: a Cited Reference Science Database
1	56	Trophoblast toxicity of the neonicotinoid insecticide acetamiprid and an acetamiprid-based formulation	(Feb 15, 2020)	SciSearch®: a Cited Reference Science Database
1	57	Variability in urinary neonicotinoid concentrations in single-spot and first-morning void and its association with oxidative stress markers	(Feb 2020)	SciSearch®: a Cited Reference Science Database
1	59	Catalytic ozonation by metal ions for municipal wastewater disinfection and simulataneous micropollutants removal	(Dec 15, 2019)	SciSearch®: a Cited Reference Science Database
1	61	Mitigation of acetamiprid - induced renotoxicity by natural antioxidants via the regulation of ICAM, NF-kB and TLR 4 pathways	(Dec 2019)	SciSearch®: a Cited Reference Science Database
1	62	A nationwide survey of urinary concentrations of neonicotinoid insecticides in China	(Nov 2019)	SciSearch®: a Cited Reference Science Database
1	63	Toxic effects of subchronic oral acetamiprid exposure in rats	(Nov 2019)	SciSearch®: a Cited Reference Science Database
1	64	Occurrence of pesticides in fruits and vegetables from organic and conventional agriculture by QuEChERS extraction liquid chromatography tandem mass spectrometry	(Oct 2019)	SciSearch®: a Cited Reference Science Database
1	65	Neonicotinoid pesticides poorly interact with human drug transporters	(Oct 2019)	SciSearch®: a Cited Reference Science Database
1	66	Exposure to neonicotinoid insecticides in the US general population: Data from the 2015-2016 national health and nutrition examination survey	(Sep 2019)	SciSearch®: a Cited Reference Science Database
1	69	Assessment of acetamiprid-induced genotoxic effects in bone marrow cells of Swiss albino male mice	(Jul 4, 2019)	SciSearch®: a Cited Reference Science Database
1	70	LC-ESI/MS/MS analysis of neonicotinoids in urine of very low birth weight infants at birth	(Jul 1, 2019)	SciSearch®: a Cited Reference Science Database

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1	71	The neonicotinoids acetamiprid and imidacloprid impair neurogenesis and alter the microglial profile in the hippocampal dentate gyrus of mouse neonates	(Jun 2019)	SciSearch®: a Cited Reference Science Database
1	72	Occurrences of the Typical Agricultural Non-ionic Surfactants Tristyrylphenol Ethoxylates in Cherries (<i>Cerasus pseudocerasus</i>), Peaches (<i>Amygdalus persica</i>), and Kiwifruit (<i>Actinidia chinensis</i>) and the Implications of Human Exposure in China	(Mar 13, 2019)	SciSearch®: a Cited Reference Science Database
1	73	A Turn-on Biosensor-Based Aptamer-Mediated Carbon Quantum Dots Nanoaggregate for Acetamiprid Detection in Complex Samples	(Mar 2019)	SciSearch®: a Cited Reference Science Database
1	78	Quantification of DEET and neonicotinoid pesticide biomarkers in human urine by online solid-phase extraction high-performance liquid chromatography-tandem mass spectrometry	(Jan 2019)	SciSearch®: a Cited Reference Science Database
1	80	Interactions of food matrix and dietary components on neonicotinoid bioaccessibility in raw fruit and vegetables	(Jan 1, 2019)	SciSearch®: a Cited Reference Science Database
1	81	Neurodevelopmental toxicity in the mouse neocortex following prenatal exposure to acetamiprid	(Dec 2018)	SciSearch®: a Cited Reference Science Database
1	82	Plant protection practices and pesticide exposure levels of Northern Benin cotton producers	(Nov 30, 2018)	SciSearch®: a Cited Reference Science Database
1	83	A label-free triplex-to-G-qadruplex molecular switch for sensitive fluorescent detection of acetamiprid	(Nov 1, 2018)	SciSearch®: a Cited Reference Science Database
1	84	Quantification of five neonicotinoids in human urine by modified QuEChERS with isotope dilution mass spectrometry: a preliminary study for the development of certified reference material	(Sep 26, 2018)	SciSearch®: a Cited Reference Science Database
1	85	Simultaneous determination of nine neonicotinoids in human urine using isotope-dilution ultra-performance liquid chromatography tandem mass spectrometry	(Sep 2018)	SciSearch®: a Cited Reference Science Database
1	86	The Targeted Pesticides as Acetylcholinesterase Inhibitors: Comprehensive Cross-Organism Molecular Modelling Studies Performed to Anticipate the Pharmacology of Harmfulness to Humans In Vitro	(Sep 2018)	SciSearch®: a Cited Reference Science Database
1	87	Development and Validation of an Ultra-Sensitive UHPLC-MS/MS Method for Neonicotinoid Analysis in Milk	(Aug 15, 2018)	SciSearch®: a Cited Reference Science Database
1	88	Comparison of uptake, translocation and accumulation of several neonicotinoids in komatsuna (<i>Brassica rapa</i> var. <i>perviridis</i>) from contaminated soils	(Jun 2018)	SciSearch®: a Cited Reference Science Database
1	89	The insecticides chlorpyrifos and acetamiprid induce redox imbalance in umbilical cord blood erythrocytes in vitro	(Jun 2018)	SciSearch®: a Cited Reference Science Database
1	90	Investigation of the genotoxic and cytotoxic effects of widely used neonicotinoid insecticides in HepG2 and SH-SY5Y cells	(Jun 2018)	SciSearch®: a Cited Reference Science Database
1	91	Highly Sensitive Silver Nanorod Arrays for Rapid Surface Enhanced Raman Scattering Detection of Acetamiprid Pesticides	(Apr 2018)	SciSearch®: a Cited Reference Science Database
1	92	Assessment of human exposure to pesticides by hair analysis: The case of vegetable-producing areas in Burkina Faso	(Feb 2018)	SciSearch®: a Cited Reference Science Database
1	94	Neuroprotective effects of curcumin against acetamiprid-induced neurotoxicity and oxidative stress in the developing male rat cerebellum: biochemical, histological, and behavioral changes	(Dec 2017)	SciSearch®: a Cited Reference Science Database
1	95	Exposure to neonicotinoid insecticides induces embryotoxicity in mice and rabbits	(Dec 1, 2017)	SciSearch®: a Cited Reference Science Database
1	98	Developmental neurotoxicity of different pesticides in PC-12 cells in vitro	(Jun 15, 2017)	SciSearch®: a Cited Reference Science Database
1	99	Acetamiprid inhibits testosterone synthesis by affecting the mitochondrial function and cytoplasmic adenosine triphosphate production in rat Leydig cells	(Jan 2017)	SciSearch®: a Cited Reference Science Database
1	100	Hematological, biochemical, and toxicopathic effects of subchronic acetamiprid toxicity in Wistar rats	(Dec 2016)	SciSearch®: a Cited Reference Science Database
1	101	Cyclooxygenase-2-Derived Prostaglandins Mediate Cerebral Microcirculation in a Juvenile Ischemic Rat Model	(Dec 2016)	SciSearch®: a Cited Reference Science Database
1	103	Neonicotinoid Insecticides Alter the Gene Expression Profile of Neuron-Enriched Cultures from Neonatal Rat Cerebellum	(Oct 2016)	SciSearch®: a Cited Reference Science Database
1	104	A simple and rapid chemiluminescence aptasensor for acetamiprid in contaminated samples: Sensitivity, selectivity and mechanism	(Sep 15, 2016)	SciSearch®: a Cited Reference Science Database
1	105	In utero and Lactational Exposure to Acetamiprid Induces Abnormalities in Socio-Sexual and Anxiety-Related Behaviors of Male Mice	(Jun 3, 2016)	SciSearch®: a Cited Reference Science Database
1	106	High Levels of Resistance in the Common Bed Bug, <i>Cimex lectularius</i> (Hemiptera: Cimicidae), to Neonicotinoid Insecticides	(May 2016)	SciSearch®: a Cited Reference Science Database
1	107	A critical review of neonicotinoid insecticides for developmental neurotoxicity	(Feb 7, 2016)	SciSearch®: a Cited Reference Science Database
1	108	Biological Monitoring of Human Exposure to Neonicotinoids Using Urine Samples, and Neonicotinoid Excretion Kinetics	(Jan 5, 2016)	SciSearch®: a Cited Reference Science Database
1	109	Characterization of a versatile nitrile hydratase of the neonicotinoid thiacloprid-degrading bacterium <i>Ensifer meliloti</i> CGMCC 7333	2016	SciSearch®: a Cited Reference Science Database
1	110	Suspected poisoning of domestic animals by pesticides	(Jan 1, 2016)	SciSearch®: a Cited Reference Science Database
1	111	Temporal Levels of Urinary Neonicotinoid and Dialkylphosphate Concentrations in Japanese Women Between 1994 and 2011	(Dec 15, 2015)	SciSearch®: a Cited Reference Science Database
1	112	Development and evaluation of alginate-chitosan nanocapsules for controlled release of acetamiprid	(Nov 2015)	SciSearch®: a Cited Reference Science Database
1	113	Investigation of the mechanisms mediating MDMA "Ecstasy"-induced increases in cerebro-cortical perfusion determined by btASL MRI	(May 2015)	SciSearch®: a Cited Reference Science Database
1	114	Choice of optimal biocide combination to control flies (Diptera: Muscidae)	2015	SciSearch®: a Cited Reference Science Database
1	116	POTENTIAL GENOTOXICITY OF ACETAMIPRID AND PROPINEB SINGLY OR IN COMBINATION IN CULTURED HUMAN PERIPHERAL BLOOD LYMPHOCYTES BY USING MN ASSAY	2015	SciSearch®: a Cited Reference Science Database
1	117	Biological Monitoring Method for Urinary Neonicotinoid Insecticides Using LC-MS/MS and Its Application to Japanese Adults	(Nov 2014)	SciSearch®: a Cited Reference Science Database
1	118	Degradation of the Neonicotinoid Insecticide Acetamiprid via the N-Carbamoylimine Derivate (IM-1-2) Mediated by the Nitrile Hydratase of the Nitrogen-Fixing Bacterium <i>Ensifer meliloti</i> CGMCC 7333	(Oct 15, 2014)	SciSearch®: a Cited Reference Science Database
1	120	Depressive-like behavior induced by tumor necrosis factor- α is abolished by agmatine administration	(Mar 15, 2014)	SciSearch®: a Cited Reference Science Database
1	121	Abnormal sperm morphology in mouse germ cells after short-term exposures to acetamiprid, propineb, and their mixture	(Mar 2014)	SciSearch®: a Cited Reference Science Database

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1	122	Major Pesticides Are More Toxic to Human Cells Than Their Declared Active Principles	2014	SciSearch®: a Cited Reference Science Database
1	6	DOES REPEAT LOW-DOSE ORAL EXPOSURE TO ACETAMIPRID (NEONICOTINOID INSECTICIDE) DURING GESTATION ALTER THE PHYSIOLOGY OF THE TRIAD MOTHER- PLACENTA- FETUS IN THE RAT?	(Aug 2019)	SciSearch®: a Cited Reference Science Database
1	9	Postnatal development of rat pups after maternal low-dose exposure to the neonicotinoid insecticide acetamiprid during gestation	(Oct 2016)	SciSearch®: a Cited Reference Science Database
2	1	Pesticides: Behavior in Agricultural Soil and Plants	(Sep 2021)	SciSearch®: a Cited Reference Science Database
2	4	Insights into the degradation and toxicity difference mechanism of neonicotinoid pesticides in honeybees by mass spectrometry imaging	(Jun 20, 2021)	SciSearch®: a Cited Reference Science Database
2	5	Efficacy of Different Decontamination Processes in Mitigation of Pesticide Residues from Chili Crop	(May 2021)	SciSearch®: a Cited Reference Science Database
2	9	Dissipation behavior, residue distribution and dietary risk assessment of cyromazine, acetamiprid and their mixture in cowpea and cowpea field soil	(Sep 2020)	SciSearch®: a Cited Reference Science Database
2	12	Spatial and temporal distribution, degradation, and metabolism of three neonicotinoid insecticides on different parts, especially pests' target feeding parts of apple tree	(Jun 2020)	SciSearch®: a Cited Reference Science Database
2	16	Analysis of seasonal and annual field-evolved insecticide resistance in populations of Thrips hawaiiensis in banana orchards	(Jun 2019)	SciSearch®: a Cited Reference Science Database
2	18	Differential metabolism of neonicotinoids by Myzus persicae CYP6CY3 stably expressed in Drosophila S2 cells	2019	SciSearch®: a Cited Reference Science Database
2	22	Evaluation of insecticides for curative, preventive, and rotational use on Scirtothrips dorsalis South Asia 1 (Thysanoptera: Thripidae)	(Sep 2017)	SciSearch®: a Cited Reference Science Database
2	23	Loss of soil microbial diversity may increase insecticide uptake by crop	(Mar 1, 2017)	SciSearch®: a Cited Reference Science Database
2	24	Toxicity and resistance of the cotton leaf hopper, Amrasca devastans (Distant) to neonicotinoid insecticides in Punjab, Pakistan	(Mar 2017)	SciSearch®: a Cited Reference Science Database
2	26	Liquid-phase membrane extraction of targeted pesticides from manufacturing wastewaters in a hollow fibre contactor with feed-stream recycle	(Jan 2017)	SciSearch®: a Cited Reference Science Database
2	27	Resistance of green lacewing, Chrysoperla carnea Stephens to nitenpyram: Cross-resistance patterns, mechanism, stability, and realized heritability	(Jan 2017)	SciSearch®: a Cited Reference Science Database
2	28	Evaluation of potential biocides for control of the earthworm Eukerria saltensis (Oligochaeta: Ocnerodrilidae), a pest of rice in southern Australia	(Jun 2016)	SciSearch®: a Cited Reference Science Database
2	29	Effect of insecticide rotations on density and species composition of thrips (Thysanoptera) in Florida strawberry (Rosales: Rosaceae)	(Jun 2016)	SciSearch®: a Cited Reference Science Database
2	30	Effect of Piperonyl Butoxide on the Toxicity of Four Classes of Insecticides to Navel Orangeworm (Amyelois transitella) (Lepidoptera: Pyralidae)	(Dec 2015)	SciSearch®: a Cited Reference Science Database
2	31	Fate of micropollutants during sewage sludge disintegration by low-frequency ultrasound	(Nov 15, 2015)	SciSearch®: a Cited Reference Science Database
2	32	Monitoring resistance of Phenacoccus solenopsis Tinsley (Homoptera: Pseudococcidae) to new chemical insecticides in Punjab, Pakistan	(Aug 2015)	SciSearch®: a Cited Reference Science Database
2	33	Determination of Neonicotinoid Insecticides and Strobilurin Fungicides in Particle Phase Atmospheric Samples by Liquid Chromatography-Tandem Mass Spectrometry	(Jun 3, 2015)	SciSearch®: a Cited Reference Science Database
2	36	Thiamethoxam resistance selected in the western flower thrips Frankliniella occidentalis (Thysanoptera: Thripidae): Cross-resistance patterns, possible biochemical mechanisms and fitness costs analysis	(Sep 2014)	SciSearch®: a Cited Reference Science Database
2	37	Insecticide Residues in Head Lettuce, Cabbage, Chinese Cabbage, and Broccoli Grown in Fields	(Apr 23, 2014)	SciSearch®: a Cited Reference Science Database
3	1	Ameliorative role of ascorbic acid on the oxidative stress and genotoxicity induced by acetamiprid in Nile tilapia (Oreochromis niloticus)	(Oct 2021)	SciSearch®: a Cited Reference Science Database
3	3	Resistance and Vulnerability of Honeybee (Apis mellifera) Gut Bacteria to Commonly Used Pesticides	(Sep 3, 2021)	SciSearch®: a Cited Reference Science Database
3	4	Modification of the existing maximum residue levels for acetamiprid in various crops	(Sep 2021)	SciSearch®: a Cited Reference Science Database
3	5	Contamination by neonicotinoid insecticides in barn owls (Tyto alba) and Alpine swifts (Tachymarptis melba)	(Sep 1, 2021)	SciSearch®: a Cited Reference Science Database
3	9	Toxicity assessment of chronic exposure to common insecticides and bee medications on colony development and drones sperm parameters	(Jul 2021)	SciSearch®: a Cited Reference Science Database
3	13	Short-term lab assessments and microcolonies are insufficient for the risk assessment of insecticides for bees	(Jun 2021)	SciSearch®: a Cited Reference Science Database
3	14	Chronic effects of a binary insecticide Acer 35 EC on Nile tilapia Oreochromis niloticus through a multi-biomarker approach	(Jun 2021)	SciSearch®: a Cited Reference Science Database
3	17	Pesticides residues and metabolites in honeybees: A Greek overview exploring Varroa and Nosema potential synergies	(May 15, 2021)	SciSearch®: a Cited Reference Science Database
3	20	Comparative ecotoxicity of insecticides with different modes of action to Osmia excavata (Hymenoptera: Megachilidae)	(Apr 1, 2021)	SciSearch®: a Cited Reference Science Database
3	22	Toxicity of the insecticide sulfoxaflor alone and in combination with the fungicide fluxapyroxad in three bee species	(Mar 25, 2021)	SciSearch®: a Cited Reference Science Database
3	23	The influence of pesticides repellency used in oilseed rape (Brassica napus subsp. napus) on the preference by bees (Apis mellifera L.)	(Mar 15, 2021)	SciSearch®: a Cited Reference Science Database
3	26	Acute neurotoxicity evaluation of two anticholinesterasic insecticides, independently and in mixtures, and a neonicotinoid on a freshwater gastropod	(Feb 2021)	SciSearch®: a Cited Reference Science Database
3	27	Pesticide risk assessment at the molecular level using honey bee cytochrome P450 enzymes: A complementary approach	(Feb 2021)	SciSearch®: a Cited Reference Science Database
3	29	Acute Oral and Contact Toxicity of Three Plant Protection Products to Adult Solitary Bees Osmia bicornis	2021	SciSearch®: a Cited Reference Science Database
3	32	The influence of acetamiprid and deltamethrin on the mortality and behaviour of honeybees (Apis mellifera carnicaPollman) in oilseed rape cultivations	(Dec 2020)	SciSearch®: a Cited Reference Science Database
3	35	Effects of the Neonicotinoid Acetamiprid in Pollen on Bombus impatiens Microcolony Development	(Dec 2020)	SciSearch®: a Cited Reference Science Database
3	36	Effects of abamectin and acetamiprid pesticides on the survival and behavior of Scaptotrigona aff. xanthotricha (Apidae, Meliponini)	(Nov 19, 2020)	SciSearch®: a Cited Reference Science Database
3	37	Exposure to acetamiprid influences the development and survival ability of worker bees (Apis mellifera L.) from larvae to adults	(Nov 2020)	SciSearch®: a Cited Reference Science Database
3	38	Involvement of oxygenase confers higher resistance to neonicotinoid insecticides in estuarine resident sand shrimpCrangon uritaithan in kuruma prawnPenaeus japonicusand mysidAmericamysis bahia	(Nov 2020)	SciSearch®: a Cited Reference Science Database

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3	39	Effects of the neonicotinoid acetamiprid in syrup on Bombus impatiens (Hymenoptera: Apidae) microcolony development	(Oct 29, 2020)	SciSearch®: a Cited Reference Science Database
3	40	Sublethal acetamiprid doses negatively affect the lifespans and foraging behaviors of honey bee (Apis mellifera L.) workers	(Oct 10, 2020)	SciSearch®: a Cited Reference Science Database
3	41	Pollinator exposure to systemic insecticides and fungicides applied in the previous fall and pre-bloom period in apple orchards	(Oct 2020)	SciSearch®: a Cited Reference Science Database
3	43	Are there viable chemical and non-chemical alternatives to the use of conventional insecticides for the protection of young trees from damage by the large pine weevil Hylobius abietis L. in UK forestry?	(Oct 2020)	SciSearch®: a Cited Reference Science Database
3	47	Joint toxicity of two phytosanitary molecules, lambda-cyhalothrin and acetamiprid, on African catfish (Clarias gariepinus) juveniles	(Jul 2, 2020)	SciSearch®: a Cited Reference Science Database
3	53	Toxicity evaluation of the active ingredient acetamiprid and a commercial formulation (Assail (R) 70) on the non-target gastropod Biomphalaria straminea (Mollusca: Planorbidae)	(Apr 1, 2020)	SciSearch®: a Cited Reference Science Database
3	54	Fast oxidation of the neonicotinoid pesticides listed in the EU Decision 2018/840 from aqueous solutions	(Mar 18, 2020)	SciSearch®: a Cited Reference Science Database
3	55	Interaction patterns and combined toxic effects of acetamiprid in combination with seven pesticides on honey bee (Apis mellifera L.)	(Mar 1, 2020)	SciSearch®: a Cited Reference Science Database
3	56	Acute and chronic toxicity of acetamiprid, carbaryl, cypermethrin and deltamethrin to Apis mellifera larvae reared in vitro	(Mar 2020)	SciSearch®: a Cited Reference Science Database
3	57	Environmental impacts of reduced-risk and conventional pesticide programs differ in commercial apple orchards, but similarly influence pollinator community	(Feb 2020)	SciSearch®: a Cited Reference Science Database
3	58	The fate of acetamiprid and its degradation during long-term storage of honey	(Feb 1, 2020)	SciSearch®: a Cited Reference Science Database
3	59	Repellent effects of insecticides on Stephanitis pyrioides Scott (Hemiptera: Tingidae) under laboratory conditions	(Jan 2020)	SciSearch®: a Cited Reference Science Database
3	60	Toxicity of insecticides on Neotropical stingless bees Plebeia emerina (Friese) and Tetragonisca fiebrigi (Schwarz) (Hymenoptera: Apidae: Meliponini)	(Jan 2020)	SciSearch®: a Cited Reference Science Database
3	61	Comparative toxicity of two neonicotinoids and a pyrethroid to forager honeybees (Apis mellifera L, 1758) (Hymenoptera: Apidae) by different exposure methods	2020	SciSearch®: a Cited Reference Science Database
3	62	Natural attributes of Chilean honeys modified by the presence of neonicotinoids residues	(Dec 2019)	SciSearch®: a Cited Reference Science Database
3	65	tau-Fluvalinate and other pesticide residues in honey bees before overwintering	(Dec 2019)	SciSearch®: a Cited Reference Science Database
3	66	Distribution, Dissipation, and Metabolism of Neonicotinoid Insecticides in the Cotton Ecosystem under Foliar Spray and Root Irrigation	(Nov 13, 2019)	SciSearch®: a Cited Reference Science Database
3	67	A sublethal dose of the neonicotinoid insecticide acetamiprid reduces sperm density in a songbird	(Oct 2019)	SciSearch®: a Cited Reference Science Database
3	68	Chronic oral exposure to field-realistic pesticide combinations via pollen and nectar: effects on feeding and thermal performance in a solitary bee	(Sep 24, 2019)	SciSearch®: a Cited Reference Science Database
3	69	Oral acute toxicity and impact of neonicotinoids on Apis mellifera L. and Scaptotrigona postica Latreille (Hymenoptera: Apidae)	(Sep 2019)	SciSearch®: a Cited Reference Science Database
3	70	Effects of sublethal acetamiprid doses on the lifespan and memory-related characteristics of honey bee (Apis mellifera) workers	(Aug 2019)	SciSearch®: a Cited Reference Science Database
3	72	Alternatives to neonicotinoids	(Aug 2019)	SciSearch®: a Cited Reference Science Database
3	73	Assessments of Algal Toxicity and PBT Behaviour of Pesticides with No Eco-toxicological Data: Predictive Ability of QSA/(T)R Models	(Aug 2019)	SciSearch®: a Cited Reference Science Database
3	75	Occurrence and ecological risk of pharmaceuticals and personal care products (PPCPs) and pesticides in typical surface watersheds, China	(Jul 15, 2019)	SciSearch®: a Cited Reference Science Database
3	76	Comparative acute toxicity of two phytosanitary molecules, lambda-cyhalothrin and acetamiprid, on Nile Tilapia (Oreochromis Niloticus) juveniles	(Jul 3, 2019)	SciSearch®: a Cited Reference Science Database
3	78	Widespread occurrence and spatial distribution of glyphosate, atrazine, and neonicotinoids pesticides in the St. Lawrence and tributary rivers	(Jul 2019)	SciSearch®: a Cited Reference Science Database
3	79	An integrated assessment and spatial-temporal variation analysis of neonicotinoids in pollen and honey from noncrop plants in Zhejiang, China	(Jul 2019)	SciSearch®: a Cited Reference Science Database
3	80	The impact of four widely used neonicotinoid insecticides on Tetragonisca angustula (Latreille) (Hymenoptera: Apidae)	(Jun 2019)	SciSearch®: a Cited Reference Science Database
3	83	Chronic toxicity and biochemical response of Apis cerana cerana (Hymenoptera: Apidae) exposed to acetamiprid and propiconazole alone or combined	(May 2019)	SciSearch®: a Cited Reference Science Database
3	84	Investigation of neonicotinoid pesticides in Slovenian honey by LC-MS/MS	(May 2019)	SciSearch®: a Cited Reference Science Database
3	85	Contact application of neonicotinoids suppresses the predation rate in different densities of prey and induces paralysis of common farmland spiders	(Apr 5, 2019)	SciSearch®: a Cited Reference Science Database
3	86	Ultra-trace level determination of neonicotinoids in honey as a tool for assessing environmental contamination	(Apr 2019)	SciSearch®: a Cited Reference Science Database
3	87	Developmental Toxicity of a Neonicotinoid Insecticide, Acetamiprid to Zebrafish Embryos	(Mar 6, 2019)	SciSearch®: a Cited Reference Science Database
3	89	Aquatic toxicity and loss of linear alkylbenzenesulfonates alone and in a neonicotinoid insecticide formulation in surface water	(Feb 20, 2019)	SciSearch®: a Cited Reference Science Database
3	92	Pharmacokinetics of Three Neonicotinoid Insecticides upon Contact Exposure in the Western Honey Bee, Apis mellifera	(Jan 2019)	SciSearch®: a Cited Reference Science Database
3	95	Part-per-trillion LC-MS/MS determination of neonicotinoids in small volumes of songbird plasma	(Dec 10, 2018)	SciSearch®: a Cited Reference Science Database
3	97	Alcohol ethoxylates significantly synergize pesticides than alkylphenol ethoxylates considering bioactivity against three pests and joint toxicity to Daphnia magna	(Dec 10, 2018)	SciSearch®: a Cited Reference Science Database
3	99	Relative chronic sensitivity of neonicotinoid insecticides to Ceriodaphnia dubia and Daphnia magna	(Nov 15, 2018)	SciSearch®: a Cited Reference Science Database
3	100	Effects of imidacloprid and a neonicotinoid mixture on aquatic invertebrate communities under Mediterranean conditions	(Nov 2018)	SciSearch®: a Cited Reference Science Database
3	101	Removal of contaminants of emerging concern (CECs) and antibiotic resistant bacteria in urban wastewater using UVA/TiO2/H2O2 photocatalysis	(Nov 2018)	SciSearch®: a Cited Reference Science Database
3	102	Toxicological assessment of lambda-cyhalothrin and acetamiprid insecticides formulated mixture on hatchability rate, histological aspects, and protein electrophoretic pattern of Biomphalaria alexandrina (Ehrenberg, 1831) snails	(Nov 2018)	SciSearch®: a Cited Reference Science Database
3	104	Pesticide residues in honey bees, pollen and beeswax: Assessing beehive exposure	(Oct 2018)	SciSearch®: a Cited Reference Science Database
3	107	Matrix solid-phase dispersion associated to gas chromatography for the assessment in honey bee of a group of pesticides of concern in the apicultural field	(Sep 14, 2018)	SciSearch®: a Cited Reference Science Database

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3	108	Insecticide exposure affects DNA and antioxidant enzymes activity in honey bee species Apis florea and A. dorsata: Evidence from Punjab, Pakistan (Retracted article. See vol. 717, 2020)	(Sep 1, 2018)	SciSearch®: a Cited Reference Science Database
3	109	Binary mixtures of alcohol ethoxylates, nonylphenol ethoxylates and pesticides exhibit comparative bioactivity against three pests and toxicological risks to aquatic organisms	(Aug 2018)	SciSearch®: a Cited Reference Science Database
3	113	Apis cerana Is Less Sensitive to Most Neonicotinoids, Despite of Their Smaller Body Mass	(Feb 2018)	SciSearch®: a Cited Reference Science Database
3	115	INHIBITORY EFFECTS OF FOUR NEONICOTINOID ACTIVE INGREDIENTS ON ACETYLCHOLINE ESTERASE ACTIVITY	(Dec 2017)	SciSearch®: a Cited Reference Science Database
3	117	Influence of sublethal doses of acetamiprid and halosulfuron-methyl on metabolites of zebra fish (&ITBrachydanio rerio&IT)	(Oct 2017)	SciSearch®: a Cited Reference Science Database
3	118	Validation of a QuEChERS method for analysis of neonicotinoids in small volumes of blood and assessment of exposure in Eurasian eagle owl (Bubo bubo) nestlings	(Oct 1, 2017)	SciSearch®: a Cited Reference Science Database
3	119	Neonicotinoids act like endocrine disrupting chemicals in newly-emerged bees and winter bees	(Sep 8, 2017)	SciSearch®: a Cited Reference Science Database
3	120	Phytoextraction of Pb, Cr, Ni, and Zn using the aquatic plant Limnobium laevigatum and its potential use in the treatment of wastewater	(Aug 2017)	SciSearch®: a Cited Reference Science Database
3	121	Application of Box-Behnken design to optimize multi-sorbent solid phase extraction for trace neonicotinoids in water containing high level of matrix substances	(Aug 1, 2017)	SciSearch®: a Cited Reference Science Database
3	122	THE EXPOSURE OF HONEY BEES TO PESTICIDE RESIDUES IN THE HIVE ENVIRONMENT WITH REGARD TO WINTER COLONY LOSSES	(Jun 17, 2017)	SciSearch®: a Cited Reference Science Database
3	127	Binary mixtures of neonicotinoids show different transcriptional changes than single neonicotinoids in honeybees (Apis mellifera)	(Jan 2017)	SciSearch®: a Cited Reference Science Database
3	128	Evaluation of the effects of some insecticides based on neonicotinoids on entomopathogenic nematodes, Steinernema feltiae and S. carpocapsae	2017	SciSearch®: a Cited Reference Science Database
3	129	Effects of microbial, organically acceptable, and reduced risk insecticides on Anthonomus signatus (Curculionidae: Coleoptera) in strawberries (Fragaria x ananassa)	(Nov 2016)	SciSearch®: a Cited Reference Science Database
3	131	Fast determination of neonicotinoid insecticides in bee pollen using QuEChERS and ultra-high performance liquid chromatography coupled to quadrupole time-of-flight mass spectrometry	(Oct 2016)	SciSearch®: a Cited Reference Science Database
3	132	Mass Balance Assessment for Six Neonicotinoid Insecticides During Conventional Wastewater and Wetland Treatment: Nationwide Reconnaissance in United States Wastewater	(Jun 21, 2016)	SciSearch®: a Cited Reference Science Database
3	134	Molecular Effects of Neonicotinoids in Honey Bees (Apis mellifera)	(Apr 5, 2016)	SciSearch®: a Cited Reference Science Database
3	136	Chestnut shells to mitigate pesticide contamination	(Apr 2016)	SciSearch®: a Cited Reference Science Database
3	137	Multi-Drug Resistance Transporters and a Mechanism-Based Strategy for Assessing Risks of Pesticide Combinations to Honey Bees	(Feb 3, 2016)	SciSearch®: a Cited Reference Science Database
3	140	Similar Comparative Low and High Doses of Deltamethrin and Acetamiprid Differently Impair the Retrieval of the Proboscis Extension Reflex in the Forager Honey Bee (Apis mellifera)	(Dec 2015)	SciSearch®: a Cited Reference Science Database
3	141	Neonicotinoid insecticides inhibit cholinergic neurotransmission in a molluscan (Lymnaea stagnalis) nervous system	(Oct 2015)	SciSearch®: a Cited Reference Science Database
3	142	An Observational Study of Honey Bee Colony Winter Losses and Their Association with Varroa destructor, Neonicotinoids and Other Risk Factors	(Jul 8, 2015)	SciSearch®: a Cited Reference Science Database
3	146	Analysis of neonicotinoids from plant material by desorption atmospheric pressure photoionization-mass spectrometry	(Mar 15, 2015)	SciSearch®: a Cited Reference Science Database
3	147	Toxicity and biochemical changes in the honey bee Apis mellifera exposed to four insecticides under laboratory conditions	(Mar 2015)	SciSearch®: a Cited Reference Science Database
3	148	Evaluation of pesticide toxicity at their field recommended doses to honeybees, Apis cerana and A-mellifera through laboratory, semi-field and field studies	(Jan 2015)	SciSearch®: a Cited Reference Science Database
3	150	Comparative Toxicity of Acetamiprid and Azadirachta indica Leave Extract on Biochemical Components of Blood of Labeo rohita	(Dec 2014)	SciSearch®: a Cited Reference Science Database
3	3	The effects of acetamiprid on the motor coordination and sucrose sensitivity of the honey bee, Apis mellifera	(Apr 2015)	SciSearch®: a Cited Reference Science Database
4	9	Occurrence, spatiotemporal distribution, and risk assessment of current-use pesticides in surface water: A case study near Taihu Lake, China	(Aug 15, 2021)	SciSearch®: a Cited Reference Science Database
4	10	Prevalence of neonicotinoids and sulfoxaflor in alluvial aquifers in a high corn and soybean producing region of the Midwestern United States	(Aug 15, 2021)	SciSearch®: a Cited Reference Science Database
4	12	Carbon xerogels combined with nanotubes as solid-phase extraction sorbent to determine metaflumizone and seven other surface and drinking water micropollutants	(Jul 5, 2021)	SciSearch®: a Cited Reference Science Database
4	16	Monitoring of Neonicotinoid Pesticides in Water-Soil Systems Along the Agro-Landscapes of the Cauvery Delta Region, South India	(Jun 2021)	SciSearch®: a Cited Reference Science Database
4	18	Effect of ozone treatments on the removal of pesticide residues and postharvest quality in green pepper	(Jun 2021)	SciSearch®: a Cited Reference Science Database
4	20	Recyclable nitrogen-containing chitin-derived carbon microsphere as sorbent for neonicotinoid residues adsorption and analysis	(May 15, 2021)	SciSearch®: a Cited Reference Science Database
4	22	Effect of Salinity on UVA-Vis Light Driven Photo-Fenton Process at Acidic and Circumneutral pH	(May 2021)	SciSearch®: a Cited Reference Science Database
4	23	Fungal degradation of selected medium to highly polar pesticides by Trametes versicolor: kinetics, biodegradation pathways, and ecotoxicity of treated waters	(Apr 15, 2021)	SciSearch®: a Cited Reference Science Database
4	24	A density functional theoretical study of the hydrolysis mechanism of three neonicotinoid based pesticides	(Apr 15, 2021)	SciSearch®: a Cited Reference Science Database
4	27	Chemical constituents of essential oils from Thymus vulgaris and Cymbopogon citratus and their insecticidal potential against the tomato borer, Tuta absoluta (Lepidoptera: Gelechiidae)	(Mar 30, 2021)	SciSearch®: a Cited Reference Science Database
4	28	Transfer rates on nine pesticides from dry tea to infusion by QuEChERS purification followed by LC-MS/MS analysis	(Mar 19, 2021)	SciSearch®: a Cited Reference Science Database
4	33	A novel approach based on capillary liquid chromatography for the simultaneous determination of neonicotinoid residues in cereal samples	(Feb 2021)	SciSearch®: a Cited Reference Science Database

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4	36	Neonicotinoids, fipronil, chlorpyrifos, carbendazim, chlorotriazines, chlorophenoxy herbicides, bentazon, and selected pesticide transformation products in surface water and drinking water from northern Vietnam	(Jan 1, 2021)	SciSearch®: a Cited Reference Science Database
4	39	Solid-phase extraction cartridges with multi-walled carbon nanotubes and effect of the oxygen functionalities on the recovery efficiency of organic micropollutants	(Dec 18, 2020)	SciSearch®: a Cited Reference Science Database
4	40	Photocatalytic degradation of neonicotinoid insecticides using sulfate-doped Ag3PO4 with enhanced visible light activity	(Dec 15, 2020)	SciSearch®: a Cited Reference Science Database
4	42	Development of Fluorescence Polarization Immunoassay for Imidacloprid in Environmental and Agricultural Samples	(Dec 2, 2020)	SciSearch®: a Cited Reference Science Database
4	45	Characteristics of Exposure of Reproductive-Age Farmworkers in Chiang Mai Province, Thailand, to Organophosphate and Neonicotinoid Insecticides: A Pilot Study	(Nov 2020)	SciSearch®: a Cited Reference Science Database
4	48	Capillary liquid chromatography as an effective method for the determination of seven neonicotinoid residues in honey samples	(Oct 2020)	SciSearch®: a Cited Reference Science Database
4	49	Washing fresh tea leaves before picking decreases pesticide residues in tea	(Oct 2020)	SciSearch®: a Cited Reference Science Database
4	51	Magnetic Solid Phase Extraction Based on Nanostructured Magnetic Porous Porphyrin Organic Polymer for Simultaneous Extraction and Preconcentration of Neonicotinoid Insecticides From Surface Water	(Sep 16, 2020)	SciSearch®: a Cited Reference Science Database
4	52	Capacitive sensor based on molecularly imprinted polymers for detection of the insecticide imidacloprid in water	(Sep 2, 2020)	SciSearch®: a Cited Reference Science Database
4	53	Micellar electrokinetic chromatography as efficient alternative for the multiresidue determination of seven neonicotinoids and 6-chloronicotinic acid in environmental samples	(Sep 2020)	SciSearch®: a Cited Reference Science Database
4	55	Desalination of Groundwater from a Well in Puglia Region (Italy) by Al2O3-Doped Silica and Polymeric Nanofiltration Membranes	(Sep 2020)	SciSearch®: a Cited Reference Science Database
4	56	Metal-organic framework MIL101 (Cr)-NH2 functionalized magnetic graphene oxide for ultrasonic-assisted magnetic solid phase extraction of neonicotinoid insecticides from fruit and water samples	(Sep 2020)	SciSearch®: a Cited Reference Science Database
4	57	A facile strategy for photocatalytic degradation of seven neonicotinoids over sulfur and oxygen co-doped carbon nitride	(Aug 2020)	SciSearch®: a Cited Reference Science Database
4	58	Bioadsorbent from Magnetic Activated Carbon Hybrid for Removal of Dye and Pesticide	(Jul 31, 2020)	SciSearch®: a Cited Reference Science Database
4	62	Solar reclamation of agro-wastewater polluted with eight pesticides by heterogeneous photocatalysis using a modular facility. A case study	(Jun 2020)	SciSearch®: a Cited Reference Science Database
4	64	Lethal and Sublethal Effects of Methyl Benzoate on the Predatory BugNesidiocoris tenuis	(Jun 2020)	SciSearch®: a Cited Reference Science Database
4	68	Health risk assessment of neonicotinoid insecticide residues in pistachio using a QuEChERS-based method in combination with HPLC-UV	(Mar 2020)	SciSearch®: a Cited Reference Science Database
4	69	Neonicotinoid insecticides in the drinking water system - Fate, transportation, and, their contributions to the overall dietary risks	(Mar 2020)	SciSearch®: a Cited Reference Science Database
4	70	Development and validation of two robust simple chromatographic methods for estimation of tomatoes specific pesticides' residues for safety monitoring prior to food processing line and evaluation of local samples	(Feb 15, 2020)	SciSearch®: a Cited Reference Science Database
4	71	Synthesis, molecular docking studies, and larvicidal activity evaluation of new fluorinated neonicotinoids against Anopheles darlingi larvae	(Feb 5, 2020)	SciSearch®: a Cited Reference Science Database
4	72	Simultaneous determination of eight neonicotinoid insecticides, fipronil and its three transformation products in sediments by continuous solvent extraction coupled with liquid chromatography-tandem mass spectrometry	(Feb 2020)	SciSearch®: a Cited Reference Science Database
4	74	Preparation and evaluation of hydrocalumite-iron oxide magnetic intercalated with dodecyl sulfate for removal of agrichemicals	(Feb 1, 2020)	SciSearch®: a Cited Reference Science Database
4	75	Assessing washing methods for reduction of pesticide residues in Capia pepper with LC-MS/MS	(Jan 2, 2020)	SciSearch®: a Cited Reference Science Database
4	76	Fabrication of a sustained release delivery system for pesticides using interpenetrating polyacrylamide/alginate/montmorillonite nanocomposite hydrogels	(Dec 15, 2019)	SciSearch®: a Cited Reference Science Database
4	78	Coconut Shell Activated Carbon as Solid-Phase Extraction Adsorbent for Preconcentration of Selected Pesticides from Water Samples	(Dec 2019)	SciSearch®: a Cited Reference Science Database
4	79	Prey contaminated with neonicotinoids induces feeding deterrent behavior of a common farmland spider	(Nov 4, 2019)	SciSearch®: a Cited Reference Science Database
4	80	Simultaneous determination of neonicotinoids and fipronil and its metabolites in environmental water from coastal bay using disk-based solid-phase extraction and high-performance liquid chromatography-tandem mass spectrometry	(Nov 2019)	SciSearch®: a Cited Reference Science Database
4	81	Occurrence of pesticides in Dutch drinking water sources	(Nov 2019)	SciSearch®: a Cited Reference Science Database
4	82	Photo-degradation dynamics of five neonicotinoids: Bamboo vinegar as a synergistic agent for improved functional duration	(Oct 17, 2019)	SciSearch®: a Cited Reference Science Database
4	83	Acetamiprid, a neonicotinoid insecticide, induced cytotoxicity and genotoxicity in PC12 cells	(Oct 13, 2019)	SciSearch®: a Cited Reference Science Database
4	84	Mobility and sorption assessment of selected pesticides in alluvial aquifer	(Oct 2019)	SciSearch®: a Cited Reference Science Database
4	92	A Magnetic Zeolitic Imidazolate Framework Nanohybrid for Fast and Efficient Extraction of Clothianidin, Imidacloprid, Acetamiprid, and Thiacloprid in Water	(Jun 2019)	SciSearch®: a Cited Reference Science Database
4	93	Biodegradation of the Neonicotinoid Insecticide Acetamiprid by Actinomycetes Streptomyces canus CGMCC 13662 and Characterization of the Novel Nitrile Hydratase Involved	(May 29, 2019)	SciSearch®: a Cited Reference Science Database
4	94	Implementation of a new modular facility to detoxify agro-wastewater polluted with neonicotinoid insecticides in farms by solar photocatalysis	(May 15, 2019)	SciSearch®: a Cited Reference Science Database
4	95	Rinsing Tea before Brewing Decreases Pesticide Residues in Tea Infusion	(May 15, 2019)	SciSearch®: a Cited Reference Science Database
4	97	LC-MS/MS method validation for determination of selected neonicotinoids in groundwater for the purpose of a column experiment	(May 4, 2019)	SciSearch®: a Cited Reference Science Database
4	98	Reducing the Ecotoxicity of Pesticide Polluted Waters by Electrochemical Methods	(May 2019)	SciSearch®: a Cited Reference Science Database
4	99	Reclamation of agro-wastewater polluted with pesticide residues using sunlight activated persulfate for agricultural reuse	(Apr 10, 2019)	SciSearch®: a Cited Reference Science Database
4	100	Degradation of neonicotinoids by UV irradiation: Kinetics and effect of real water constituents	(Mar 18, 2019)	SciSearch®: a Cited Reference Science Database

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4	101	Abatement of ozone-recalcitrant micropollutants during municipal wastewater ozonation: Kinetic modelling and surrogate-based control strategies	(Mar 15, 2019)	SciSearch®: a Cited Reference Science Database
4	105	Monitoring of the 17 EU Watch List contaminants of emerging concern in the Ave and the Sousa Rivers	(Feb 1, 2019)	SciSearch®: a Cited Reference Science Database
4	110	Spatial and seasonal occurrence of micropollutants in four Portuguese rivers and a case study for fluorescence excitation-emission matrices	(Dec 10, 2018)	SciSearch®: a Cited Reference Science Database
4	113	Industrial prune processing and its effect on pesticide residue concentrations	(Dec 1, 2018)	SciSearch®: a Cited Reference Science Database
4	114	Degradation of acetamiprid in UV/H2O2 and UV/persulfate systems: A comparative study	(Nov 1, 2018)	SciSearch®: a Cited Reference Science Database
4	115	Neonicotinoid insecticide hydrolysis and photolysis: Rates and residual toxicity	(Nov 2018)	SciSearch®: a Cited Reference Science Database
4	117	Mechanistic modeling of solar photo-Fenton process with Fe3+ -EDDS at neutral pH	(Oct 5, 2018)	SciSearch®: a Cited Reference Science Database
4	121	Anti-Agglomeration Behavior and Sensing Assay of Chlorsulfuron Based on Acetamiprid-Gold Nanoparticles	(Jul 2018)	SciSearch®: a Cited Reference Science Database
4	122	Focussed assessment of certain existing MRLs of concern for acetamiprid and modification of the existing MRLs for table olives, olives for oil production, barley and oats	(May 2018)	SciSearch®: a Cited Reference Science Database
4	124	Ultrasonically Modified Amended-Cloud Point Extraction for Simultaneous Pre-Concentration of Neonicotinoid Insecticide Residues	(May 2018)	SciSearch®: a Cited Reference Science Database
4	125	Year-round presence of neonicotinoid insecticides in tributaries to the Great Lakes, USA	(Apr 2018)	SciSearch®: a Cited Reference Science Database
4	126	Preconcentration of Trace Neonicotinoid Insecticide Residues Using Vortex-Assisted Dispersive Micro Solid-Phase Extraction with Montmorillonite as an Efficient Sorbent	(Apr 2018)	SciSearch®: a Cited Reference Science Database
4	127	Lethal and sublethal effects of synthetic insecticides on the locomotory and feeding behavior of Riptortus pedestris (Hemiptera: Alydidae) under laboratory conditions	(Mar 2018)	SciSearch®: a Cited Reference Science Database
4	128	Influence of humic substances and iron and aluminum ions on the sorption of acetamiprid to an arable soil	(Feb 15, 2018)	SciSearch®: a Cited Reference Science Database
4	130	Degradation of the Neonicotinoid Pesticides in the Atmospheric Pressure Ionization Source	(Feb 2018)	SciSearch®: a Cited Reference Science Database
4	131	PROGRESS IN THE BIODEGRADATION OF CHLORONICOTINYL INSECTICIDE ACETAMIPRID	2018	SciSearch®: a Cited Reference Science Database
4	132	EFFECT OF THREE CHEMICALS AND NEEM INSECTICIDE AGAINST AUTUMN POPULATIONS OF DUBAS BUG, OMMATISSUS LYBICUS DE BERGEVIN (TROPIDUCHIDUE: HOMOPTERA) IN OMAN	2018	SciSearch®: a Cited Reference Science Database
4	134	Effects of Ozone Treatment on the Degradation and Toxicity of Several Pesticides in Different Groups	2018	SciSearch®: a Cited Reference Science Database
4	135	Enhanced Quenching Effect of Neonicotinoid Pesticides on Time-Resolved Terbium Luminescence in Presence of Surfactants	2018	SciSearch®: a Cited Reference Science Database
4	136	Comprehensive solution for acetamiprid degradation: Combined electro-Fenton and adsorption process	(Jan 1, 2018)	SciSearch®: a Cited Reference Science Database
4	137	Grab and passive sampling applied to pesticide analysis in the SAo Lourenco river headwater in Campo Verde - MT, Brazil	2018	SciSearch®: a Cited Reference Science Database
4	138	Pesticides from wastewater treatment plant effluents affect invertebrate communities	(Dec 1, 2017)	SciSearch®: a Cited Reference Science Database
4	139	Dietary risk assessment of pesticides from vegetables and drinking water in gardening areas in Burkina Faso	(Dec 1, 2017)	SciSearch®: a Cited Reference Science Database
4	140	Priority pesticides abatement by advanced water technologies: The case of acetamiprid removal by ozonation	(Dec 1, 2017)	SciSearch®: a Cited Reference Science Database
4	141	Estimated exposure of hands inside the protective gloves used by non-occupational handlers of agricultural pesticides	(Nov 2017 - Dec 2017)	SciSearch®: a Cited Reference Science Database
4	143	Solubilization of seven hydrophobic pesticides in quaternary ammonium based eco-friendly ionic liquid aqueous systems	(Oct 7, 2017)	SciSearch®: a Cited Reference Science Database
4	144	Development of hydrophobic deep eutectic solvents for extraction of pesticides from aqueous environments	(Sep 25, 2017)	SciSearch®: a Cited Reference Science Database
4	145	Optimization of photochemical decomposition acetamiprid pesticide from aqueous solutions and effluent toxicity assessment by Pseudomonas aeruginosa BCRC using response surface methodology	(Aug 4, 2017)	SciSearch®: a Cited Reference Science Database
4	146	Neonicotinoids Detection by new LC-MS/MS Method in Romanian Surface Waters	(Aug 2017)	SciSearch®: a Cited Reference Science Database
4	147	SERS-active metal-organic frameworks with embedded gold nanoparticles	(Jul 21, 2017)	SciSearch®: a Cited Reference Science Database
4	148	Susceptibility of MED-Q1 and MED-Q3 Biotypes of Bemisia tabaci (Hemiptera: Aleyrodidae) Populations to Essential and Seed Oils	(Jun 2017)	SciSearch®: a Cited Reference Science Database
4	150	Solid-phase extraction disk based on multiwalled carbon nanotubes for the enrichment of targeted pesticides from aqueous samples	(Apr 2017)	SciSearch®: a Cited Reference Science Database
4	154	Development of a Facile and High-Throughput Bioluminescence Assay Using Vibrio fischeri to Determine the Chronic Toxicity of Contaminated Samples	(Feb 2017)	SciSearch®: a Cited Reference Science Database
4	155	Rapid Sample Preparation Followed by a 100% Water Mobile Phase HPLC Analysis for Quantifying Acetamiprid and its N-desmethyl Metabolite, IM-2-1, in Cow's Milk	(Feb 2017)	SciSearch®: a Cited Reference Science Database
4	156	DETERMINATION OF PESTICIDES IN WATER AND SEDIMENT BY HPLC-HRMS AND ITS RELATIONSHIP WITH THE USE AND LAND OCCUPATION	(Feb 2017)	SciSearch®: a Cited Reference Science Database
4	157	Reduction of methomyl and acetamiprid residues from tomatoes after various household washing solutions	2017	SciSearch®: a Cited Reference Science Database
4	158	Multiresidue Analysis of Five Neonicotinoid Insecticides and Their Primary Metabolite in Cucumbers and Soil Using High-Performance Liquid Chromatography with Diode-Array Detection	(Jan 2017 - Feb 2017)	SciSearch®: a Cited Reference Science Database
4	159	Low cost UVA-LED as a radiation source for the photo-Fenton process: a new approach for micropollutant removal from urban wastewater	(Jan 1, 2017)	SciSearch®: a Cited Reference Science Database
4	160	Biodegradation of the neonicotinoid insecticide acetamiprid in surface water by the bacterium Variovorax boronicumulans CGMCC 4969 and its enzymatic mechanism	2017	SciSearch®: a Cited Reference Science Database

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4	161	QD-aptamer as a donor for a FRET-based chemosensor and evaluation of affinity between acetamiprid and its aptamer	2017	SciSearch®: a Cited Reference Science Database
4	162	Reduction of pesticides residues on okra fruits by different processing treatments	(Dec 2016)	SciSearch®: a Cited Reference Science Database
4	165	Structure of the beta-cyclodextrin: acetamiprid insecticide inclusion complex in solution and solid state	(Oct 2016)	SciSearch®: a Cited Reference Science Database
4	166	Studied on Distribution and Heavy Metal Pollution Index of Heavy Metals in Water from Upper Reaches of the Yellow River, China	(Sep 2016)	SciSearch®: a Cited Reference Science Database
4	167	Aptamer-based Resonance Light Scattering for Sensitive Detection of Acetamiprid	(Jul 2016)	SciSearch®: a Cited Reference Science Database
4	168	Liquid chromatography-tandem mass spectrometry analysis of neonicotinoid pesticides and 6-chloronicotinic acid in environmental water with direct aqueous injection	(Jun 21, 2016)	SciSearch®: a Cited Reference Science Database
4	171	Theoretical studies on the hydrolysis mechanism of acetamiprid	(Mar 2, 2016)	SciSearch®: a Cited Reference Science Database
4	172	Leaching behaviour of slag and fly ash from laterite nickel ore smelting (Niquelandia, Brazil)	(Jan 2016)	SciSearch®: a Cited Reference Science Database
4	174	Performance of different advanced oxidation processes for tertiary wastewater treatment to remove the pesticide acetamiprid	(Jan 2016)	SciSearch®: a Cited Reference Science Database
4	176	Modelling of the operation of raceway pond reactors for micropollutant removal by solar photo-Fenton as a function of photon absorption	(Nov 2015)	SciSearch®: a Cited Reference Science Database
4	177	Determination of H2O2 by MnO2 modified screen printed carbon electrode during Fenton and visible light-assisted photo-Fenton based removal of acetamiprid from water	(Oct 15, 2015)	SciSearch®: a Cited Reference Science Database
4	178	Determination of background levels and pollution assessment for seven metals (Cd, Cu, Ni, Pb, Zn, Fe, Mn) in sediments of a Mediterranean coastal lagoon	(Oct 2015)	SciSearch®: a Cited Reference Science Database
4	179	Photodegradation of neonicotinoid insecticides in water by semiconductor oxides	(Oct 2015)	SciSearch®: a Cited Reference Science Database
4	180	Effects of Types of Washing and Peeling in Relation to Pesticide Residues in Tomatoes	(Oct 2015)	SciSearch®: a Cited Reference Science Database
4	181	Kinetic and metallographic study of oxidation at high temperature of cast Ni 25Cr alloy in water vapour rich air	(Sep 2015)	SciSearch®: a Cited Reference Science Database
4	182	Degradation and monitoring of acetamiprid, thiabendazole and their transformation products in an agro-food industry effluent during solar photo-Fenton treatment in a raceway pond reactor	(Jul 2015)	SciSearch®: a Cited Reference Science Database
4	184	In-coupled syringe assisted octanol-water partition microextraction coupled with high-performance liquid chromatography for simultaneous determination of neonicotinoid insecticide residues in honey	(Jul 1, 2015)	SciSearch®: a Cited Reference Science Database
4	186	Bio-degradation of acetamiprid from wetland wastewater using indigenous Micrococcus luteus strain SC 1204: Optimization, evaluation of kinetic parameter and toxicity	(Jun 2015)	SciSearch®: a Cited Reference Science Database
4	187	Polyoxometalate-Based Nickel Clusters as Visible Light-Driven Water Oxidation Catalysts	(Apr 29, 2015)	SciSearch®: a Cited Reference Science Database
4	188	Magnetic porous carbon based solid-phase extraction coupled with high performance liquid chromatography for the determination of neonicotinoid insecticides in environmental water and peanut milk samples	2015	SciSearch®: a Cited Reference Science Database
4	189	Novel use of PVPP in a modified QuEChERS extraction method for UPLC-MS/MS analysis of neonicotinoid insecticides in tea matrices	2015	SciSearch®: a Cited Reference Science Database
4	190	Supported TiO2 solar photocatalysis at semi-pilot scale: degradation of pesticides found in citrus processing industry wastewater, reactivity and influence of photogenerated species	(Jan 2015)	SciSearch®: a Cited Reference Science Database
4	191	Effect of in-situ gas changes on thermally grown chromia scales formed on Ni-25Cr alloy at 1000 degrees C in atmospheres with and without water vapour	(Jan 2015)	SciSearch®: a Cited Reference Science Database
4	192	Electro-catalytic degradation pathway and mechanism of acetamiprid using an Er doped Ti/SnO2-Sb electrode	2015	SciSearch®: a Cited Reference Science Database
4	193	Survival and growth of foodborne pathogens in pesticide solutions routinely used in leafy green vegetables and tomato production	(Nov 2014)	SciSearch®: a Cited Reference Science Database
4	195	EFFICACIES OF COMMON READY TO USE INSECTICIDES AGAINST HALYOMORPHA HALYS (HEMIPTERA: PENTATOMIDAE)	(Jun 2014)	SciSearch®: a Cited Reference Science Database
4	196	Effects of Lipids on Analysis of Residue Pesticides in Herbal Medicines	(Jun 2014)	SciSearch®: a Cited Reference Science Database
4	197	Photodegradation of Neonicotinoid Active Ingredients and Their Commercial Formulations in Water by Different Advanced Oxidation Processes	(May 2014)	SciSearch®: a Cited Reference Science Database
4	198	Phenomenological study and application of the combined influence of iron concentration and irradiance on the photo-Fenton process to remove micropollutants	(Apr 15, 2014)	SciSearch®: a Cited Reference Science Database
4	199	Application of liquid chromatography quadrupole time-of-flight mass spectrometry to the identification of acetamiprid transformation products generated under oxidative processes in different water matrices	(Apr 2014)	SciSearch®: a Cited Reference Science Database
4	201	Widespread Use and Frequent Detection of Neonicotinoid Insecticides in Wetlands of Canada's Prairie Pothole Region	(Mar 26, 2014)	SciSearch®: a Cited Reference Science Database
4	202	ASSESSMENT OF DISTRIBUTION CHARACTERISTICS AND CONTAMINATION WITH HEAVY METALS IN SURFACE SEDIMENTS OF LAKE CHAOHU, CHINA	(Mar 2014)	SciSearch®: a Cited Reference Science Database
4	203	Effects of Rinsing on Residue Level of Chlorpyrifos Ethyl, Acetamiprid and Penconazole in Grapes	2014	SciSearch®: a Cited Reference Science Database
1,2,3	25	In vitro metabolism assessment of thiacloprid in rainbow trout and rat by LC-UV and high resolution-mass spectrometry	(Mar 12, 2021)	SciSearch®: a Cited Reference Science Database
1,2,3	42	Quantification of Neonicotinoid Pesticides in Six Cultivable Fish Species from the River Owena in Nigeria and a Template for Food Safety Assessment	(Sep 2020)	SciSearch®: a Cited Reference Science Database
1,2,3	60	A holistic study of neonicotinoids neuroactive insecticides-properties, applications, occurrence, and analysis	(Dec 2019)	SciSearch®: a Cited Reference Science Database
1,2,3	115	Immunotoxicity assessment of sub-chronic oral administration of acetamiprid in Wistar rats	2015	SciSearch®: a Cited Reference Science Database
1,2,3,4	13	Pesticides in surface waters of tropical river basins draining areas with rice-vegetable rotations in Hainan, China: Occurrence, relation to environmental factors, and risk assessment	(Aug 15, 2021)	SciSearch®: a Cited Reference Science Database

Search #	Result #	Title	Date	Database
1,2,4	36	Preparation and characterization of an oil-in-water microemulsion of thiamethoxam and acetamiprid without organic solvent for unmanned aerial vehicle spraying	(Dec 20, 2020)	SciSearch®: a Cited Reference Science Database
1,2,4	48	Laboratory scale UV-visible degradation of acetamiprid in aqueous marketed mixtures - Structural elucidation of photoproducts and toxicological consequences	(Jun 2020)	SciSearch®: a Cited Reference Science Database
1,2,4	50	Insights Into the Microbial Degradation and Biochemical Mechanisms of Neonicotinoids	(May 19, 2020)	SciSearch®: a Cited Reference Science Database
1,2,4	75	Uptake and accumulation of emerging contaminants in soil and plant treated with wastewater under real-world environmental conditions in the Al Hayer area (Saudi Arabia)	(Feb 20, 2019)	SciSearch®: a Cited Reference Science Database
1,3	21	Stink bug Agonoscelis spp. (Heteroptera: Pentatomidae)-An emerging threat for seed production in alfalfa crop (Medicago sativa L.) and their successful management	(Jun 2021)	SciSearch®: a Cited Reference Science Database
1,3	34	A comparative study on the effects of selected pesticides on hemato-biochemistry and tissue histology of freshwater fish Cirrhinus mrigala (Hamilton, 1822)	(Jan 2021)	SciSearch®: a Cited Reference Science Database
1,3	79	Exposures of children to neonicotinoids in pine wilt disease control areas	(Jan 2019)	SciSearch®: a Cited Reference Science Database
1,3	97	A worldwide survey of neonicotinoids in honey	(Oct 6, 2017)	SciSearch®: a Cited Reference Science Database
1,3,4	45	In vitro metabolism of imidacloprid and acetamiprid in rainbow trout and rat	(Jul 2, 2020)	SciSearch®: a Cited Reference Science Database
1,3,4	74	Analysis of 52 pesticides in fresh fish muscle by QuEChERS extraction followed by LC-MS/MS determination	(Feb 25, 2019)	SciSearch®: a Cited Reference Science Database
1,4	3	A pilot nationwide baseline survey on the concentrations of Neonicotinoid insecticides in tap water from China: Implication for human exposure	(Dec 15, 2021)	SciSearch®: a Cited Reference Science Database
1,4	5	BDD electrochemical oxidation of neonicotinoid pesticides in natural surface waters. Operational, kinetic and energetic aspects	(Nov 15, 2021)	SciSearch®: a Cited Reference Science Database
1,4	7	Occurrence of neonicotinoids and sulfoxaflor in major aquifer groups in Iowa	(Oct 2021)	SciSearch®: a Cited Reference Science Database
1,4	8	Mixtures of chelating agents to enhance photo-Fenton process at natural pH: Influence of wastewater matrix on micropollutant removal and bacterial inactivation	(Sep 10, 2021)	SciSearch®: a Cited Reference Science Database
1,4	11	Integrated non-targeted lipidomics and metabolomics analyses for fluctuations of neonicotinoids imidacloprid and acetamiprid on Neuro-2a cells	(Sep 1, 2021)	SciSearch®: a Cited Reference Science Database
1,4	19	Effect of Acetamiprid on spatial memory and hippocampal glutamatergic system	(Jun 2021)	SciSearch®: a Cited Reference Science Database
1,4	27	Residues of neonicotinoids in soil, water and people's hair: A case study from three agricultural regions of the Philippines	(Feb 25, 2021)	SciSearch®: a Cited Reference Science Database
1,4	28	Nanochitin whisker enhances insecticidal activity of chemical pesticide for pest insect control and toxicity	(Feb 16, 2021)	SciSearch®: a Cited Reference Science Database
1,4	32	A nationwide study of occurrence and exposure assessment of neonicotinoid insecticides and their metabolites in drinking water of China	(Feb 1, 2021)	SciSearch®: a Cited Reference Science Database
1,4	35	Label-free hairpin-like aptamer and EIS-based practical, biostable sensor for acetamiprid detection	(Dec 23, 2020)	SciSearch®: a Cited Reference Science Database
1,4	40	Predictors, sources, and health risk of exposure to neonicotinoids in Chinese school children: A biomonitoring-based study	(Oct 2020)	SciSearch®: a Cited Reference Science Database
1,4	58	Dietary exposure to neonicotinoid insecticides and health risks in the Chinese general population through two consecutive total diet studies	(Feb 2020)	SciSearch®: a Cited Reference Science Database
1,4	67	Occurrence and distribution of neonicotinoid insecticides in surface water and sediment of the Guangzhou section of the Pearl River, South China	(Aug 2019)	SciSearch®: a Cited Reference Science Database
1,4	68	Neonicotinoids in raw, finished, and tap water from Wuhan, Central China: Assessment of human exposure potential	(Jul 20, 2019)	SciSearch®: a Cited Reference Science Database
1,4	76	Comprehensive toxicological study over 160 processing factors of pesticides in selected fruit and vegetables after water, mechanical and thermal processing treatments and their application to human health risk assessment	(Feb 20, 2019)	SciSearch®: a Cited Reference Science Database
1,4	77	Trends in neonicotinoid pesticide residues in food and water in the United States, 1999-2015	(Jan 11, 2019)	SciSearch®: a Cited Reference Science Database
1,4	93	Effect of acetamiprid on the immature murine testes	2018	SciSearch®: a Cited Reference Science Database
1,4	96	Specific immune responses in mice following subchronic exposure to acetamiprid	(Nov 1, 2017)	SciSearch®: a Cited Reference Science Database
1,4	102	Acetamiprid Accumulates in Different Amounts in Murine Brain Regions	(Oct 2016)	SciSearch®: a Cited Reference Science Database
1,4	119	Effects of fullerene nanoparticles on acetamiprid induced cytotoxicity and genotoxicity in cultured human lung fibroblasts	(Sep 2014)	SciSearch®: a Cited Reference Science Database
2,3	3	The development of the solitary bee Osmia bicornis is affected by some insecticide agrochemicals at environmentally relevant concentrations	(Jun 25, 2021)	SciSearch®: a Cited Reference Science Database
2,3	19	Evaluation of Highly Detectable Pesticides Sprayed in Brassica napus L.: Degradation Behavior and Risk Assessment for Honeybees	(Oct 2018)	SciSearch®: a Cited Reference Science Database
2,3	21	LC-MS/MS analysis of neonicotinoid insecticides: Residue findings in Chilean honeys	(Jan 2018 - Feb 2018)	SciSearch®: a Cited Reference Science Database
2,3	34	Development of HPLC-DAD method for determination of neonicotinoids in honey	(Jun 2015)	SciSearch®: a Cited Reference Science Database
2,3,4	25	Modeling Remobilization of Neonicotinoid Residues from Tree Foliage in Streams-A Relevant Exposure Pathway in Risk Assessment?	(Feb 7, 2017)	SciSearch®: a Cited Reference Science Database
2,4	7	Chemical factors affecting uptake and translocation of six pesticides in soil by maize (Zea mays L.)	(Mar 5, 2021)	SciSearch®: a Cited Reference Science Database
2,4	15	Attenuating effects of Mangifera indica leaves ethanolic extract against acetamiprid induced reproductive toxicity in male guinea pigs	(Jul 2019 - Sep 2019)	SciSearch®: a Cited Reference Science Database
2,4	20	Organic solvent-free immunoassay for quantitative detection of neonicotinoid acetamiprid residues in agricultural products	(Jul 14, 2018)	SciSearch®: a Cited Reference Science Database
3,4	2	Comparative Evaluation of the Polar Organic Chemical Integrative Sampler in Two Types of Validation Systems Simulating Peak Concentration Events	(Sep 27, 2021)	SciSearch®: a Cited Reference Science Database
3,4	7	Development of a high-throughput multi-residue method for analysis of common pesticides in aquatic environments by automated online solid phase extraction coupled with LC-MS/MS	(Jul 28, 2021)	SciSearch®: a Cited Reference Science Database
3,4	8	Acute toxicity, accumulation and sublethal effects of four neonicotinoids on juvenile Black Tiger Shrimp (Penaeus monodon)	(Jul 2021)	SciSearch®: a Cited Reference Science Database
3,4	10	A reconnaissance study of pharmaceuticals, pesticides, perfluoroalkyl substances and organophosphorus flame retardants in the aquatic environment, wild plants and vegetables of two Saudi Arabia urban areas: Environmental and human health risk assessment	(Jul 1, 2021)	SciSearch®: a Cited Reference Science Database

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3,4	12	Highly Efficient Removal of Neonicotinoid Insecticides by Thioether-Based (Multivariate) Metal-Organic Frameworks	(Jun 23, 2021)	SciSearch®: a Cited Reference Science Database
3,4	16	UV-A activation of peroxymonosulfate for the removal of micropollutants from secondary treated wastewater	(May 20, 2021)	SciSearch®: a Cited Reference Science Database
3,4	18	Acute and chronic toxicity tests of systemic insecticides, four neonicotinoids and fipronil, using the tadpoles of the western clawed frog <i>Silurana tropicalis</i>	(May 2021)	SciSearch®: a Cited Reference Science Database
3,4	19	Effects of acetamiprid and flumethrin on <i>Unio</i> sp. primary cells	(Apr 2021)	SciSearch®: a Cited Reference Science Database
3,4	21	Evaluation of the occurrence and fate of pesticides in a typical Mediterranean delta ecosystem (Ebro River Delta) and risk assessment for aquatic organisms	(Apr 1, 2021)	SciSearch®: a Cited Reference Science Database
3,4	25	Concentration- and time-dependent toxicity of commonly encountered pesticides and pesticide mixtures to honeybees (<i>Apis mellifera</i> L.)	(Mar 2021)	SciSearch®: a Cited Reference Science Database
3,4	28	Emerging organic contaminants in groundwater under a rapidly developing city (Patna) in northern India dominated by high concentrations of lifestyle chemicals	(Jan 1, 2021)	SciSearch®: a Cited Reference Science Database
3,4	31	Behaviour of neonicotinoids in contrasting soils	(Dec 15, 2020)	SciSearch®: a Cited Reference Science Database
3,4	33	Architecting neonicotinoid-scavenging nanocomposite hydrogels for environmental remediation	(Dec 2020)	SciSearch®: a Cited Reference Science Database
3,4	34	Adsorption of acetamiprid, chlorantraniliprole and flubendiamide on different type of microplastics present in alluvial soil	(Dec 2020)	SciSearch®: a Cited Reference Science Database
3,4	42	Occurrence, source and ecotoxicological risk assessment of pesticides in surface water of Wujin District (northwest of Taihu Lake), China	(Oct 2020)	SciSearch®: a Cited Reference Science Database
3,4	44	Determination of neonicotinoids and butenolide residues in avian and insect pollinators and their ambient environment in Western Canada (2017-2018)	(Oct 1, 2020)	SciSearch®: a Cited Reference Science Database
3,4	45	Fate of selected neonicotinoid insecticides in soil-water systems: Current state of the art and knowledge gaps	(Sep 2020)	SciSearch®: a Cited Reference Science Database
3,4	49	Development and Calibration of the Polar Organic Chemical Integrative Sampler (POCIS) for Neonicotinoid Pesticides	(Jul 2020)	SciSearch®: a Cited Reference Science Database
3,4	50	Contamination of neonicotinoid insecticides in soil-water-sediment systems of the urban and rural areas in a rapidly developing region: Guangzhou, South China	(Jun 2020)	SciSearch®: a Cited Reference Science Database
3,4	51	Neonicotinoid insecticides hinder the pupation and metamorphosis into adults in a crabronid wasp	(Apr 27, 2020)	SciSearch®: a Cited Reference Science Database
3,4	52	Distribution and ecological risk of neonicotinoid insecticides in sediment in South China: Impact of regional characteristics and chemical properties	(Apr 20, 2020)	SciSearch®: a Cited Reference Science Database
3,4	63	Effects of dropleg application technique during flowering of oilseed rape on insect pests	(Dec 2019)	SciSearch®: a Cited Reference Science Database
3,4	71	Neonicotinoid insecticides in surface water from the central Yangtze River, China	(Aug 2019)	SciSearch®: a Cited Reference Science Database
3,4	74	Acute and chronic toxicity of neonicotinoid and butenolide insecticides to the freshwater amphipod, <i>Hyalella azteca</i>	(Jul 15, 2019)	SciSearch®: a Cited Reference Science Database
3,4	77	Pesticides from the EU First and Second Watch Lists in the Water Environment	(Jul 2019)	SciSearch®: a Cited Reference Science Database
3,4	81	Ecological risk assessment of the increasing use of the neonicotinoid insecticides along the east coast of China	(Jun 2019)	SciSearch®: a Cited Reference Science Database
3,4	82	<i>Eichhornia crassipes</i> : a Powerful Bio-indicator for Water Pollution by Emerging Pollutants	(May 13, 2019)	SciSearch®: a Cited Reference Science Database
3,4	90	Occurrence and risk of neonicotinoid insecticides in surface water in a rapidly developing region: Application of polar organic chemical integrative samplers	(Jan 15, 2019)	SciSearch®: a Cited Reference Science Database
3,4	91	Occurrence of Acetamiprid Residues in Water Reservoirs in the Cotton Basin of Northern Benin	(Jan 2019)	SciSearch®: a Cited Reference Science Database
3,4	94	Occurrence of Neonicotinoid Residues in Danube River and Tributaries	(Jan 2019)	SciSearch®: a Cited Reference Science Database
3,4	96	Constructed wetland microcosms for the removal of organic micropollutants from freshwater aquaculture effluents	(Dec 10, 2018)	SciSearch®: a Cited Reference Science Database
3,4	98	The use of algae in the process of heavy metal ions removal from wastewater	(Dec 2018)	SciSearch®: a Cited Reference Science Database
3,4	103	High-Throughput Quantitation of Neonicotinoids in Lyophilized Surface Water by LC-APCI-MS/MS	(Nov 2018 - Dec 2018)	SciSearch®: a Cited Reference Science Database
3,4	105	Chronic toxicity of 6 neonicotinoid insecticides to <i>Chironomus dilutus</i> and <i>Neocloeon triangulifer</i>	(Oct 2018)	SciSearch®: a Cited Reference Science Database
3,4	110	Lethal and sublethal toxicity of neonicotinoid and butenolide insecticides to the mayfly, <i>Hexagenia</i> spp	(Jul 2018)	SciSearch®: a Cited Reference Science Database
3,4	111	Acute Toxicity of 6 Neonicotinoid Insecticides to Freshwater Invertebrates	(May 2018)	SciSearch®: a Cited Reference Science Database
3,4	112	Single and joint toxicity assessment of four currently used pesticides to zebrafish (<i>Danio rerio</i>) using traditional and molecular endpoints	(Feb 2018)	SciSearch®: a Cited Reference Science Database
3,4	123	Does Waterborne Exposure Explain Effects Caused by Neonicotinoid-Contaminated Plant Material in Aquatic Systems?	(May 16, 2017)	SciSearch®: a Cited Reference Science Database
3,4	124	Effects of clothianidin on aquatic communities: Evaluating the impacts of lethal and sublethal exposure to neonicotinoids	(Mar 23, 2017)	SciSearch®: a Cited Reference Science Database
3,4	125	Neonicotinoids transference from the field to the hive by honey bees: Towards a pesticide residues biomonitor	(Mar 1, 2017)	SciSearch®: a Cited Reference Science Database
3,4	130	Sensitivity of the early-life stages of freshwater mollusks to neonicotinoid and butenolide insecticides	(Nov 2016)	SciSearch®: a Cited Reference Science Database
3,4	133	Occurrence and removal of organic micropollutants: An overview of the watch list of EU Decision 2015/495	(May 1, 2016)	SciSearch®: a Cited Reference Science Database
3,4	135	Comparative approach for trace metal risk evaluation in settling particles from the Uruguay River, Argentina: enrichment factors, sediment quality guidelines and metal speciation	(Apr 2016)	SciSearch®: a Cited Reference Science Database
3,4	138	First national-scale reconnaissance of neonicotinoid insecticides in streams across the USA	2016	SciSearch®: a Cited Reference Science Database
3,4	139	Liquid chromatography/tandem mass spectrometry analysis of neonicotinoids in environmental water	(Dec 15, 2015)	SciSearch®: a Cited Reference Science Database
3,4	143	Quantum Yields for Direct Photolysis of Neonicotinoid Insecticides in Water: Implications for Exposure to Nontarget Aquatic Organisms	(Jul 2015)	SciSearch®: a Cited Reference Science Database
3,4	144	Bioaccumulation of nickel and its biochemical and genotoxic effects on juveniles of the neotropical fish <i>Prochilodus lineatus</i>	(Jun 2015)	SciSearch®: a Cited Reference Science Database
3,4	151	Rapid Detection of Acetamiprid in Foods using Surface-Enhanced Raman Spectroscopy (SERS)	(Apr 2014)	SciSearch®: a Cited Reference Science Database
3,4	152	Treatment of acetamiprid insecticide from artificially contaminated water by colloidal manganese dioxide in the absence and presence of surfactants	2014	SciSearch®: a Cited Reference Science Database

Phase 1 Conformity category	Title	Citation	Abstract
8, 9	Abatement of ozone-recalcitrant micropollutants during municipal wastewater ozonation: Kinetic modelling and surrogate-based control strategies	Cruz-Alcalde, A., et al. (2019). "Abatement of ozone-recalcitrant micropollutants during municipal wastewater ozonation: Kinetic modelling and surrogate-based control strategies." Chemical Engineering Journal 360: 1092-1100.	Although ozonation is nowadays recognized as one of the most efficient technologies for micropollutants abatement in municipal wastewater effluents, several of the compounds potentially present in those waters exhibit a strong resistance to direct ozone oxidation. In addition, the real-time control of the removal process is still challenging. In this work, the abatement of ozone-recalcitrant micropollutants during wastewater ozonation of six different wastewater effluents was explored using the pesticide acetamiprid as hydroxyl radical (OH) probe. By means of this data, the oxidation efficiency (i.e., hydroxyl radical exposure per consumed ozone) could be described by means of a two-stage model based on the ROHO3 concept. This was possible using a semi-continuous bubbling ozone contactor in all experiments, which permitted the inclusion of the ozone mass balance in the model. ROHO3 values of (1.53–7.60)·10 ⁻⁷ s for initial ozonation stage and (0.61–2.95)·10 ⁻⁶ s for the secondary stage were obtained allowing the characterization and comparison of the process performance in a wide range of effluent qualities, including water matrices with a high content of dissolved and particulate organic matter (total organic carbon (TOC), dissolved organic carbon (DOC) and turbidity tested ranges: 6.7–50 mg C L ⁻¹ , 6.6–27.6 mg C L ⁻¹ and 0.3–28.6 NTU, respectively). Finally, a surrogate strategy involving OH exposure estimation by means of ultraviolet absorbance at 254 nm (UVA254) measurements was proposed based on the ROHO3 concept, and by means of its application the removal of atrazine and ibuprofen in six different wastewaters could be rightly predicted (R2 > 0.98).
Toxicology	Abnormal sperm morphology in mouse germ cells after short-term exposures to acetamiprid, propineb, and their mixture	Rasgele PG. Abnormal sperm morphology in mouse germ cells after short-term exposures to acetamiprid, propineb, and their mixture. Arh Hig Rada Toksikol. 2014 Mar;65(1):47-56.	Pesticides are one of the most potent environmental contaminants, which accumulate in biotic and abiotic components of ecosystems. Acetamiprid (Acm), a neonicotinoid insecticide, and Propineb (Pro), a dithiocarbamate fungicide, are widely used to control sucking insects and fungal infections on crops, respectively. The present study was undertaken to investigate the genotoxic effects of these compounds, individually and in mixtures, in mouse germ cells by using the sperm morphology assay. Mice were injected intraperitoneally with 0.625, 1.25, and 2.50 $\mu\text{g mL}^{-1}$ of Acm, 12.5, 25, and 50 $\mu\text{g mL}^{-1}$ of Pro, and their mixture at the same concentrations over 24 and 48 h. Acm did not significantly increase the percentage of abnormal sperm at any concentration. The frequency of abnormal sperm significantly increased after 24 and 48 h of exposure to 50 $\mu\text{g mL}^{-1}$ of Pro. The mixtures of 2.50 $\mu\text{g mL}^{-1}$ of Acm and 50 $\mu\text{g mL}^{-1}$ of Pro induced sperm abnormalities antagonistically both after 24 and 48 h of exposure. Results suggest that Acm was non-genotoxic for mouse germ cells, while Pro may have been a germ cell mutagen due to the observed increase in the frequency of sperm abnormalities. However, to gain better insight into the mutagenicity and DNA damaging potential of both of these pesticides, further studies at molecular level should be done.
Toxicology	Acetamiprid Accumulates in Different Amounts in Murine Brain Regions	H. E. Terayama, et. al. Int J Environ Res Public Health 13, 10, https://www.ncbi.nlm.nih.gov/pubmed/27669271	Neonicotinoids such as acetamiprid (ACE) belong to a new and widely used single class of pesticides. Neonicotinoids mimic the chemical structure of nicotine and share agonist activity with the nicotine acetylcholine receptor (nAChR). Neonicotinoids are widely considered to be safe in humans; however, they have recently been implicated in a number of human health disorders. A wide range of musculoskeletal and neuromuscular disorders associated with high doses of neonicotinoids administered to animals have also been reported. Consequently, we used a mouse model to investigate the response of the central nervous system to ACE treatment. Our results show that exposure to ACE-containing water for three or seven days (decuple and centuple of no observable adverse effect level (NOAEL)/day) caused a decrease in body weight in 10-week old A/JmsSlc (A/J) mice. However, the treatments did not affect brain histology or expression of CD34. ACE concentrations were significantly higher in the midbrain of ACE-treated mice than that of the normal and vehicle groups. Expression levels of alpha7, alpha4, and beta2 nAChRs were found to be low in the olfactory bulb and midbrain of normal mice. Furthermore, in the experimental group (centuple ACE-containing water for seven days), beta2 nAChR expression decreased in many brain regions. Information regarding the amount of accumulated ACE and expression levels of the acetylcholine receptor in each region of the brain is important for understanding any clinical symptoms that may be associated with ACE exposure.
Toxicology	Acetamiprid inhibits testosterone synthesis by affecting the mitochondrial function and cytoplasmic adenosine triphosphate production in rat Leydig cells	Kong, D.Z., et. al. Biol Reprod 96, 1, 254-265 https://www.ncbi.nlm.nih.gov/pubmed/28395332	The insecticide acetamiprid is used to control noxious agricultural pests. However, it can cause mammalian toxicity. We evaluated the reproductive toxicity of acetamiprid in adult male Sprague Dawley rats. Rats were given oral acetamiprid alone or with vitamin E for 35 days. Rat plasma testosterone concentration and sperm quality decreased significantly as the levels of luteinizing hormone (LH) increased after exposure. At the same time, acetamiprid increased malondialdehyde and nitric oxide (NO) levels of Leydig cells. Further analysis showed that acetamiprid reduced the adenosine triphosphate (ATP) and cyclic adenosine monophosphate (cAMP) production of Leydig cells, but the expression of luteinizing hormone/choriogonadotropin receptor (LHCGR) and the activity of adenyl cyclase were not changed. Acetamiprid exposure also significantly diminished protein levels of steroidogenic acute regulatory protein (STAR), hydroxy-delta-5-steroid dehydrogenase, 3 beta- and steroid delta-isomerase cluster (HSD3B), and cytochrome P450, family 11, subfamily a, polypeptide 1 (CYP11A1), and testicular mRNA levels, which are cAMP-dependent proteins that are essential for steroidogenesis. Electron microscopy indicated mitochondrial membrane damage in the Leydig cells of the testes of exposed rats. Vitamin E ameliorated the impairment of acetamiprid on Leydig cells. Our results indicate that acetamiprid causes oxidative stress and mitochondrial damage in Leydig cells and inhibits the synthesis of testicular ATP and cAMP. Acetamiprid disrupts subsequent testosterone biosynthesis by decreasing the rate of conversion of cholesterol to testosterone and by preventing cholesterol from entering the mitochondria within the Leydig cells. These effects caused reproductive damage to the rats.
Toxicology	Acetamiprid, a neonicotinoid insecticide, induced cytotoxicity and genotoxicity in PC12 cells	Annabi, E.B.S., et. al. Toxicol Mech Methods 29, 8, 580-586 https://www.ncbi.nlm.nih.gov/pubmed/31170869	Neonicotinoids are a group of pesticides widely used in agriculture and at home. Among those pesticides, acetamiprid (ACM) is a broad-spectrum insecticide used for the protection of vegetables and fruits from pest. The extensive use of this pesticide had led to contamination of environment including soil, water, as well as food products. However, there are few informations regarding the molecular mechanism by which ACM exerts its cytotoxic and genotoxic effects. The aim of the present study was to investigate the toxic effects of ACM in PC12 cells. We demonstrated that ACM significantly decreased cell viability as assessed by the MTT assay. We also shown that ACM-induced reactive oxygen species (ROS) generation followed by lipid peroxidation as evidenced by an increase in the MDA levels. The increase in cell death was accompanied by a reduction in the mitochondrial membrane potential. Besides, pretreatment with Z-VAD-FMK, a general caspases inhibitor, significantly decreased the ACM-induced cell death. Our results also indicate that ACM induced a concentration-dependent increase in DNA damage as evident by the Comet assay. These data indicate that ACM produces cytotoxicity and DNA damage in mammalian cells. Highlights ACM is cytotoxic toward rat pheochromocytoma adrenal medulla cells (PC12). ACM induces ROS generation, lipid peroxidation, and DNA fragmentation. ACM induces caspase-dependent apoptosis in PC12 cells.
Ecotoxicology	Acute and chronic toxicity of acetamiprid, carbaryl, cypermethrin and deltamethrin to Apis mellifera larvae reared in vitro	Yang, Y.M., et. al. Pest Manag Sci 76, 3, 978-985 https://www.ncbi.nlm.nih.gov/pubmed/31486576	BACKGROUND: The effects of exposing Apis mellifera larvae to common insecticides were tested in the laboratory. RESULTS: The acute toxicity values of the four insecticides that we tested ranged from high toxicity to low toxicity: deltamethrin > cypermethrin > carbaryl > acetamiprid. The NOAEC (no observed adverse effect concentration) values of the chronic toxicity tests for each compound are 5 mg L ⁻¹ for acetamiprid, 2 mg L ⁻¹ for carbaryl, 1 mg L ⁻¹ for cypermethrin, and 0.2 mg L ⁻¹ for deltamethrin. CONCLUSION: According to the risk quotient (RQ) values of acute and chronic toxicity that we obtained, the risk is acceptable at exposure rates that have been identified in the field. Overall, our results are valuable for evaluating the acute and chronic toxicities of these insecticides to developing honey bees. (c) 2019 Society of Chemical Industry.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Acute and chronic toxicity of neonicotinoid and butenolide insecticides to the freshwater amphipod, <i>Hyalella azteca</i>	Bartlett, A.J.H., et. al. <i>Ecotoxicol Environ Saf</i> 175, , 215-223 https://www.ncbi.nlm.nih.gov/pubmed/30901639	Neonicotinoids are the most widely used insecticides in the world. They are preferentially toxic to insects while displaying a low toxicity toward vertebrates, and this selective toxicity has resulted in the rapid and ubiquitous use of these compounds. However, neonicotinoids have been detected in agricultural surface waters and are known to cause adverse effects in non-target aquatic organisms. A wide range of toxicity has been reported for aquatic crustaceans, but most of the studies focus on the acute effects of imidacloprid, and few data are available regarding chronic effects of other neonicotinoids or neonicotinoid replacements (e.g., butenolides). The objective of this study was to assess the acute and chronic toxicity of six neonicotinoids (imidacloprid, thiamethoxam, acetamiprid, clothianidin, thiacloprid, and dinotefuran) and one butenolide (flupyradifurone) to the freshwater amphipod <i>Hyalella azteca</i> . Chronic (28-d), water-only, static-renewal tests were conducted. Survival was assessed weekly, and growth was measured at the end of the exposure. Effects of neonicotinoids varied depending on the compound. Acute (7-d) LC50s were 4.0, 4.7, 60, 68, 230, and 290mg/L for clothianidin, acetamiprid, dinotefuran, thiacloprid, imidacloprid, and thiamethoxam, respectively. Chronic (28-d) survival and growth were reduced at similar concentrations to acute (7-d) survival for thiamethoxam, acetamiprid, clothianidin, and dinotefuran. However, chronic survival and growth of amphipods exposed to imidacloprid and thiacloprid were reduced at lower concentrations than acute survival, with respective 28-d LC50s of 90 and 44mg/L, and EC50s of 4 and 3mg/L. Flupyradifurone was intermediate in toxicity compared to the neonicotinoids: 7-d LC50, 28-d LC50, and 28-d EC50 were 26, 20, and 16mg/L, respectively. The concentrations of imidacloprid and clothianidin reported for North American surface waters fall within the effect ranges observed in this study, indicating the potential for these compounds to cause adverse effects to indigenous populations of <i>H. azteca</i> .
Ecotoxicology	Acute and chronic toxicity tests of systemic insecticides, four neonicotinoids and fipronil, using the tadpoles of the western clawed frog <i>Silurana tropicalis</i>	Saka, M. and N. Tada (2021). "Acute and chronic toxicity tests of systemic insecticides, four neonicotinoids and fipronil, using the tadpoles of the western clawed frog <i>Silurana tropicalis</i> ." <i>Chemosphere</i> 270: 129418.	Extensive use of neonicotinoids and fipronil, which are popular systemic insecticides used in Japanese rice paddies, has raised concerns about their impacts on nontarget aquatic organisms such as amphibians. This study employed premetamorphic tadpoles of <i>Silurana tropicalis</i> and addressed the toxicity of four neonicotinoids (acetamiprid, clothianidin, dinotefuran, and imidacloprid) and fipronil. Acute toxicity tests were conducted under a 96-h semistatic exposure regime and median lethal concentration (LC50) values were calculated at 24-h intervals. All LC50 values of the four neonicotinoids exceeded 100 mg/L, suggesting their low acute toxicity to amphibians. Fipronil yielded much lower LC50 values (3.00–1.34 mg/L) and was highly toxic compared to the four neonicotinoids. Additionally, exposure to fipronil at >1 mg/L induced axial malformations, suggesting its teratogenicity. However, the LC50 values of fipronil were three orders of magnitude higher than the realistic concentrations in paddy water. Chronic toxicity tests were conducted with morphometric, gravimetric, and thyroid-histological endpoints. Premetamorphic tadpoles were exposed to each insecticide at two test concentrations: 0.1 and 1.0 mg/L for the four neonicotinoids; and 1/100 and 1/10 of the 96-h LC50 value for fipronil. Exposure to each insecticide continued until all tadpoles in the control reached late prometamorphic stages or the initial stage of metamorphic climax. At test termination, all insecticides showed no significant differences in any of the endpoints between the respective controls and chemical exposure groups. Overall, our results suggest that these insecticides alone do not directly affect amphibians through their larval stages at concentrations that likely occur in paddy water.
Ecotoxicology	Acute neurotoxicity evaluation of two anticholinesterase insecticides, independently and in mixtures, and a neonicotinoid on a freshwater gastropod	Herbert, L.T.C., et. al. <i>Chemosphere</i> 265, , 129107 https://www.ncbi.nlm.nih.gov/pubmed/33288284	Neurotoxic insecticides are ubiquitous in aquatic ecosystems, frequently as part of complex mixtures. Freshwater gastropods are generally underrepresented in neurotoxicity evaluations and cumulative toxicity testing. This study investigates the behavioural and biochemical effects of acute exposures to the carbamate carbaryl, the organophosphate chlorpyrifos, and the neonicotinoid acetamiprid on the freshwater gastropod <i>Chilina gibbosa</i> . First, we evaluated behavioural neurotoxicity and cholinesterase (ChE), carboxylesterase (CE), and glutathione S-transferase (GST) activities in acute (48h) single-chemical exposures to increasing concentrations of carbaryl (0.5-500 mg L ⁻¹), chlorpyrifos (10-7500 mg L ⁻¹), and acetamiprid (1-10000 mg L ⁻¹). We then studied the effects of acute (48h) exposures to binary mixtures of carbaryl and chlorpyrifos equivalent to 0.5, 1, and 1.5 ChE 48h-IC50. None of the insecticides caused severe behavioural neurotoxicity, except for a significant lack of adherence by 5000 mg L ⁻¹ chlorpyrifos. Carbaryl caused concentration-dependent inhibition of ChEs (NOEC 5 mg L ⁻¹ ; 48h-IC50 45 mg L ⁻¹) and CEs with p-nitrophenyl butyrate as substrate (NOEC 5 mg L ⁻¹ ; 48h-IC50 37 mg L ⁻¹). Chlorpyrifos caused concentration-dependent inhibition of ChEs (NOEC 50 mg L ⁻¹ ; 48h-IC50 946 mg L ⁻¹) but did not affect CEs (NOEC >7500 mg L ⁻¹). Carbaryl-chlorpyrifos mixtures inhibited ChEs additively, inhibited CEs with p-nitrophenyl butyrate, and did not affect behaviour. GST activity was not affected by single or mixture exposures. Acute exposure to acetamiprid did not affect any of the endpoints evaluated. This study provides new information on carbaryl, chlorpyrifos, and acetamiprid toxicity on <i>C. gibbosa</i> , relevant to improve gastropod representation in ecotoxicological risk assessment.
Ecotoxicology	Acute Oral and Contact Toxicity of Three Plant Protection Products to Adult Solitary Bees <i>Osmia bicornis</i>	Mokkapati J S, Wnęk A, Laskowski R, Bednarska AJ. <i>Acute Oral and Contact Toxicity of Three Plant Protection Products to Adult Solitary Bees Osmia bicornis</i> . <i>Polish Journal of Environmental Studies</i> . 2021;30(5):4105-4113. doi:10.15244/pjoes/130516.	Bee pollinators decline worldwide over the last decades mainly due to the widespread use of pesticides. However, the data on wild bee sensitivity to pesticides are scarce. As it may not be possible to stop using pesticides at the moment due to a growing food demand, we need to make every effort to ensure that they are used in a way that do not jeopardize pollinator populations. We tested the toxicity of three agrochemicals, namely Dursban 480 EC with chlorpyrifos as active ingredient (a.i.), Sherpa 100 EC (a.i. cypermethrin), and Mospilan 20 SP (a.i. acetamiprid), to female <i>Osmia bicornis</i> through oral and contact exposures. The estimated LC50s at infinite-time were lower than concentrations recommended for field application for Dursban in both exposure routes, whereas in case of Sherpa and Mospilan the values were lower for oral exposure only. Regardless of the exposure route, high mortality in less than 24 hours was observed in Dursban-treated bees at a fraction of concentration actually used by farmers in the field, indicating high toxicity of this product to <i>O. bicornis</i> . Therefore, some commonly used insecticides may cause unacceptable effects to pollinators even when applied in the field according to recommendations, indicating the urgent need for revising current pesticide usage regulations.
Ecotoxicology	Acute Toxicity of 6 Neonicotinoid Insecticides to Freshwater Invertebrates	Raby, M.N., et. al. <i>Environ Toxicol Chem</i> 37, 5, 1430-1445 https://www.ncbi.nlm.nih.gov/pubmed/29336495	Neonicotinoids are a group of insecticides commonly used in agriculture. Due to their high water solubility, neonicotinoids can be transported to surface waters and have the potential to be toxic to aquatic life. The present study assessed and compared the acute (48- or 96-h) toxicity of 6 neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, and thiamethoxam) to 21 laboratory-cultured and field-collected aquatic invertebrates spanning 10 aquatic arthropod orders. Test conditions mimicked species' habitat, with lentic taxa exposed under static conditions, and lotic taxa exposed under recirculating systems. Median lethal concentrations (LC50s) and median effect concentrations (EC50s; immobility) were calculated and used to construct separate lethal- and immobilization-derived species sensitivity distributions for each neonicotinoid, from which 5th percentile hazard concentrations (HC5s) were calculated. The results showed that the most sensitive invertebrates were insects from the orders Ephemeroptera (Neocleleon triangulifer) and Diptera (<i>Chironomus dilutus</i>), whereas cladocerans (<i>Daphnia magna</i> , <i>Ceriodaphnia dubia</i>) were the least sensitive. The HC5s were compared with neonicotinoid environmental concentrations from Ontario (Canada) monitoring studies. For all neonicotinoids except imidacloprid, the resulting hazard quotients indicated little to no hazard in terms of acute toxicity to aquatic communities in Ontario freshwater streams. For the neonicotinoid imidacloprid, a moderate hazard was found when only invertebrate immobilization, and not lethality, data were considered. <i>Environ Toxicol Chem</i> 2018;37:1430-1445. (c) 2018 SETAC.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Acute toxicity, accumulation and sublethal effects of four neonicotinoids on juvenile Black Tiger Shrimp (<i>Penaeus monodon</i>)	Butcherine, P.K., et. al. Chemosphere 275, , 129918 https://www.ncbi.nlm.nih.gov/pubmed/33639551	Neonicotinoid pesticides have been detected in aquatic habitats, and exposure may impact the health of aquatic organisms such as commercially-important crustaceans. Black Tiger Shrimp (<i>Penaeus monodon</i>) is a broadly distributed and high-value shrimp species that rely on estuaries for early life stages. Differences in the acute toxicity and accumulation of different neonicotinoids in tissues of commercial crustaceans have not been widely investigated. This study compared acute toxicity, uptake, and depuration of four neonicotinoids; thiamethoxam, clothianidin, acetamiprid, and imidacloprid, on juvenile <i>P. monodon</i> and their effects on enzyme biomarkers. Acute toxicity (48-h LC50) was determined as 190 µg L ⁻¹ (clothianidin), 390 µg L ⁻¹ (thiamethoxam), 408 µg L ⁻¹ (imidacloprid), and >500 µg L ⁻¹ (acetamiprid). To assess uptake and elimination, shrimp were exposed to a fixed 5 µg L ⁻¹ water concentration for eight days (uptake) or four days of exposure followed by four days of depuration (elimination). Neonicotinoid water and tissue concentrations were measured by liquid chromatography-mass spectrometry following solid-phase extraction and QuEChERS extraction respectively. The lower toxicity associated with acetamiprid could be associated with lower accumulation in the tissue, with concentrations remaining below 0.01 µg g ⁻¹ . The activity of acetylcholinesterase, catalase and glutathione S-transferase in abdominal tissues was determined by spectrophotometric assay, with significant sublethal effects detected for all four neonicotinoids. Depuration reduced the tissue concentration of the active ingredient and reduced the activity of oxidative stress enzymes. Given acetamiprid showed no acute toxicity and reduced impact on the enzymatic activity of <i>P. monodon</i> , it may be an appropriate alternative to other neonicotinoids in shrimp producing areas.
8,9	Adsorption of acetamiprid, chlorantraniliprole and flubendiamide on different type of microplastics present in alluvial soil	Sunta, U.P., et. al. Chemosphere 261, , 127762 https://www.ncbi.nlm.nih.gov/pubmed/32738715	The presence of microplastics (MPs) and their effects have been widely investigated in the aquatic environment, whereas the research done in the terrestrial environment is incomparably lacking. MPs are considered a pollutant in soil on agricultural land, where they can act as a vector for other pollutants, namely organic chemical compounds, such as pesticides. In soil, presence of MPs is affecting the growth and life of microorganisms in it. The interactions between two types of MPs and three pesticides in the mixture with alluvial soil were studied. Adsorption of acetamiprid, chlorantraniliprole and flubendiamide in concentrations of 1, 5 and 10 mg L ⁻¹ onto polyester fibres and polypropylene particles of 0.5-1 mm size was studied at 1% and 5% (w/w) of their content in soil. Results showed that the adsorption of pesticides was dependent on their octanol/water partition coefficient, with the most highly adsorbed pesticide also being the most hydrophobic, regardless of the type and form of MPs. Adsorption of pesticides onto MP particles was confirmed in soil-MPs mixtures with 5% polypropylene and 5% polyester at all tested pesticides' concentrations, proving that MPs in soil systems act as carriers to pollutants. MPs in soil decreased the soil's intrinsic capacity to retain pesticides, indicating the possibility of a greater mobility of pesticides on MPs through the soil system.
4,8,9	Alcohol ethoxylates significantly synergize pesticides than alkylphenol ethoxylates considering bioactivity against three pests and joint toxicity to <i>Daphnia magna</i>	Li BX, Pang XY, Zhang P, Lin J, Li XX, Liu Y, Li H, Liu F, Mu W. Alcohol ethoxylates significantly synergize pesticides than alkylphenol ethoxylates considering bioactivity against three pests and joint toxicity to <i>Daphnia magna</i> . Sci Total Environ. 2018 Dec 10;644:1452-1459	Seeking alternatives for alkylphenol ethoxylates (APEOs) have been a heavily researched topic in the surfactant industry and agricultural systems. In this study, the combined effects of different ethoxylates and pesticides on the bioactivity against three pests and toxicological risks to <i>Daphnia magna</i> were investigated. Results showed that alcohol ethoxylates (AEOs) had higher synergistic effects on the bioactivity of pesticides against <i>Spodoptera exigua</i> , <i>Agrotis ipsilon</i> and <i>Aphis citricola</i> than did APEOs. In terms of the joint toxicity of the ethoxylates and pesticides to <i>D. magna</i> , additive index method, toxicity unit method, V value method and isobologram method were used in the tests. All of these methods indicated that the joint effects of APEOs + acetamiprid and APEOs + indoxacarb upon <i>D. magna</i> turned from synergism to antagonism with the increasing EO (ethylene oxide) numbers. Those of AEOs exhibited similar trends. Overall, AEOs may be potential alternatives for APEOs in agriculture as they synergize pesticides against three pests significantly more than do APEOs. However, further research should investigate the compounds' environmental risks to aquatic organisms because the AEOs were highly toxic to <i>D. magna</i> .
3	Alternatives to neonicotinoids	Jactel H, Verheggen F, Thiéry D, Escobar-Gutiérrez AJ, Gachet E, Desneux N; Neonicotinoids Working Group. Alternatives to neonicotinoids. Environ Int. 2019 Aug;129:423-429.	The European Food Safety Authority concluded in February 2018 that "most uses of neonicotinoid insecticides represent a risk to wild bees and honeybees". In 2016, the French government passed a law banning the use of the five neonicotinoids previously authorized: clothianidin, imidacloprid, thiamethoxam, acetamiprid and thiacloprid. In the framework of an expert assessment conducted by the French Agency for Food, Environmental and Occupational Health and Safety to identify possible derogations, we performed a thorough assessment of the available alternatives to the five banned neonicotinoids. For each pest targeted by neonicotinoids use, we identified the main alternative pest management methods, which we then ranked for (i) efficacy for controlling the target pest, (ii) applicability (whether directly useable by farmers or in need of further research and development), (iii) durability (risk of resistance in targeted pests), and (iv) practicability (ease of implementation by farmers). We identified 152 authorized uses of neonicotinoids in France, encompassing 120 crops and 279 pest insect species (or genera). An effective alternative to neonicotinoids use was available in 96% of the 2968 case studies analyzed from the literature (single combinations of one alternative pest control method or product × one target crop plant × one target pest insect). The most common alternative to neonicotinoids (89% of cases) was the use of another chemical insecticide (mostly pyrethroids). However, in 78% of cases, at least one non-chemical alternative method could replace neonicotinoids (e.g. microorganisms, semiochemicals or surface coating). The relevance of non-chemical alternatives to neonicotinoids depends on pest feeding habits. Leaf and flower feeders are easier to control with non-chemical methods, whereas wood and root feeders are more difficult to manage by such methods. We also found that further field studies were required for many promising non-chemical methods before their introduction into routine use by farmers. Our findings, transmitted to policymakers, indicate that non-chemical alternatives to neonicotinoids do exist. Furthermore, they highlight the need to promote these methods through regulation and funding, with a view to reducing pesticide use in agriculture.
8,9	Ameliorative role of ascorbic acid on the oxidative stress and genotoxicity induced by acetamiprid in Nile tilapia (<i>Oreochromis niloticus</i>)	Environ Sci Pollut Res Int 28, 39, 55089-55101 https://www.ncbi.nlm.nih.gov/pubmed/34121161	On juveniles of <i>Oreochromis niloticus</i> , the protective potential of ascorbic acid (Asc) against oxidative stress and genotoxicity induced by acetamiprid (Aceta) sub-lethal concentrations was investigated in this study. Fishes were divided into six groups and exposed to either Asc (50 ppm), 10 and 20 ppm Aceta, 10 ppm (Aceta)+Asc, 20 ppm (Aceta)+Asc, or the unexposed control group. Superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPX) activities and their transcripts were assessed. DNA damage in erythrocytes, hepatocytes, and gill cells, in addition to the mitotic index (MI), and the existence of erythrocytic nuclear abnormalities (ENAs) were performed. The results showed that concentrations of Aceta (10 and 20 ppm) induced oxidative stress by altering the antioxidant enzyme activities and transcripts. There were genotoxic effects of Aceta exposure showed by the significant ($P < 0.05$) increase in DNA-damaged cells and ENA, meanwhile a decrease in MI. Co-exposure with Asc showed significant alleviations of oxidative status and genotoxicity. Thus, results suggest that Asc-combined exposure could be the effective treatment against Aceta-induced oxidative stress accompanied with genotoxicity in <i>O. niloticus</i> .
5	Analysis of 52 pesticides in fresh fish muscle by QuEChERS extraction followed by LC-MS/MS determination	H. M. R. S. Hathout, et. al. Sci Total Environ 653, , 958-967 https://www.ncbi.nlm.nih.gov/pubmed/30759621	Pesticide pollution in water has been well described; however, little is known on pesticide accumulation by aquatic organisms, and to date, most studies in this line have been focused on persistent organochlorine pesticides. For this reason, a method based on QuEChERS extraction and subsequent liquid chromatography-tandem mass spectrometry (LC-MS/MS) analysis has been developed and validated for the determination of 52 medium to highly polar pesticides in fresh fish muscle. Target pesticides were selected on the basis of use and occurrence in surface waters. Quantification is carried out following an isotope dilution approach. The method developed is satisfactory in terms of accuracy (relative recoveries between 71 and 120%), precision (relative standard deviations below 21%) and sensitivity (limits of determination in the pg/g or low ng/g f.w. range for most compounds). The application of the validated methodology to fish specimens collected from the Adige River (Italy) revealed the presence of trace levels of diazinon, dichlorvos and diuron, and measurable levels of metolachlor, quinoxifen, irgarol, terbutryn, and acetamiprid, but in all cases at concentrations below the default maximum residue level of 10ng/g established for pesticides not specifically regulated in fish intended for human consumption. Metolachlor and quinoxifen were both the most ubiquitous and abundant pesticides, in agreement with their high potential for bioaccumulation. Both are toxic to aquatic organisms, and therefore, their potential effects on aquatic ecosystems should be further explored.

Phase 1 Conformity category	Title	Citation	Abstract
5	Analysis of neonicotinoids from plant material by desorption atmospheric pressure photoionization-mass spectrometry	A. S. Vaikkinen, et. al. Rapid Commun Mass Spectrom 29, 5, 424-30 https://www.ncbi.nlm.nih.gov/pubmed/26349464	RATIONALE: Neonicotinoids are widely used insecticides which have been shown to affect the memory and learning abilities of honey bees, and are suspected to play a part in the unexplainable, large-scale loss of honey bee colonies. Fast methods, such as ambient mass spectrometry (MS), for their analysis from a variety of matrices are necessary to control the use of forbidden products and study the spreading of insecticides in nature. METHODS: The feasibilities of two ambient MS methods, desorption electrospray ionization (DESI) and desorption atmospheric pressure photoionization (DAPPI), for the analysis of five most used neonicotinoid compounds, thiacloprid, acetamiprid, clothianidin, imidacloprid and thiamethoxam, were tested. In addition, DAPPI was used to analyze fresh rose leaves treated with commercially available thiacloprid insecticide and dried and powdered turnip rape flowers, which had been collected from a field treated with thiacloprid-containing insecticide. RESULTS: DAPPI was found to be more sensitive than DESI, with 2-11 times better signal-to-noise ratios, and limits of detection at 0.4-5.0 fmol for the standard compounds. DAPPI was able to detect thiacloprid from the rose leaves even 2.5 months after the treatment and from the turnip rape flower samples collected from a field. The analysis of plant material by DAPPI did not require extraction or other sample preparation. CONCLUSIONS: DAPPI was found to be suitable for the fast and direct qualitative analysis of thiacloprid neonicotinoid from plant samples. It shows promise as a fast tool for screening of forbidden insecticides, or studying the distribution of insecticides in nature.
4	Analysis of seasonal and annual field-evolved insecticide resistance in populations of Thrips hawaiiensis in banana orchards	Fu, B., Qiu, H., Li, Q. et al. Analysis of seasonal and annual field-evolved insecticide resistance in populations of Thrips hawaiiensis in banana orchards. J Pest Sci 92, 1293–1307 (2019).	Every season over the past decade, efficacious thrips insecticides have been commonly applied for control of Thrips hawaiiensis on banana crops in China. For effective thrips control, some insecticides have been used extensively against the thrips in numerous banana plantations. This study aims to examine the current resistance status and the dynamics regarding the changing frequencies of resistance in the field T. hawaiiensis populations. A total of 13 field samples from banana orchards (Chengmai, Lingao, Dongfang and Ledong located in Hainan Province, China) were collected monthly in 2014 to 2017, and selected individuals were used in bioassays assessing insecticide resistance and metabolic enzyme activity compared to a laboratory-susceptible strain. In 2014, the initial resistance survey found that all sampled populations were susceptible to spirotetramat and cyantraniliprole, while Lingao and Chengmai population showed a moderate resistance to imidacloprid, acetamiprid, abamectin and spinetoram. Further, seasonal and annual analysis of resistance dynamics with imidacloprid, abamectin and spinetoram demonstrated that resistance in field populations of T. hawaiiensis developed quickly within a season (from April to August 2016), but resistance was unstable over subsequent seasons (April 2015, 2016 and 2017). Moreover, synergism experiments using enzyme inhibitors together with metabolic enzyme assays revealed that field-evolved insecticide resistance in T. hawaiiensis was closely associated with the elevated metabolic enzymes. The observed resistance increase within a season was attributed mainly to the intense use of these insecticides and short generation time of thrips. These findings suggest that a rotation system using efficacious thrips insecticides should be implemented for sustainable thrips control to reduce the potential of resistance development.
5	Anti-Agglomeration Behavior and Sensing Assay of Chlorsulfuron Based on Acetamiprid-Gold Nanoparticles	G. Z. Liu, et. al. Nanomaterials (Basel) 8, 7, https://www.ncbi.nlm.nih.gov/pubmed/29986430	Monitoring of low levels of chlorsulfuron in environmental water samples is important. Although several detection methods have been developed, they all have some drawbacks, such as being time-consuming, requiring expensive instruments and experienced operators, and consuming large volumes of organic solvents. There is an urgent need for a simple, rapid, and inexpensive detection method for chlorsulfuron. Herein, such a method was developed using anti-aggregation of gold nanoparticles (AuNPs) in the presence of acetamiprid in agricultural irrigation water samples. Aggregation of the AuNPs was induced by acetamiprid, and this produced a distinct color change from Bordeaux red to blue. However, the strong hydrogen bonding interaction between chlorsulfuron and acetamiprid could inhibit AuNP aggregation. The effect of chlorsulfuron on the anti-agglomeration behavior of AuNPs was monitored by ultraviolet(-)visiblespectroscopy (UV-Vis) and the naked eye over a concentration range 0.1(-)100 mg/L. The detection limit for chlorsulfuron was 0.025 mg/L (signal-to-noise ratio of three). This colorimetric method was successfully applied to the determination of chlorsulfuron in spiked tap water and agricultural irrigation water with satisfactory recoveries (76.3%(-)94.2%).
8,9	Antioxidant, histopathological and biochemical outcomes of short-term exposure to acetamiprid in liver and brain of rat: The protective role of N-acetylcysteine and S-methylcysteine	N. S. Khovarnagh, B. Saudi Pharm J 29, 3, 280-289 https://www.ncbi.nlm.nih.gov/pubmed/33981177	The present study was conducted to investigate the protective effects of N-Acetyl-L-cysteine (NAC) and S-methyl-L-cysteine (SMC) against hepatic oxidative stress and brain damage induced by acetamiprid (ACP) in rats, which were evaluated by histopathological changes, measuring serum biomarkers and antioxidant defense systems. In this study, 42 rats were randomly divided into 6 groups and administered by intraperitoneally for one week: the control group, the sham group (normal saline), ACP alone (5 mg/kg) (group1), NAC alone (160 mg/kg) (group2), ACP + SMC (100 mg/kg) (group3), ACP + NAC (group 4) and ACP + NAC + SMC (group 5). Our results showed that acetamiprid induces liver injuries including infiltration of inflammatory cells, congestion and altered histomorphology and brain damages including gliosis, hyperemia and necrosis. The biochemical analyses showed that acetamiprid significantly altered the structural and biochemical profiles of liver which may be due to the loss of integrity of cell membranes. Furthermore, antioxidant parameters results of ACP group revealed that glutathione (GSH) and total antioxidant capacity (TAC) levels decreased significantly, while lipid peroxidation (LPO) content and glutathione-S-transferase (GST) and catalase (CAT) activities increased in both tissues (P < 0.05), suggesting tissue oxidative damage, which was also confirmed histopathological. Conversely, administration of NAC and SMC ameliorated LPO, GSH content and antioxidant enzymes system considerably (P < 0.05) in both tissues. Moreover, NAC and SMC administration also improved liver and brain malfunction. These results indicate that both NAC and in to a lesser amount SMC have a potent antioxidant protection in both tissues of rat against ACP-induced oxidative stress.
8,9	Apis cerana Is Less Sensitive to Most Neonicotinoids, Despite of Their Smaller Body Mass	Yue M, Luo S, Liu J, Wu J. Apis cerana Is Less Sensitive to Most Neonicotinoids, Despite of Their Smaller Body Mass. J Econ Entomol. 2018 Feb 9;111(1):39-42.	Multiple stressors and interaction between them may be responsible for the decline of global pollinators. Among them, exposure to neonicotinoids has been getting more attention and has been considered as a main stressor. The Western honey bee (<i>Apis mellifera</i> L.) (Hymenoptera: Apidae) and Chinese indigenous honey bee (<i>Apis cerana</i> F.) (Hymenoptera: Apidae) are two managed honey bee species in China. These two species are widely used in beekeeping, and many wild <i>A. cerana</i> is widely spread in forests and contributes to the ecosystem. It is predicated that <i>A. cerana</i> is more sensitive to insecticides than <i>A. mellifera</i> due to their smaller mass. Here, we found that although the body mass of <i>A. cerana</i> is significantly lower than <i>A. mellifera</i> , the sensitivity of the two species to neonicotinoids are not associated with their body mass but depended on the chemical structure of neonicotinoids. To dinotefuran, the two species showed the similar sensitivity. To acetamiprid, <i>A. mellifera</i> was less sensitive than <i>A. cerana</i> . However, to imidacloprid and thiamethoxam, <i>A. mellifera</i> was more sensitive than <i>A. cerana</i> . These results suggested that the sensitivity of honey bees to neonicotinoids is closely associated with the structure of pesticides, but not with body mass of bees. It is also indicated that the hazards of pesticides to the different pollinators could not be inferred from one species to another.
5	Application of Box-Behnken design to optimize multi-sorbent solid phase extraction for trace neonicotinoids in water containing high level of matrix substances	J. W. Zhang. Talanta 170, , 392-398 https://www.ncbi.nlm.nih.gov/pubmed/28501186	Extensive use of neonicotinoid insecticides has raised great concerns about their ecological risk. A reliable method to measure trace neonicotinoids in complicated aquatic environment is a premise for assessing their aquatic risk. To effectively remove matrix interfering substances from field water samples before instrumental analysis with HPLC/MS/MS, a multi-sorbent solid phase extraction method was developed using Box-Behnken design. The optimized method employed 200mg HLB/GCB (w/w, 8/2) as the sorbents and 6mL of 20% acetone in acetonitrile as the elution solution. The method was applied for measuring neonicotinoids in water at a wide range of concentrations (0.03-100mg/L) containing various amounts of matrix components. The recoveries of acetamiprid, imidacloprid, thiacloprid and thiamethoxam from the spiked samples ranged from 76.3% to 107% while clothianidin and dinotefuran had relatively lower recoveries. The recoveries of neonicotinoids in water with various amounts of matrix interfering substances were comparable and the matrix removal rates were approximately 50%. The method was sensitive with method detection limits in the range of 1.8-6.8ng/L for all target neonicotinoids. Finally, the developed method was validated by measurement of trace neonicotinoids in natural water.

Phase 1 Conformity category	Title	Citation	Abstract
5	Application of liquid chromatography quadrupole time-of-flight mass spectrometry to the identification of acetamiprid transformation products generated under oxidative processes in different water matrices	C. A. Sirtori, et. al. Anal Bioanal Chem 406, 11, 2549-58 https://www.ncbi.nlm.nih.gov/pubmed/24577576	This work allowed the identification of major transformation products (TPs) of acetamiprid (ACTM) during Fenton process. Acetamiprid is a chloronicotinoid insecticide widely used around the world for its characteristics (high insecticidal activity, good systemic properties, suitable field stability, etc.). The degradation of the parent molecule and the identification of the main TPs were evaluated in different water matrices (demineralized water and real agro-food industrial wastewater). TPs of acetamiprid generated by Fenton experiments were monitored and identified by liquid chromatography quadrupole time-of-flight tandem mass spectrometry (LC-QTOF-MS/MS). Up to 14 TPs were characterized based on the accurate mass of the molecular ion and fragment ions obtained in both full-scan and MS/MS modes. Most of them were eliminated after 75 min of treatment time in demineralized water. However, in real agro-food industrial wastewater, most of them were eliminated at 90 min of treatment time, demonstrating the influence of the matrix composition on the studied compound degradation.
5	Aptamer-based Resonance Light Scattering for Sensitive Detection of Acetamiprid	C. C. Wang, et. al. Anal Sci 32, 7, 757-62 https://www.ncbi.nlm.nih.gov/pubmed/27396657	In this work, an aptasensor-based resonance light-scattering (RLS) method was developed for the sensitive and selective detection of acetamiprid. The ABA (acetamiprid binding aptamer)-stabilized gold nanoparticles (ABA-AuNPs) were used as a probe. Highly specific single-strand DNA (ssDNA, i.e. aptamers) that bind to acetamiprid with high affinity were employed to discriminate other pesticides, such as edifenphos, kanamycin, metribuzin et. al. The sensing approach is based on a specific interaction between acetamiprid and ABA. Aggregation of AuNPs was specifically induced by the desorption of the ABA from the surface of AuNPs, which caused the RLS signal intensity to be enhanced at 700 nm. The alteration of AuNPs' aggregation has been successfully optimized by controlling several conditions. Under the optimal conditions, the RLS intensity changes (I/I ₀) of AuNPs were linearly correlated with the acetamiprid concentration in the range of 0 - 100 nM. The detection limit is 1.2 nM (3sigma). This method had also been used for acetamiprid detection in lake water samples.
Ecotoxicology	Aquatic toxicity and loss of linear alkylbenzenesulfonates alone and in a neonicotinoid insecticide formulation in surface water	M. T. Mortl, et. al. Sci Total Environ 652, 780-787 https://www.ncbi.nlm.nih.gov/pubmed/30380485	Substance losses of linear alkylbenzene sulfonates (LASs) in a neat surfactant mixture, in an insecticide formulation Mospilan 20 SG, and in solutions with different neonicotinoid active ingredients (AIs) was studied in distilled water and in surface water samples originated from River Danube. Analytical measurements were performed both by HPLC-UV and commercial ELISA methods. Loss rates of LASs were found different in these aqueous matrices, with decomposition rates higher for the neat surfactant mixture than for Mospilan 20 SG (nearly 2- and 9-fold in distilled water and in surface water from River Danube, respectively). Half-lives determined in surface water from River Danube were shown to be affected by the presence of neonicotinoid AIs thiacloprid>imidacloprid>acetamiprid (ACE), while clothianidin and thiamethoxam did not affect LAS decomposition. Aquatic toxicity of Mospilan 20 SG, along with that of its AI ACE and co-formulant LAS, as well as the mixture of ACE and LAS was also investigated in the 48-h acute immobilisation assay on the water flea (<i>Daphnia magna</i>) aquatic indicator organism. LAS appeared to be significantly (8-fold) more toxic in the <i>D. magna</i> test than ACE, and the toxicity of the formulated insecticide was found to be 1.3 and 19.6 times higher than explained by its AI and LAS content, respectively, indicating synergistic toxicity. The strongest synergy between ACE and LASs was observed, when the neat forms of the two substances were applied in combination at concentrations equivalent to those in Mospilan 20 SG.
13	Architecting neonicotinoid-scavenging nanocomposite hydrogels for environmental remediation	Alammar, A., et al. (2020). "Architecting neonicotinoid-scavenging nanocomposite hydrogels for environmental remediation." Applied Materials Today 21: 100878.	The ubiquitous presence of neonicotinoid insecticides in the environment poses potential health concerns across all biomes, aquatic systems, and food chains. This global environmental challenge requires robust, advanced materials to efficiently scavenge and remove these harmful neonicotinoids. In this work, we engineered nanocomposite hydrogels based on sustainable cellulose acetate for water treatment. The nanocomposite hydrogels were incorporated with small quantities of polymers of intrinsic microporosity (PIM-1) and graphene oxide (GO). We prepared the hydrogels using green solvents such as Cyrene and MeTHF via simple dropwise phase inversion. High adsorption capacity and fast kinetic behavior toward acetamiprid, clothianidin, dinotefuran, imidacloprid, and thiamethoxam were observed. We also developed a rapid and sustainable ultrasound-assisted regeneration method for the hydrogels. Molecular dynamics of the complex quaternary system revealed the synergistic effects of the components, and the presence of PIM-1 was found to increase the GO surface area available for neonicotinoid scavenging. We demonstrated the robustness and practicality of the nanocomposites in continuous environmental remediation by using the hydrogels to treat contaminated groundwater from the Adyar river in India. The presented methodology is adaptable to other contaminants in both aqueous environments and organic media.
4	Are there viable chemical and non-chemical alternatives to the use of conventional insecticides for the protection of young trees from damage by the large pine weevil <i>Hylobius abietis</i> L. in UK forestry?	Ian H Willoughby, Roger Moore, Andrew J Moffat, Jack Forster, Imam Sayyed, Kerstin Leslie, Are there viable chemical and non-chemical alternatives to the use of conventional insecticides for the protection of young trees from damage by the large pine weevil <i>Hylobius abietis</i> L. in UK forestry?, Forestry: An International Journal of Forest Research, Volume 93, Issue 5, October 2020, Pages 694–712	In UK forestry, the synthetic pyrethroid insecticides alpha-cypermethrin and cypermethrin have been used for many years to provide protection for young trees planted on restock sites from damage by the large pine weevil, <i>Hylobius abietis</i> L. However, concerns over the toxicity of these insecticides to aquatic life if misused have led to a search for alternative forms of protection. This paper describes a detailed programme of efficacy experiments undertaken between 2009 and 2015 to find replacements for these products. Over 50 combinations of chemical and non-chemical approaches were tested on 16 different sites. Of the alternative synthetic insecticides tested, applications of 0.037 g a.i. stem – 1 acetamiprid provided high levels of protection from <i>Hylobius</i> browsing damage on young Sitka spruce (<i>Picea sitchensis</i> (Bong.) Carrière) trees, without causing any phytotoxic symptoms, and gave comparable levels of protection to those achievable using alpha-cypermethrin or cypermethrin. Acetamiprid is less toxic to aquatic life than alpha-cypermethrin or cypermethrin and has not been linked to bee decline. Applications of 0.0129 g a.i. stem – 1 chlorantraniliprole also showed promise, and this relatively low toxicity non-neonicotinoid insecticide merits further study. Although imidacloprid and thiacloprid also provided good levels of protection, their use in forests is not now permitted due to concerns over their potential impacts on bees and drinking water, respectively. Whilst the natural product insecticide spinosad, and the entomopathogenic fungal control agent <i>Metarhizium anisopliae</i> (Metschn.) Sorokin, gave only limited protection in our work, they may have some future potential if methods of deployment can be improved. Other chemical and non-chemical approaches tested, but found to be largely ineffective in UK conditions, included the natural product insecticides azadirachtin, maltodextrin and pyrethrins, the synthetic insecticides lambda-cyhalothrin and spirotetramat and a wide range of repellents, flexible stem coatings and physical barrier products. However, we conclude that physical barrier sleeves such as MultiPro® and BioSleeve® may have a limited role as a partial substitute for the use of insecticides in the UK in some circumstances, but only if on-site populations of <i>Hylobius</i> are predicted to be low.
5	Assessing washing methods for reduction of pesticide residues in Capia pepper with LC-MS/MS	B. T. Polat, O. J Environ Sci Health B 55, 1, 44206 https://www.ncbi.nlm.nih.gov/pubmed/31522655	The effects of washing treatments on removal rates of some pesticides residues (acetamiprid, chlorpyrifos and formetanate hydrochloride) on pepper were investigated. Method verification was conducted through spiking pepper samples at 0.1, 1.0 and 10.0 x MRL. QuEChERS method produced average recovery of 104.91% with relative standard deviation (RSD) of 13.41%. LOQ values of acetamiprid, chlorpyrifos and formetanate hydrochloride were estimated as 2, 10 and 5 microg/kg, respectively. Capia peppers grown in open fields were sprayed three times with pesticides. Peppers were harvested after 1st, 2nd and 3rd day of the treatments. Then the peppers were subjected to tap water, acetic acid and citric acid washing and ultrasonic cleaning treatments (for 2 and 5 min). Based on three different harvest times and two different washing durations, processing factors (PFs) and reduction rates were calculated for each washing treatment. The residues gradually decreased during washing treatments with increasing process duration. Similarly, a gradual reduction was noted with the progress of harvest times. This in turn corresponded to an increase in PF. Ultrasonic cleaning and citric acid (9%) washing were more effective than the others. Non-systemic pesticides (chlorpyrifos) were more readily removed than the systemic ones (acetamiprid). Similarly, highly soluble pesticides exhibited higher reduction.

Phase 1 Conformity category	Title	Citation	Abstract
Toxicology	Assessment of acetamiprid-induced genotoxic effects in bone marrow cells of Swiss albino male mice	P. J. Bagri, S. K. Drug Chem Toxicol 42, 4, 357-363 https://www.ncbi.nlm.nih.gov/pubmed/29405074	Acetamiprid (ACE), a neonicotinoid insecticide, is widely used in agriculture either alone or in combination with other insecticides. A combined approach employing micronucleus test (MNT) and chromosomal aberrations (CA) assay was utilized to assess the genotoxic effects of ACE in bone marrow of Swiss albino male mice. Acetamiprid was administered i.p. daily at 4.6 and 2.3 mg/kg/day along with 3% gum acacia as negative control for 60 and 90 days and cyclophosphamide (50 mg/kg b.wt.) as positive control. ACE treatment resulted in a dose-dependent increase in the frequencies of micronuclei per cell and chromosomal aberrations in bone marrow cells. The increased micronuclei formation in total erythrocyte cells (immature PCEs and mature NCEs) was observed only at higher dose level (4.6 mg/kg b.wt.) administered for 90 days. The test also indicated the cytotoxic effect of higher dose level of pesticide by PCE/NCE ratio. The number of chromosomal aberrations were increased in the pesticide treated group compared to the negative control group, although significant increase was observed only in the group exposed to higher dose level of pesticide for both 60 and 90 days. Thus, daily exposure of ACE at a dose level of 4.6 mg/kg body weight for 60 and 90 days caused genotoxic and cytotoxic effects on the somatic cells of Swiss albino male mice.
1	Assessment of Distribution Characteristics and Contamination with Heavy Metals in Surface Sediments of Lake Chaohu, China	Huo, S., et al. (2014). "ASSESSMENT OF DISTRIBUTION CHARACTERISTICS AND CONTAMINATION WITH HEAVY METALS IN SURFACE SEDIMENTS OF LAKE CHAOHU, CHINA." Environmental Engineering and Management Journal 13: 669-680.	The distribution and fractionation of nine heavy metals (Cr, Co, Ni, Cu, Cd, Zn, V, Pb and As) in the sediments of Lake Chaohu, a shallow eutrophic lake, were investigated using the BCR sequential extraction procedure. The level of pollution attributed to these nine heavy metals was evaluated employing the potential ecological risk index (RI) and geoaccumulation index (Igeo). Metal concentrations in sediments ranged from 65.00–104.00 for Cr, 14.50–21.70 for Co, 28.50–50.90 for Ni, 25.40–51.30 for Cu, 0.30–1.27 for Cd, 96.80–436.00 for Zn, 89.00–126.00 for V, 37.80–102.00 for Pb and 9.63–16.61 for As. Cr, As, Ni, V and Cu were present mainly in the residual fraction, with proportions of 73.75%, 73.54%, 67.80%, 73.24% and 59.46%, respectively, while Co, Pb, Zn and Cd were associated with the non-residual fractions (soluble, reducible and oxidizable fractions) dominantly, with total non-residual fraction proportions of 56.54%, 70.97%, 65.55% and 91.6%, respectively. The results of correlations analysis between different heavy metals showed that the heavy metals studied have different origins and distributions, which were divided into five categories: (1) Cu, Zn and Ni, (2) Co and V, (3) Pb and Cd, (4) Cr and (5) As. The rank order of potential ecological risk indices for these heavy metals was Cd> As> Pb> Co> Cu> Ni> Zn> V> Cr. Cd had high potential ecological risk and contributed the most to the potential ecological risk index as compared to the other heavy metals. The Igeo values suggested "unpolluted" levels for Cr, V, As and Ni (mean Igeo< 0), "unpolluted to moderately polluted" levels for Co, Cu, Zn and Pb (0< mean Igeo <1), and "moderately polluted" levels for Cd (1< mean Igeo <2).
Epidemiology	Assessment of human exposure to pesticides by hair analysis: The case of vegetable-producing areas in Burkina Faso	E. O. Lehmann, C, et. al. Environ Int 111, , 317-331 https://www.ncbi.nlm.nih.gov/pubmed/29128258	The present work assesses human exposure to pesticides in vegetable-producing areas in Burkina Faso, using hair as an indicator. The study design includes a comparison between operators who are occupationally exposed while working in the fields and a reference population (i.e. not occupationally exposed) to evaluate both occupational and indirect exposures. Hair samples from volunteers (n=101) were positive for 17 pesticides (38 analyzed). Acetamiprid, desethylatrazine, carbofuran, and deltamethrin were detected for the first time in field samples. With a maximum of 9 residues per sample, pesticide exposure was ubiquitous in both populations. Contamination by acetamiprid, cypermethrin, and lambda-cyhalothrin (used in vegetable production) prevailed in operator samples. For other pesticides, such as imidacloprid and deltamethrin, no significant difference was found. This indicates a potentially large environmental exposure (dietary intake or atmospheric contamination) or the prevalence of other contamination sources. The present findings are concerning, as detected levels are globally higher than those previously reported, and indicate exposure to endocrine disrupting chemicals and probable carcinogens. Hair was found to be a suitable matrix for biomonitoring human exposure to pesticides and assessing dominant factors (i.e. sex, age, and protective equipment) in subgroups, as well as identifying geographical contamination patterns.
1,8,9	Assessment of imidacloprid related exposure using imidacloprid-olefin and desnitro-imidacloprid: Neonicotinoid insecticides in human urine in Wuhan, China	Wang, A., et al. (2020). "Assessment of imidacloprid related exposure using imidacloprid-olefin and desnitro-imidacloprid: Neonicotinoid insecticides in human urine in Wuhan, China." Environment International 141: 105785.	While neonicotinoid insecticides (NNIs) have been widely used worldwide, limited studies have measured specific metabolites of imidacloprid (IMI), the most commonly used NNI) in human urine. To better understand human exposure to NNIs, 10 parent compounds, and 6 of their metabolites were analyzed in 408 urine samples collected from 129 healthy adults in Wuhan, Central China, during autumn and winter of 2018. These specimens included repeated urine samples taken in 3 d from 75 volunteers. The urinary concentrations of desnitro-imidacloprid (DN-IMI), imidacloprid-olefin (IMI-olefin), and desmethyl-acetamiprid (DM-ACE) were higher (4–40 times) than those of their parent compounds (IMI and acetamiprid, ACE). DN-IMI and IMI-olefin accounted for 92% of the urinary Σ IMI (the sum of IMI and its specific metabolites measured). Positive correlations (r) were observed between DN-IMI and IMI (0.50), IMI-olefin and IMI (0.75), and DM-ACE and ACE (0.53). Good to excellent inter-day reliabilities (unadjusted intraclass correlation coefficients) were observed for IMI-olefin (0.61) and DM-ACE (0.81), while moderate inter-day reliability was observed for DN-IMI (0.43). The urinary NNI concentrations were significantly higher in autumn than in winter, and higher in urban areas than in rural areas, while no significant gender or age-related differences were observed. To our knowledge, this is the first report on DN-IMI and IMI-olefin in human urine.
15	Assessments of Algal Toxicity and PBT Behaviour of Pesticides with No Eco-toxicological Data: Predictive Ability of QSA/(T)R Models	Gökçe S, Saçan MT. Assessments of Algal Toxicity and PBT Behaviour of Pesticides with No Eco-toxicological Data: Predictive Ability of QSA/(T)R Models. Mol Inform. 2019 Aug;38(8-9):e1800137.	In the present study, the effect of eight pesticides with no ecotoxicological data on the growth rate of <i>Chlorella vulgaris</i> was measured. The selected pesticides are acetochlor, acetamiprid, boscalid diphenamid, gibberellic acid, ioxynil, diclofop and 2,4,5-T. The algal toxicity (IC50) of boscalid could not be determined within its solubility limit. Acetamiprid, diphenamid and gibberellic acid revealed IC50 values>100 mg/L. Among the others, the order of 96-h IC50 of pesticides was found as acetochlor>ioxynil>diclofop>2,4,5-T. The IC50 values were also predicted by using four Quantitative Structure-Activity/(Toxicity) Relationship (QSA/(T)R) models selected from the literature. The predictions of the models provided by QSARINS-Chem module of QSARINS as well as those obtained in our previous studies were compared with the results of experimental algal toxicity tests that were performed in our laboratory. The QSTR model generated for the toxicity of diverse chemicals to freshwater algae was able to correctly predict the toxicity order of the pesticides tested in the present study, confirming the utility of the QSA/(T)R approach. Additionally, Persistence, Bioaccumulation and Toxicity (PBT) Index model provided via the software QSARINS was employed and boscalid and diclofop were found to be PBT chemicals based on the PBT model. The present study will be very helpful when a more holistic approach applied to understand the fate of these chemicals in the environment.
8,9	Attenuating effects of Mangifera indica leaves ethanolic extract against acetamiprid induced reproductive toxicity in male guinea pigs	A. J. N. K. Guiekep, A., et. al. Vet Res Forum 10, 3, 187-192 https://www.ncbi.nlm.nih.gov/pubmed/31737226	Acetamiprid (ACP) belonging to the neonicotinoid family used against wide array of pests in agriculture and domestic purposes. In this study, we evaluated the attenuating effects of ethanolic extract of <i>Mangifera indica</i> leaves (EEMI) in averting reproductive toxicity caused by ACP in male guinea pigs. Thirty male guinea pigs were randomly assigned to five treatment groups (n = 6). Group 1 (T0) received distilled water orally; group 2 (T0-) was given 80 mg kg(-1) of ACP and groups 3, 4 and 5 were treated, respectively, with EEMI at doses of 50, 100 and 200 mg kg(-1) plus ACP. After 90 days, the reaction time, sexual organ weights, sperm count, motility and anomalies, spermatozoa with entire plasma membrane, testicular histology, serum testosterone concentration, testicular malondialdehyde (MDA) level, reduced glutathione (GSH) concentration, testicular superoxide dismutase (SOD) and catalase (CAT) activities were assessed. Co-administration of EEMI significantly reduced the reaction time, sperm anomalies and testicular MDA, SOD and CAT levels compared to the T0- group. Co-treatment of EEMI significantly alleviated sperm count and motility, percentage of spermatozoa with the normal plasma membrane, serum testosterone concentration, accessory sex gland weights, and testicular GSH concentrations. The ACP treatment induced cell membrane degradation in the testis and this effect was prevented with the addition of EEMI. In conclusion, ACP negatively affected the animal reproductive function and induced oxidative stress. The addition of EEMI alleviated the toxic effects of ACP on the reproductive function of male guinea pigs.

Phase 1 Conformity category	Title	Citation	Abstract
9	BDD electrochemical oxidation of neonicotinoid pesticides in natural surface waters. Operational, kinetic and energetic aspects	J. R. G. Dominguez, T., et. al. J Environ Manage 298, , 113538 https://www.ncbi.nlm.nih.gov/pubmed/34403917	Neonicotinoids pesticides were introduced to the market in the 1990s to control various pests. Its accumulation in the environment supposes a severe problem that can affect human health. This study investigates the electrochemical degradation of four common neonicotinoid pesticides; thiamethoxam (TMX), imidacloprid (ICP), acetamiprid (ACP) and thiacloprid (TCP), in different natural surface waters by a boron-doped diamond anode (BDD). The most influencing variable was the current density (j), and to a lesser extent, the supporting electrolyte concentration (Ce). In optimal conditions (j = 34.14 mA cm ⁻²) and Ce = 10.00 mM, using Na2SO4 as electrolyte) pesticide removals for TMX, ICP, ACP and TCP were 97.2, 96.9, 87.8 and 98.2 %, respectively. The obtained results with different support electrolytes (Na2SO4, NaCl, NaNO3 and HK2PO4) suggest that sulphate electrolyte was the optimum for TMX, ICP and ACP. However, for TCP, a total removal was achieved in less than 10 min using NaCl. It was also verified that the initial pH of the solution did not significantly influence the process in the range 3-9. All these results were rationalized in this paper. Finally, to evaluate the matrix influence, some experiments were carried out in different natural surface water matrices (river, reservoir and two different WWTP effluents). The factors influencing the process were the conductivity of the solution and the organic matter content. It was noticeable that the specific energy consumption (SEC) reduced by approximately 15 % for river water and WWTP effluent. High mineralization rates were obtained for all water matrices, with TOC removals ranging between 60 and 80 %.
1,8,9	Behaviour of neonicotinoids in contrasting soils	A. K. B. Aseperi, R., et. al. J Environ Manage 276, , 111329 https://www.ncbi.nlm.nih.gov/pubmed/32932069	Neonicotinoids are widely used to control insect pests in agriculture. Their presence in the environment can affect the health of non-target insects and aquatic animals. The behaviour of four neonicotinoids, namely imidacloprid, acetamiprid, thiacloprid and thiamethoxam, has been investigated in soils with contrasting characteristics to understand their migration in soil and ecological risk. Among the study neonicotinoids, thiamethoxam and thiacloprid were found to be the least and most sorbed neonicotinoids by all the soils, respectively (up to 186 time greater adsorption of thiacloprid), and their uptake was affected by the content of organic matter in the soil. Leaching studies in columns confirmed that thiamethoxam leached out of the soils readily, pointing out to a relatively high risk of ground water contamination with possible ecological impact when thiamethoxam is used in soils with low organic matter. In soil column studies, the soil with the lowest organic matter presents the greatest residue of neonicotinoids in the sub-surface (</=5 cm). In contrast the soil richer in organic matter presented most of the contamination deeper down in the column; a factor to be considered in the remediation from soil.
4,8,9	Binary mixtures of alcohol ethoxylates, nonylphenol ethoxylates and pesticides exhibit comparative bioactivity against three pests and toxicological risks to aquatic organisms	B. L. Li, J., et. al. Chemosphere 204, , 44-50 https://www.ncbi.nlm.nih.gov/pubmed/29649663	Nonylphenol ethoxylates are widely used surfactants in the industry and agriculture. However, seeking for alternatives has been imperative considering their effects of the hormonal and other toxicological risks. In the current study, the synergistic effects of nonylphenol ethoxylates or alcohol ethoxylates on the bioactivity of indoxacarb and acetamiprid were compared. Results showed that synergistic ratios of nonylphenol ethoxylates (TX-7 approximately TX-30) and alcohol ethoxylates (MOA-5 approximately MOA-20) against <i>Spodoptera exigua</i> , <i>Agrotis ipsilon</i> and <i>Aphis citricola</i> decreased with the EO (ethylene oxide) numbers, although different magnitudes of decreases were observed. Single toxicities of all ethoxylates to <i>Daphnia magna</i> and <i>Brachydanio rerio</i> also dramatically decreased with the EO numbers. In terms of joint toxicity, the combined effects of all ethoxylates and pesticides upon <i>D. magna</i> turned from synergism to antagonism with the increasing EO numbers; the combined effects of nonylphenol ethoxylates and pesticides turned from synergism to antagonism with the increasing EO numbers of ethoxylates, whereas alcohol ethoxylates and pesticides always showed antagonistic effects whatever EO numbers. Overall, alcohol ethoxylates may be potential alternatives for nonylphenol ethoxylates as they exhibited nearly comparative bioactivity against tested pests and toxicities to <i>D. magna</i> and <i>B. rerio</i> .
8,9,12	Binary mixtures of neonicotinoids show different transcriptional changes than single neonicotinoids in honeybees (<i>Apis mellifera</i>)	Christen V, Bachofer S, Fent K. Binary mixtures of neonicotinoids show different transcriptional changes than single neonicotinoids in honeybees (<i>Apis mellifera</i>). Environ Pollut. 2017 Jan;220(Pt B):1264-1270.	Among the many factors responsible for the decline of bee populations are plant protection products such as neonicotinoids. In general, bees are exposed to not only one but mixtures of such chemicals. At environmental realistic concentrations neonicotinoids may display negative effects on the immune system, foraging activity, learning and memory formation of bees. Neonicotinoids induce alterations of gene transcripts such as nicotinic acetylcholine receptor (nAChR) subunits, vitellogenin, genes of the immune system and genes linked to memory formation. While previous studies focused on individual compounds, the effect of neonicotinoid mixtures in bees is poorly known. Here we investigated the effects of neonicotinoids acetamiprid, clothianidin, imidacloprid and thiamethoxam as single compounds, and binary mixtures thereof in honeybees. We determined transcriptional changes of nAChR subunits and vitellogenin in the brain of experimentally exposed honeybees after exposure up to 72 h. Exposure concentrations were selected on the basis of lowest effect concentrations of the single compounds. Transcriptional induction of nAChRs and vitellogenin was strongest for thiamethoxam, and weakest for acetamiprid. To a large extent, binary mixtures did not show additive transcriptional inductions but they were less than additive. Our data suggest that the joint transcriptional activity of neonicotinoids cannot be explained by concentration addition. The in vivo effects are not only governed by agonistic interaction with nAChRs alone, but are more complex as a result of interactions with other pathways as well. Further studies are needed to investigate the physiological joint effects of mixtures of neonicotinoids and other plant protection products on bees to better understand their joint effects.
9	Bio-degradation of acetamiprid from wetland wastewater using indigenous <i>Micrococcus luteus</i> strain SC 1204: Optimization, evaluation of kinetic parameter and toxicity	Kanjilal, T., et al. (2015). "Bio-degradation of acetamiprid from wetland wastewater using indigenous <i>Micrococcus luteus</i> strain SC 1204: Optimization, evaluation of kinetic parameter and toxicity." Journal of Water Process Engineering 6: 21-31.	The fundamental objective of this study is to investigate the feasibility of microbes in removing toxic substances from environment and hopeful consideration that microbial bioremediation can be a cost effective tool for the detoxification of insecticides. Therefore, efforts were made to isolate and characterize indigenous bacteria, capable of degrading the neonicotinoid insecticide acetamiprid (ACE) and to optimize different process parameters in order to effectively treat the Wetland waste water. The enrichment and isolation was done in minimal salts media enhanced with 50mgL ⁻¹ of ACE as sole carbon, nitrogen and energy source, incubated at 40° C on a rotary shaker at 100rpm for about 7 days. The Face centered central composite design (FCCD) was performed to check the significance of the degradation process in a quadratic model. The mathematical model fitting of growth curve of the isolated bacteria was also studied. The indigenous bacterium capable of degrading ACE was observed to be <i>Micrococcus luteus</i> strain SC 1204, having a maximum consumption of 69.84% of ACE in 24h, quantified using GC-MS. The rate kinetic analysis was investigated using zero-order and three half- order kinetic models. Among the identified metabolites, benzothiazole, 2-(2-hydroxyethylthio) with a prominent peak at RT 6.99 was found to be the end product of ACE bio-degradation. Further, toxicological analysis on <i>Pseudomonas aeruginosa</i> exhibited no inhibition zone, suggesting the eco-friendly nature of the degraded metabolite.
1	Bioaccumulation of nickel and its biochemical and genotoxic effects on juveniles of the neotropical fish <i>Prochilodus lineatus</i>	F. F. R. Palermo, W. E., et. al. Ecotoxicol Environ Saf 116, , 19-28 https://www.ncbi.nlm.nih.gov/pubmed/25744913	Juveniles of the freshwater fish <i>Prochilodus lineatus</i> were exposed to three concentrations of nickel (Ni): 25, 250 and 2500 microg L ⁻¹ or water only for periods of 24 and 96 h to test for Ni bioaccumulation, its effects on antioxidant defenses and metallothioneins, and the occurrence of DNA damage. After exposure, the fish were sampled and tissue removed from the gills, liver, kidney and muscle to test for Ni accumulation and conduct biochemical (gills and liver) and genotoxic (blood cells and gills) analyses. The results showed that Ni accumulates in the organs in different proportions (kidney>liver>gills>muscle) and accumulation varied according to exposure time. Metallothionein (MT) levels increased in the liver and gills after exposure to Ni, implying that the presence of Ni in these tissues could induce MT synthesis. We also observed that Ni exposure affected antioxidant defenses, increasing lipid peroxidation in the liver of fish exposed to Ni for 96 h at the highest concentration tested. DNA damage increased in both blood cells and gills of fish exposed to all Ni concentrations, indicating the genotoxic potential of Ni on fish. We therefore concluded that Ni accumulates in various tissues and results in oxidative and DNA damage in <i>P. lineatus</i> , and that the maximum permitted Ni concentration set in Brazilian legislation (25 microg L ⁻¹) for freshwaters is not safe for this species.

Phase 1 Conformity category	Title	Citation	Abstract
13	Bioadsorbent from Magnetic Activated Carbon Hybrid for Removal of Dye and Pesticide	V. Nejadshafiee, M. R. Islami, Bioadsorbent from Magnetic Activated Carbon Hybrid for Removal of Dye and Pesticide. ChemistrySelect 2020, 5, 8814.	A novel bioadsorbent has been developed based on the framework of activated carbon, Fe3O4 nanoparticles, and ascorbic acid (AA@Fe3O4 NPs@AC). The objective of this study was efficient adsorption of organic compounds such as dye and pesticide from aqueous solutions by AA@Fe3O4 NPs@AC adsorbent. The structure of AA@Fe3O4 NPs@AC was characterized by TEM, TGA, FTIR, VSM, XRD, BET and Zeta potential. Moreover, the adsorption process of dye and pesticide compounds on AA@Fe3O4 NPs@AC was systematically considered and was found which the pseudo-second-order kinetic equation and Langmuir isotherm model conformed. The maximum adsorption capacities of AA@Fe3O4 NPs@AC for methylene blue (MB) dye and acetamiprid pesticide compounds were 370.37 and 357.14 mg g ⁻¹ , respectively that revealed excellent adsorption performance of AA@Fe3O4 NPs@AC adsorbent. On the other hand, with easy and high recovery of AA@Fe3O4 NPs@AC through magnetic separation has provided a simple and green method to enhance the efficiency of bio-adsorbent for remove of dyes and pesticides from contaminated water.
13	Biodegradation of the Neonicotinoid Insecticide Acetamiprid by Actinomycetes Streptomyces canus CGMCC 13662 and Characterization of the Novel Nitrile Hydratase Involved	L. F. Guo, W. W., et. al. J Agric Food Chem 67, 21, 5922-5931 https://www.ncbi.nlm.nih.gov/pubmed/31067049	Neonicotinoid insecticide pollution in soil and water poses serious environmental risks. Microbial biodegradation is an important neonicotinoid insecticide degradation pathway in the environment. In this study, 70.0% of the acetamiprid in a 200 mg/L solution was degraded by actinomycetes Streptomyces canus CGMCC 13662 (isolated from soil) in 48 h, and the acetamiprid degradation half-life was 27.7 h. Acetamiprid was degraded to IM-1-2 ((E)-1-(1-(((6-chloropyridin-3-yl)methyl)(methyl) amino)ethylidene)urea) through hydrolysis of the cyanoimine moiety. Gene cloning and overexpression indicated that a novel nitrile hydratase with three unusual subunits (AnhD, AnhE, and AnhA) without accessory protein mediated IM-1-2 formation. The purified nitrile hydratase responds for degrading acetamiprid had a Km of 5.85 mmol/L and a Vmax of 15.99 U/mg. A homology model suggested that AnhD-Glu56 and AnhE-His21 play important roles in the catalytic efficiency of the nitrile hydratase. S. canus CGMCC 13662 could be used to remediate environments contaminated with acetamiprid.
13	Biodegradation of the neonicotinoid insecticide acetamiprid in surface water by the bacterium Variovorax boronicumulans CGMCC 4969 and its enzymatic mechanism	Sun, S.-L., et al. (2017). "Biodegradation of the neonicotinoid insecticide acetamiprid in surface water by the bacterium Variovorax boronicumulans CGMCC 4969 and its enzymatic mechanism." RSC Advances 7(41): 25387-25397.	The plant growth-promoting rhizobacterium Variovorax boronicumulans CGMCC 4969 was used to degrade the neonicotinoid insecticide, acetamiprid (AAP), in surface water, and the enzymatic mechanisms of AAP degradation in V. boronicumulans CGMCC 4969 were explored. V. boronicumulans CGMCC 4969 degraded 34.7% of 2 mg L ⁻¹ AAP over 120 h with a degradation half-life of 182 h in surface water, and the major metabolite was the amide product, (E)-N2-carbamoyl-N1-[(6-chloro-3-pyridyl) methyl]-N1-methylacetamide (IM-1-2). Gene cloning and over-expression studies proved that AAP hydration to IM-1-2 was mediated by a nitrile hydratase (ANHase). Addition of AAP to the mineral salt medium (MSM) broth significantly upregulated the ANHase gene expression by 1.6-fold, when compared with that in the control without AAP. Co-expression of the ANHase gene with its activator gene (anhC) apparently increased ANHase activity 21-fold for AAP hydration compared with the ANHase gene alone. The independent over-expression of anhC gave rise to competitive inhibition on the β -subunit of the ANHase and resulted in decreased ANHase activity. This ANHase is versatile, hydrating aromatic, N-heterocyclic, and aliphatic nitrile compounds. The present study shows the potential of V. boronicumulans CGMCC 4969 in the bioremediation of AAP contaminated water.
Epidemiology	Biological Monitoring Method for Urinary Neonicotinoid Insecticides Using LC-MS/MS and Its Application to Japanese Adults	Ueyama J, Nomura H, Kondo T, Saito I, Ito Y, Osaka A, Kamijima M. Biological monitoring method for urinary neonicotinoid insecticides using LC-MS/MS and its application to Japanese adults. J Occup Health. 2014;56(6):461-8.	Objectives: Agricultural use of neonicotinoid (NEO) insecticides has been increasing in recent years, but their biological monitoring methods have been scarcely reported. In this study, we developed and validated a rapid and sensitive method for quantifying urinary NEO concentrations using high-performance liquid chromatography-tandem mass spectrometry (LC-MS/MS). Methods: After phosphate-induced acidification of a urine sample, urinary NEOs were trapped by a solid-phase extraction column and eluted with methanol for acetamiprid, imidacloprid, thiacloprid, thiamethoxam, clothianidin and dinotefuran and with an acetonitrile and methanol solution (1:1, v/v) containing 5% NH3 for nitenpyram. A separation analysis was performed by LC-MS/MS within 10 minutes for the sample. This method was applied to first morning urine obtained from 52 Japanese (40.9 $\pm$ 10.5 years old, mean $\pm$ standard deviation) without occupational NEO exposure. Results: The linear dynamic ranges and their limit of quantification (LOQ, signal to noise ratio=10) levels were 0.3-20 or 50 μ g/l (r=0.998-0.999) and 0.05-0.36 μ g/l, respectively. The absolute recovery was 64-95%, and the intra- and inter-day precisions were less than 16.4% (relative standard deviation, %RSD). This method was successfully applied for analysis of NEOs in human urine samples obtained from 52 adults. The frequencies of individuals who showed more than LOD levels was above 90% for imidacloprid, thiamethoxam, clothianidin and dinotefuran, more than 50% for acetamiprid and thiacloprid and 29% for nitenpyram. Conclusions: These results indicated that our new method could be applied to biological monitoring of NEO exposure even at environmental exposure levels in Japanese adults without occupational spraying histories.
Epidemiology	Biological Monitoring of Human Exposure to Neonicotinoids Using Urine Samples, and Neonicotinoid Excretion Kinetics	Harada KH, Tanaka K, Sakamoto H, Imanaka M, Niisoe T, Hitomi T, Kobayashi H, Okuda H, Inoue S, Kusakawa K, Oshima M, Watanabe K, Yasojima M, Takasuga T, Koizumi A. Biological Monitoring of Human Exposure to Neonicotinoids Using Urine Samples, and Neonicotinoid Excretion Kinetics. PLoS One. 2016 Jan 5;11(1):e0146335.	Background: Neonicotinoids, which are novel pesticides, have entered into usage around the world because they are selectively toxic to arthropods and relatively non-toxic to vertebrates. It has been suggested that several neonicotinoids cause neurodevelopmental toxicity in mammals. The aim was to establish the relationship between oral intake and urinary excretion of neonicotinoids by humans to facilitate biological monitoring, and to estimate dietary neonicotinoid intakes by Japanese adults. Methodology/principal findings: Deuterium-labeled neonicotinoid (acetamiprid, clothianidin, dinotefuran, and imidacloprid) microdoses were orally ingested by nine healthy adults, and 24 h pooled urine samples were collected for 4 consecutive days after dosing. The excretion kinetics were modeled using one- and two-compartment models, then validated in a non-deuterium-labeled neonicotinoid microdose study involving 12 healthy adults. Increased urinary concentrations of labeled neonicotinoids were observed after dosing. Clothianidin was recovered unchanged within 3 days, and most dinotefuran was recovered unchanged within 1 day. Around 10% of the imidacloprid dose was excreted unchanged. Most of the acetamiprid was metabolized to desmethyl-acetamiprid. Spot urine samples from 373 Japanese adults were analyzed for neonicotinoids, and daily intakes were estimated. The estimated average daily intake of these neonicotinoids was 0.53-3.66 μ g/day. The highest intake of any of the neonicotinoids in the study population was 64.5 μ g/day for dinotefuran, and this was <1% of the acceptable daily intake.
5	Capacitive sensor based on molecularly imprinted polymers for detection of the insecticide imidacloprid in water	S. M. El-Akaad, M. A., et. al. Sci Rep 10, 1, 14479 https://www.ncbi.nlm.nih.gov/pubmed/32879399	This manuscript reports on the development of a capacitive sensor for the detection of imidacloprid (IMD) in water samples based on molecularly imprinted polymers (MIPs). MIPs used as recognition elements were synthesized via a photo-initiated emulsion polymerization. The particles were carefully washed using a methanol (MeOH) /acetic acid mixture to ensure complete template removal and were then dried. The average size of the obtained particles was less than 1 microm. The imprinting factor (IF) for IMD was 6 and the selectivity factor (alpha) for acetamiprid, clothianidin, thiacloprid and thiamethoxam were 14.8, 6.8, 7.1 and 8.2, respectively. The particles were immobilized on the surface of a gold electrode by electropolymerization. The immobilized electrode could be spontaneously regenerated using a mixture of MeOH/10 mM of phosphate buffer (pH = 7.2)/triethylamine before each measurement and could be reused for 32 times. This is the first-time that automated regeneration was introduced as part of a sensing platform for IMD detection. The developed sensor was validated by the analysis of artificially spiked water samples. Under the optimal conditions, the linearity was in the range of 5-100 microM, with a limit of detection (LOD) of 4.61 microM.

Phase 1 Conformity category	Title	Citation	Abstract
5	Capillary liquid chromatography as an effective method for the determination of seven neonicotinoid residues in honey samples	Laura Carbonell - Rozas, et al. "Capillary Liquid Chromatography As an Effective Method for the Determination of Seven Neonicotinoid Residues In Honey Samples." <i>Journal of separation science</i> , v. 43 „20 pp. 3847-3855. doi: 10.1002/jssc.202000611	A new analytical method based on capillary liquid chromatography with diode array detection has been developed for the simultaneous quantification of seven neonicotinoid insecticides commercially available (imidacloprid, thiacloprid, clothianidin, thiamethoxam, acetamiprid, nitenpyram, and dinotefuran) in honey samples. The separation was achieved in a Zorbax XDB - C18 column (150 × 0.5 mm id, 5 μm), with a mobile phase consisting of ultrapure water (solvent A) and acetonitrile (solvent B) at a flow rate of 10 μL/min. Capillary column was thermostated at 25° C during the analysis and 254 or 270 nm was established as detection wavelength, depending on the analyte. Furthermore, full loop injection mode (8 μL) was selected, using water as injection solvent. Finally, the optimized method was applied to the analysis of neonicotinoid residues in honey of different floral origins using dispersive liquid–liquid microextraction as sample treatment. Variables affecting the extraction efficiency were optimized, choosing methanol and dichloromethane as dispersive and extraction solvents, respectively. The method was characterized in terms of linearity ($R^2 \geq 0.9948$), repeatability, reproducibility (relative standard deviation below 4.5 and 6.3% respectively), and recoveries ($\geq 80.5\%$). Detection and quantification limits were lower than 6.6 and 22.0 μg/kg for the studied analytes, respectively.
5	Carbon xerogels combined with nanotubes as solid-phase extraction sorbent to determine metaflumizone and seven other surface and drinking water micropollutants	Barbosa, M.O., Ribeiro, R.S., Ribeiro, A.R.L. et al. Carbon xerogels combined with nanotubes as solid-phase extraction sorbent to determine metaflumizone and seven other surface and drinking water micropollutants. <i>Sci Rep</i> 11, 13817 (2021).	Carbon xerogels (CXs) were synthesized by polycondensation of resorcinol and formaldehyde, followed by thermal annealing, and subjected to hydrothermal oxidation. Solid-phase extraction (SPE) cartridges were filled with CXs and tested for extraction of metaflumizone and other seven environmental micropollutants (acetamiprid, atrazine, isoproturon, methiocarb, carbamazepine, diclofenac, and perfluorooctanesulfonic acid) before chromatographic analysis. The recoveries obtained with the pristine CX were low for most analytes, except for metaflumizone ($69 \pm 5\%$). Moreover, it was concluded that the adsorption/desorption process of the micropollutants performed better on CXs with a less acidic surface (i.e., pristine CX). Thus, cartridges were prepared with pristine CX and multi-walled carbon nanotubes (MWCNTs) in a multi-layer configuration. This reusable cartridge was able to simultaneously extract the eight micropollutants and was used to validate an analytical methodology based on SPE followed by ultra-high performance liquid chromatography–tandem mass spectrometry. A widespread occurrence of 6/8 target compounds was observed in surface water collected in rivers supplying three drinking water treatment plants and in the resulting drinking water at the endpoint of each distribution system. Therefore, the first study employing CXs and MWCNTs as sorbent in multi-layer SPE cartridges is herein reported as a proof of concept for determination of multi-class water micropollutants.
13	Catalytic ozonation by metal ions for municipal wastewater disinfection and simultaneous micropollutants removal	Malvestiti, J. A., et al. (2019). "Catalytic ozonation by metal ions for municipal wastewater disinfection and simultaneous micropollutants removal." <i>Applied Catalysis B: Environmental</i> 259: 118104.	Several works in literature demonstrated that catalytic ozonation using metal ions promotes the decomposition of ozone and generation of hydroxyl radicals (HO•). The purpose of this study was to assess the effects of different metal ions (Fe2+, Co2+ and Al3+) in disinfection of urban wastewater through E.coli and Pseudomonas spp inactivation along with cellular adenosine triphosphate (ATP) depletion. Simultaneously, the effect of catalytic ozonation of secondary effluent on the selected micropollutants removal with different ozone kinetics (acetamiprid, dichlorvos and atrazine) was evaluated in semi-continuous operation. Results demonstrated that E.coli and Pseudomonas spp inactivation increased almost 20% with 1 mg L ⁻¹ Fe2+, Co2+, Al3+ and 40% with 10 mg L ⁻¹ Fe2+ compared with single ozonation. Fe2+ was the most effective metal ion on inhibiting regrowth after the treatments. The cellular ATP followed the same trend as the indicators microorganisms inactivation, with significant reduction of ATP over the treatment to single ozonation comparison. The ROH, O3 was applied for the treatments to quantify and compare the micropollutants removal by the radical pathway. The improvement of metal ions on ROH, O3 values occurred significantly for both stages of ozonation (before and after initial ozone demand) for all tested metals. Thus, metal ions addition to ozonation process provided an increase in simultaneous disinfection and pesticides removal as well as in the inhibition of bacterial reactivation, which resulted in savings between 30–50% of ozone dose needs compared with the same attainment in single ozonation.
8,9	Cellular Stress Pathways Are Linked to Acetamiprid-Induced Apoptosis in SH-SY5Y Neural Cells	E. K. Oztas, M., et. al. <i>Biology (Basel)</i> 10, 9, https://www.ncbi.nlm.nih.gov/pubmed/34571697	Acetamiprid (ACE), a commonly used neonicotinoid insecticide, is correlated with neurological symptoms, immunotoxicity and hepatotoxicity. Cellular stress and damage could play an important role in ACE-induced neurotoxicity; however, its mechanism has not been fully understood. We evaluated the effects of ACE on oxidative stress, endoplasmic reticulum (ER) stress, cellular death, mRNA expression levels of related genes and protein expressions of related molecular mechanisms in SH-SY5Y human neuroblastoma cells. The half maximal inhibition of enzyme activity (IC50) value of ACE was determined as 4.26 mM after 24 h of treatment by MTT assay. We revealed an increase in reactive oxygen species (ROS) production and calcium release. Significant increases were measured in inositol-requiring enzyme 1-alpha (IRE1-alpha) and binding immunoglobulin protein 90 (GRP90) levels as well as mRNA expression levels of caspase 3, 4 and 9 genes indicating enhanced ER stress. Apoptosis and ER stress-related genes were significantly upregulated at $>/=2$ mM. Indeed, ACE caused apoptosis and necroptosis while necrosis was not observed. There was a significant increase in the protein level of mitogen-activated protein kinase-8 (MAPK8) at 4 mM of ACE while no change was seen for nuclear factor kappa-B (NF-kappaB) and tumor necrosis factor-alpha (TNF-alpha). In conclusion, increased cellular stress markers could be proposed as an underlying mechanism of ACE-induced cell death in neural cells.
Epidemiology	Characteristics of Exposure of Reproductive-Age Farmworkers in Chiang Mai Province, Thailand, to Organophosphate and Neonicotinoid Insecticides: A Pilot Study	N. P. Suwannarin, T., et. al. <i>Int J Environ Res Public Health</i> 17, 21, https://www.ncbi.nlm.nih.gov/pubmed/33121069	Exposure to insecticides containing organophosphate (OP) and neonicotinoid (NEO) compounds has been associated with adverse reproductive health outcomes. This study characterized and identified predictors of exposure to OP and NEO among 100 reproductive-age farmworkers from two intensive farming areas in Chiang Mai Province, Thailand, including 50 each from the Fang (FA) and Chom Thong (CT) districts. OP exposure was determined by measuring the urinary concentrations of six dialkylphosphates (DAPs), whereas NEO exposure was determined by measuring the urinary concentrations of NEO compounds and their metabolites (NEO/m). The most frequently detected OPs were diethylphosphate (DEP) and diethylthiophosphate (DETP), with DETP having the highest geometric mean (GM) concentration, 8.9 mug/g-creatinine. The most frequently detected NEO/m were N-desmethyl-acetamiprid (N-dm-ACE), imidacloprid (IMI), and thiamethoxam (THX), with IMI having the highest GM concentration, 8.7 mug/g-creatinine. Consumption of well water was the predominant determinant of OP and NEO exposure in this population. In addition to encouraging workers to use personal protective equipment, exposure of farmworkers to these compounds may be reduced by nation-wide monitoring agricultural insecticides and other pesticides in community drinking water resources.
13	Characterization of a versatile nitrile hydratase of the neonicotinoid thiacloprid-degrading bacterium Ensifer meliloti CGMCC 7333	Sun, S.-L., et al. (2016). "Characterization of a versatile nitrile hydratase of the neonicotinoid thiacloprid-degrading bacterium Ensifer meliloti CGMCC 7333." <i>RSC Advances</i> 6(19): 15501-15508.	The nitrogen-fixing bacterium Ensifer meliloti CGMCC 7333 and its nitrile hydratase (NHase) degrade the neonicotinoid insecticides, thiacloprid (THI) and acetamiprid (ACE), to their corresponding amide metabolites. The NHase gene cluster is composed of α -subunit and β -subunit genes and a hypothetical protein gene. The functionality of the hypothetical protein downstream of the NHase coding genes and the characteristics of CGMCC 7333 NHase were explored in this study. Co-expression of the hypothetical protein coding gene with NHase (α - and β -subunit genes) in Escherichia coli Rosetta enhanced NHase hydration of THI and ACE two- and four-fold, respectively, and also significantly improved NHase solubility compared with the absence of the hypothetical protein coding gene. The NHase displayed an optimal reaction temperature of 50° C for THI hydration and was unstable when the incubation temperature exceeded 40° C. The optimum reaction pH was 7.0 and the NHase activity was stable in the pH range of 6 to 9. The enzyme activity for THI hydration was slightly inhibited by copper, zinc, and iron, and decreased by 68.6%, 75.7%, and 70.3% when 2% ethanol, ethyl acetate, and acetone were added to the reaction mixture, respectively, whereas dichloromethane and trichloromethane had no effect. The Km and kcat values of CGMCC 7333 NHase for THI hydration were 12.39 mmol L ⁻¹ and 131.36 s ⁻¹ , respectively. Substrate specificity analysis indicated that CGMCC 7333 NHase also transformed 3-cyanopyridine, benzonitrile, and indole-3-acetonitrile to the corresponding amide products, with maximum specific activities of 652.52, 255.32, and 263.93 U mg ⁻¹ protein, respectively

Phase 1 Conformity category	Title	Citation	Abstract
4	Chemical constituents of essential oils from <i>Thymus vulgaris</i> and <i>Cymbopogon citratus</i> and their insecticidal potential against the tomato borer, <i>Tuta absoluta</i> (Lepidoptera: Gelechiidae)	Ngongang, M.D.T., Eke, P., Sameza, M.L. et al. Chemical constituents of essential oils from <i>Thymus vulgaris</i> and <i>Cymbopogon citratus</i> and their insecticidal potential against the tomato borer, <i>Tuta absoluta</i> (Lepidoptera: Gelechiidae). Int J Trop Insect Sci (2021).	This study aimed to determine the chemical composition and insecticidal activity of essential oils from <i>Thymus vulgaris</i> (thyme) and <i>Cymbopogon citratus</i> (lemongrass) against the devastating pest, <i>Tuta absoluta</i> . Essential oils were extracted by hydrodistillation and chemically analyzed by Gas chromatography coupled to mass spectrometry. Their knockdown (KD50) and larvicidal (LD50) activities were assessed through direct contact and fumigation toxicity assays. The major components of thyme oil were Thymol (21.53%), α -Pinene (Dextro) (17.43%) and o-Cymene (15.37%), while, Neral (34.48%), Geranial (34.37%) and β -Myrcene (12.84%) were prominent in lemongrass oil. Statistical analysis indicated that both oils exhibited similar knockdown and insecticidal efficiencies through direct contact and fumigation routes. The resultant biological parameters for lemongrass and thyme oils were KD50 values of 0.193 μ L/mL and 0.592 μ L/mL and LD50 values of 0.328 μ L/mL and 0.608 μ L/mL respectively for contact toxicity and KD50 of 1.290 μ L/mL and 2.565 μ L/mL and LD50 of 1.479 μ L/mL and 3.046 μ L/mL for lemongrass and thyme oils respectively for fumigant toxicity. The reference insecticide, Lynx (λ -cyhalothrin 15 g/L + acetamiprid 20 g/L) elicited no mortality through both routes after 4 hours of exposure. Both essential oils prolonged life cycle of insect pest through both routes as compared to the reference insecticide. However, greenhouse and open field trials are required to validate this approach prior to its implementation for <i>T. absoluta</i> control in tomato farms. To our knowledge, this study reports for the first time the insecticidal potential of lemongrass essential oil against <i>T. absoluta</i> .
8,9	Chemical factors affecting uptake and translocation of six pesticides in soil by maize (<i>Zea mays</i> L.)	F. L. Wang, X., et. al. J Hazard Mater 405, , 124269 https://www.ncbi.nlm.nih.gov/pubmed/33144009	Uptake of residual pesticides in a soil by a certain crop plant may be governed by their physicochemical properties. Uptake and translocation of pesticides (imidacloprid, acetamiprid, tricyclazole, azoxystrobin, tebuconazole and difenoconazole) with the octanol/water partition coefficient (log Kow) ranging from 0.57 to 4.36 were investigated in soil with maize as a model plant. The results show that all tested pesticides in soil were uptaken by maize with accumulation amount of 27.73, 17.75, 18.96, 12.56, 10.66 and 2.13 μ g for imidacloprid, acetamiprid, tricyclazole, azoxystrobin, tebuconazole and difenoconazole at 14 d, respectively. The accumulation amount was negatively correlated with adsorption coefficients and positively correlated with pesticide concentration in in situ pore water (CIPW). Root bioconcentration factor varied widely from 0.61 for imidacloprid to 974.64 for difenoconazole was positively correlated with log Kow and molecular weight but negatively with water solubility. Conversely, translocation factor varied from 0 for difenoconazole to 1.64 for imidacloprid was negatively correlated with log Kow but positively with water solubility. It determined that uptake, accumulation and translocation of the pesticides in soil by maize are governed by their physicochemical properties, especially log Kow. CIPW is an appropriate candidate to evaluate the accumulation of pesticides in maize from soil.
13	Chestnut shells to mitigate pesticide contamination	Cobas, M., et al. (2016). "Chestnut shells to mitigate pesticide contamination." Journal of the Taiwan Institute of Chemical Engineers 61: 166-173.	In the last years, the presence of pesticides in aquatic environments has increased mainly as a result of the intensification of agricultural activities. Among the different techniques that can be used to remove these contaminants, the adsorption process can disclose as an appropriate treatment. In this work, chestnut shells were evaluated as a low-cost biosorbent for the pesticides pirimicarb, imidacloprid, acetamiprid and thiamethoxam, widely used in agricultural activities. Furthermore, economic acid pretreatments were evaluated in order to increase the removal efficiency. The highest removal was obtained when chestnut shells were pretreated with citric acid, increasing a 15% of adsorption capacity in comparison to raw chestnut shells. Scanning electron microscopy images, energy disperse spectroscopy analysis, Fourier transform infrared spectroscopy and Boehm method were performed in order to characterize the biosorbent. The new biosorbent was analysed in deep by kinetic and isotherm studies. The values of the correlation coefficients and standard error of estimate indicated that the Freundlich isotherm and pseudo-second-order model fitted well to the experimental data. In addition, the biosorbent showed a good behaviour working in continuous mode. The reported results open a new alternative for the restoration of polluted aquatic environments through the application of this new low-cost biosorbent developed.
4	Choice of optimal biocide combination to control flies (Diptera: Muscidae)	M. Z. Kavran, M. F., et. al. Ann Agric Environ Med 22, 2, 243-6 https://www.ncbi.nlm.nih.gov/pubmed/26094516	INTRODUCTION: Flies - by feeding on decaying matter, human waste and food - have been implicated in the spread of numerous animal and human diseases. Excessive fly populations are generally associated with livestock units and domestic waste due to decaying organic matter. A large number of flies cause extreme disturbance in the behavior of the host, resulting in skin irritation, lesions, wounds, and secondary infections are likely to appear. OBJECTIVE: The aim of this study was to evaluate the effects of combined applications of larvicide (cyromazine) and adulticides (acetamiprid in formulation with pheromone and thiamethoxam) on the suppression of fly populations. MATERIALS AND METHODS: The study was conducted on a pig farm. The piglet farms are one of the most favorable places for fly breeding. Three units were used for biocide applications and a fourth unit as the control where biocides were not applied. The monitoring of pre- and post-treatment of adult fly populations was carried out by glued cardboards. The cards were hung on metal rods above piglet's cage. This monitoring method served as a parameter for the estimation of biological effectiveness. RESULTS: The highest degree of fly control (88.4% mortality 8 days after treatment) was achieved when a combination of cyromazine and thiamethoxam was used. A biocide based on sex pheromone (Z)-9-tricosene + acetamiprid was the most effective on flies 3 days after biocide application, with a mortality rate of 69.1 %. Thiamethoxam achieved the highest reduction of flies 6 days after treatment, with 78.19% obtained mortality. CONCLUSION: Biological efficacy of the applied biocides in combination cyromazine + thiamethoxam and thiamethoxam alone was justified.
8,9,12,14	Chronic effects of a binary insecticide Acer 35 EC on Nile tilapia <i>Oreochromis niloticus</i> through a multi-biomarker approach	Guedegba NL, Imorou Toko I, Ben Ammar I, François L, Oreins N, Palluel O, Mandiki SNM, Jauniaux T, Porcher JM, Scippo ML, Kestemont P. Chronic effects of a binary insecticide Acer 35 EC on Nile tilapia <i>Oreochromis niloticus</i> through a multi-biomarker approach. Chemosphere. 2021 Jun;273:128530.	Acer 35 EC is a widely used insecticide (a binary mixture of lambda-cyhalothrin and acetamiprid) in pest control in many West African countries, particularly in the cotton culture in north Benin. The aim of this study was to investigate the chronic effects of Acer 35 EC on Nile tilapia <i>Oreochromis niloticus</i> juveniles using a multi-biomarker approach under laboratory conditions. For this purpose, fish were exposed to sublethal concentrations of Acer 35 EC (0, 1 and 10% of LC50- 96 h value). After 28 and 56 days of exposure, several biomarkers were measured in males and females including enzymatic activities related to detoxification and oxidative stress, neurotoxicity and immune responses, sex steroid hormones (testosterone, 17 β -estradiol and 11-keto-testosterone) and histological alterations of liver, kidney and gonads. An Integrated Biomarker Response (IBR) was then calculated. The results showed a reduction of cholinesterase activity in muscles, and intercellular superoxide anion production in both sexes. Female steroidogenesis and gametogenesis were affected, especially testosterone levels and oocyte growth. More alterations were observed in liver after exposure to Acer 35 EC. In both sexes, IBR values were higher after 56 days than after 28 days of exposure. In conclusion, based on a large set of biomarkers and IBR values, the chronic exposure to low doses of insecticide Acer 35 EC seems to impair different physiological functions in Nile tilapia juveniles on a time-dependent manner, with a stronger impact on females than on males.
8,12	Chronic oral exposure to field-realistic pesticide combinations via pollen and nectar: effects on feeding and thermal performance in a solitary bee	Azpiazu C, Bosch J, Viñuela E, Medrzycki P, Teper D, Sgolastra F. Chronic oral exposure to field-realistic pesticide combinations via pollen and nectar: effects on feeding and thermal performance in a solitary bee. Sci Rep. 2019 Sep 24;9(1):13770.	Pesticide use is one of the main causes of pollinator declines in agricultural ecosystems. Traditionally, most laboratory studies on bee ecotoxicology test acute exposure to single compounds. However, under field conditions, bees are often chronically exposed to a variety of chemicals, with potential synergistic effects. We studied the effects of field-realistic concentrations of three pesticides measured in pollen and nectar of commercial melon fields on the solitary bee <i>Osmia bicornis</i> L. We orally exposed females of this species throughout their life span to 8 treatments combining two neonicotinoid insecticides (acetamiprid, imidacloprid) and a triazole fungicide (myclobutanil) via pollen and sugar syrup. We measured pollen and syrup consumption, longevity, ovary maturation and thermogenesis. Pesticide intake was three orders of magnitude higher via syrup than pollen. At the tested concentrations, no synergistic effects emerged, and we found no effects on longevity and ovary maturation. However, all treatments containing imidacloprid resulted in suppressed syrup consumption and drastic decreases in thoracic temperature and bee activity. Our results have important implications for pesticide regulation. If we had measured only lethal effects we would have wrongly concluded that the pesticide combinations containing imidacloprid were safe to <i>O. bicornis</i> . The incorporation of tests specifically intended to detect sublethal effects in bee risk assessment schemes should be an urgent priority. In this way, the effects of pesticide exposure on the dynamics of bee populations in agroecosystems will be better assessed.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Chronic toxicity and biochemical response of <i>Apis cerana cerana</i> (Hymenoptera: Apidae) exposed to acetamiprid and propiconazole alone or combined	W. Y. Han, Y., et. al. <i>Ecotoxicology</i> 28, 4, 399-411 https://www.ncbi.nlm.nih.gov/pubmed/30874992	Acetamiprid and ergosterol-inhibiting fungicide (EBI) are frequently applied to many flowering plants, while honey bees are pollinating agents or pollinators of the flowers. Hence honey bees are often exposed to these pesticides. But until now, the effects of these combinations at field-realistic doses on honey bee health have been poorly investigated. In this study, we explore the synergistic mortality and some physiological effects in surviving honey bees after chronic oral exposure to acetamiprid and/or propiconazole in the laboratory. The results indicated that chronic combined exposure to acetamiprid and propiconazole produced a significant synergistic effect on mortality both for newly emerged bees (50% mortality in 7.2 days) and forager bees (50% mortality in 4.8 days). Honey bee weight of newly emerged bees was decreased after feeding food with a field concentration of acetamiprid and propiconazole, alone or combined for 10 days. Combination of acetamiprid and propiconazole also modulated the activities of P450s, GST and CAT in newly emerged bees and forager bees than either alone, but neither pesticide affected the activity of AChE. These results show that chronic combined exposure to pesticides of relatively low toxicity may cause severely physiological disruptions that could be potentially damaging for the honey bees.
Ecotoxicology	Chronic toxicity of 6 neonicotinoid insecticides to <i>Chironomus dilutus</i> and <i>Neocleonus triangulifer</i>	M. Z. Raby, X., et. al. <i>Environ Toxicol Chem</i> 37, 10, 2727-2739 https://www.ncbi.nlm.nih.gov/pubmed/30055027	Neonicotinoid insecticides are frequently detected in surface waters near agricultural areas, leading to a potential for chronic exposure to sensitive aquatic species. The midge <i>Chironomus dilutus</i> and the mayfly <i>Neocleonus triangulifer</i> have been shown to be acutely sensitive to neonicotinoids. Previous studies have established chronic effects of some neonicotinoids on <i>C. dilutus</i> , but reproduction has not been studied. Toxic effects have not been assessed using <i>N. triangulifer</i> . We present the results of chronic, static-renewal tests for 6 neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, and thiamethoxam) with <i>C. dilutus</i> (<=56-d in length) and <i>N. triangulifer</i> (<=32-d in length). Emergence was generally the most sensitive endpoint for both species across all neonicotinoids. Effect concentrations, 10% (EC10s; emergence) were 0.03 to 1.1 µg L ⁻¹ for acetamiprid, clothianidin, imidacloprid, and thiacloprid. Dinotefuran and thiamethoxam were less potent, with EC10s (<i>C. dilutus</i>) or median effect concentrations (EC50s; <i>N. triangulifer</i>) of 2.2 to 11.2 µg L ⁻¹ . Hazard was assessed through comparison of neonicotinoid environmental concentrations from agricultural surface waters in Ontario (Canada) with either the 5th percentile hazard concentration (for imidacloprid) or species-specific EC10s from the present study (for all remaining neonicotinoids). The resulting hazard quotients (HQs) indicated little to no hazard (HQ <1) in terms of chronic toxicity for acetamiprid, dinotefuran, thiacloprid, or thiamethoxam. A moderate hazard (HQ >1) was found for emergence of <i>N. triangulifer</i> for clothianidin, and a high hazard (HQ = 74) was found for imidacloprid. <i>Environ Toxicol Chem</i> 2018;37:2727-2739. (c) 2018 SETAC.
5	Coconut Shell Activated Carbon as Solid-Phase Extraction Adsorbent for Preconcentration of Selected Pesticides from Water Samples	Kumrić, K., Vujasin, R., Egerić, M. et al. Coconut Shell Activated Carbon as Solid-Phase Extraction Adsorbent for Preconcentration of Selected Pesticides from Water Samples. <i>Water Air Soil Pollut</i> 230, 302 (2019).	Solid-phase extraction (SPE) on activated carbon derived from coconut shell (CSAC) for the preconcentration of four varying polarity pesticides (imidacloprid, acetamiprid, simazine, and linuron) prior to their determination using high performance liquid chromatography with diode array detector (HPLC-DAD) was investigated. The characteristics of the CSAC were analyzed through X-ray diffraction (XRD), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), and Brunauer-Emmett-Teller (BET) method. The effects of the solution pH, eluent type, eluent volume, and flow rate were investigated for optimization of the presented procedure. The adsorption was achieved quantitatively on the CSAC column in the pH range of 2.0–7.0, and then the retained pesticides were eluted with dichloromethane. The detection limit was found to be 0.025–0.039 µg L ⁻¹ , depending on the pesticide. The proposed SPE-CSAC method was used to determine selected pesticides in tap water samples. The recoveries ranged from 58.2 to 105.3%, with low relative standard deviations. The obtained results indicated that the CSAC could be efficiently used as a low cost alternative to commercially available SPE adsorbents for the determination of the varying polarity pesticides in environmental water samples at trace levels.
Ecotoxicology	Comparative acute toxicity of two phytosanitary molecules, lambda-cyhalothrin and acetamiprid, on Nile Tilapia (<i>Oreochromis niloticus</i>) juveniles	N. L. I. T. Guedegba, I., et. al. <i>J Environ Sci Health B</i> 54, 7, 580-589 https://www.ncbi.nlm.nih.gov/pubmed/31266377	This study aimed to compare the toxicity for fish of two active ingredients (lambda-cyhalothrin-20 g L ⁻¹), a pyrethroid, and acetamiprid-15 g L ⁻¹ , a neonicotinoid) which are components of a commercial insecticide (Acer 35 EC) used in cotton crop in many West African countries. The juveniles of <i>Oreochromis niloticus</i> (4.01 +/- 0.34 g, mean body weight) were exposed for 96 h to increasing concentrations of active ingredients (lambda-cyhalothrin and acetamiprid) or a mixture similar to Acer 35 EC (composed by 20 g of chemical compound lambda-cyhalothrin and 15 g of acetamiprid dissolved in 1 L of acetone). The experiments were carried out under controlled conditions in aquaria according to OECD Guidelines. During the experiments, the behavioral responses (loss of balance, color change, hyperactivity, etc.) that usually precede death were observed in exposed fish. Mortalities were recorded in each aquarium and the LC50-96h of each chemical was determined. The LC50-96h obtained were respectively 0.1268, 0.0029, 182.9 and 0.5685 ppm for Acer 35 EC, lambda-cyhalothrin, acetamiprid and mixture. All insecticides used in this study had profound impact on Nile tilapia behavior which may confirm the neurotoxicity of each single active compound as well as of their mixture.
1	Comparative approach for trace metal risk evaluation in settling particles from the Uruguay River, Argentina: enrichment factors, sediment quality guidelines and metal speciation	Tatone, L.M., Bilos, C., Skorupka, C.N. et al. Comparative approach for trace metal risk evaluation in settling particles from the Uruguay River, Argentina: enrichment factors, sediment quality guidelines and metal speciation. <i>Environ Earth Sci</i> 75, 575 (2016)	The source and potential risks of trace metals in settling material collected with sediment traps in the Uruguay River were evaluated utilizing enrichment factors (EF), sediment quality guidelines (SQG) and speciation using a 4-step sequential extraction procedure. The total organic carbon content of the settling material was relatively high and homogeneous (2.5 ± 0.3 %) and showed no correlation with the metal concentrations. Total trace metal concentrations decrease from Fe (48,969 ± 7380 µg g ⁻¹), Mn (1859 ± 233 µg g ⁻¹), Zn (84 ± 7.6 µg g ⁻¹), Cu (56 ± 6.9 µg g ⁻¹), Cr (19 ± 2.7 µg g ⁻¹), Ni (16 ± 2.0 µg g ⁻¹) and Pb (13 ± 1.2 µg g ⁻¹). The average EF of Zn, Cr, Ni and Pb are below 1.5 indicating natural sources, whereas those of Cu and Mn are consistently higher (EF > 2) insinuating some anthropogenic influence. Consistently, Cu concentrations duplicated the SQG (35.7 µg g ⁻¹) suggesting that adverse biological effects may be observed occasionally. However, speciation results revealed that most metals are associated with the residual fraction, strongly linked to the mineral matrix, and therefore unavailable to aquatic organisms. The sole exception is Mn which is mainly found in the non-residual fractions (ΣF1 – F3 = 82 %). Trace metal mobility/bioavailability decreased from Mn (82 %) > Pb (37 %) > Cr (26 %) ~ Ni (25 %) > Zn (20 %) > Cu (14 %) > Fe (10 %). These results demonstrate the utility of metal speciation studies to assess the real risk for aquatic organisms of high Cu concentrations, but associated to relatively immobile fractions of reduced bioavailability.
Ecotoxicology	Comparative ecotoxicity of insecticides with different modes of action to <i>Osmia excavata</i> (Hymenoptera: Megachilidae)	Y. L. Song, et. al. <i>Ecotoxicol Environ Saf</i> 212, , 112015 https://www.ncbi.nlm.nih.gov/pubmed/33561775	<i>Osmia excavata</i> is an important pollinator in commercial fruit orchards. Little information has been published about ecotoxicity to <i>O. excavata</i> , especially the larvae. To clarify the risk of commonly used insecticides with different modes of action to the larvae of <i>O. excavata</i> , six insecticides (clothianidin, acetamiprid, sulfoxaflor, lambda-cyhalothrin, chlorfenapyr and abamectin) were selected for evaluation of their acute lethal toxicity and sublethal effects. Clothianidin and abamectin were the two most toxic insecticides to the larvae of <i>O. excavata</i> with LD50 values of 0.007 (0.006-0.008) and 0.0004 (0.0003-0.0006) µg active ingredient (a.i.) bee ⁻¹), respectively. And their ecological risks were high according to the hazard quotient values (HQ > 2500). Sulfoxaflor was identified as the only safe insecticide for <i>O. excavata</i> (HQ < 50) under field conditions. Sublethal toxicity tests showed that larval weight was significantly decreased by ingesting food treated with clothianidin, lambda-cyhalothrin and abamectin (less than the maximum field registered concentrations on fruit trees) due to interference with consumption per larva and reduction of the efficiency of conversion of ingested food. Additionally, above three insecticides significantly prolonged larval developmental duration before cocooning and decreased eclosion rate. Overall, there results suggested that clothianidin and abamectin should not be applied, especially during the flowering phase, the application frequency of lambda-cyhalothrin should be minimized for the purpose of conserving <i>O. excavata</i> . Our results provided important evidences for selecting appropriate insecticides for use in fruit orchards.

Phase 1 Conformity category	Title	Citation	Abstract
5	Comparative Evaluation of the Polar Organic Chemical Integrative Sampler in Two Types of Validation Systems Simulating Peak Concentration Events	K. V. Noro, E. L. M., et. al. Environ Toxicol Chem 40, 11, 3010-3018 https://www.ncbi.nlm.nih.gov/pubmed/34506633	Polar organic chemical integrative sampler (POCIS) devices have been suggested for measuring time-weighted averages (TWAs) of contaminant concentrations resulting from chemical leak accidents in aquatic environments. However, the response of the POCIS device in the emergency condition in natural water remains unclear. The response of the POCIS device to contaminant fluctuation was investigated using a chamber test with tap water and a channel test with natural water. The fluctuation in the chamber and the channel simulated the condition of river water under a chemical leak scenario (maximum concentration: 1-10 µg L ⁻¹), half-life: 1 day). The target chemicals were neonicotinoid pesticides (dinotefuran, clothianidin, thiamethoxam, imidacloprid, acetamiprid, and thiacloprid) and bisphenol A. The ratio of the POCIS measured value to the TWA values of grab samplings (POCIS/TWA) for the channel test (temperature: 15 degrees C, flow velocity: 15 cm s ⁻¹) ranged from 61% (clothianidin) to 133% (thiacloprid). The results indicated that the POCIS device could be effectively used as a monitoring device in an aquatic environment under the chemical leak scenario over a time period of more than 14 days. In addition, the POCIS/TWA ratios obtained from the chamber test and the channel test were in the range of 50-150%. Thus, the chamber test could be used to evaluate the POCIS device at a low cost. Environ Toxicol Chem 2021;40:3010-3018. (c) 2021 SETAC.
Ecotoxicology	A comparative study on the effects of selected pesticides on hemato-biochemistry and tissue histology of freshwater fish <i>Cirrhinus mrigala</i> (Hamilton, 1822)	S. K. Ghayyur, M. F., et. al. Saudi J Biol Sci 28, 1, 603-611 https://www.ncbi.nlm.nih.gov/pubmed/33424346	The aim of the present study was to investigate the comparative effects of pesticides Chlorfenapyr, Dimethoate and Acetamiprid on the health of <i>Cirrhinus mrigala</i> under long term exposure. Eighty <i>C. mrigala</i> were divided in four equal groups; one control and three treated groups. The blood was collected from both control and treated groups at intervals of 10th, 20th and 30th days for hemato-biochemistry and histopathological alterations. The result indicates significant difference ($P < 0.05$) in RBCs, Hb, PCV and MCHC whereas elevation in WBCs and Platelets counts were recorded. In 10th day sampling, MCV value of Dimethoate and Acetamiprid treatment had no difference in comparison with the control group, however it is significantly increased ($P < 0.05$) in rest of sampling. The MCH value of exposed fish showed significant increase ($P < 0.05$) after 20th and 30th days for Chlorfenapyr and after 30th days for Acetamiprid exposure while insignificantly increased for rest of sampling. It was also found that these pesticides significantly decrease ($p < 0.05$) the T3 and T4 levels while increase in the TSH, cortisol, ALP, AST, ALT and LDH levels in the serum of the treated fishes in contrast to control group. Similarly, histopathological analysis of gills and liver showed significant alterations in all the treated groups. Toxicity trends of these pesticides was ranked as Chlorfenapyr > Acetamiprid > Dimethoate. It is concluded that indiscriminate use of such pesticides poses a noxious threat to non-target organisms, harm the ecosystems and jeopardizes human health.
8,9,12	Comparative Toxicity of Acetamiprid and Azadirachta indica Leave Extract on Biochemical Components of Blood of <i>Laboe rohita</i>	Alam, Asifa; Amtul Bari Tabinda; Mahmood-ul-Hassan; Abdullah, Yasar. Comparative Toxicity of Acetamiprid and Azadirachta indica Leave Extract on Biochemical Components of Blood of <i>Laboe rohita</i> . Pakistan Journal of Zoology; Lahore Vol. 46, Iss. 6, (Dec 2014).	<i>Laboe rohita</i> was exposed to different concentrations of acetamiprid (10, 11, 12, 13, 14 and 15mg/L) and <i>Azadirachta indica</i> leaves extract (250, 500, 750, 1000 and 1050mg/L) to determine their LC50. The LC50 of <i>A. indica</i> leaves extract and acetamiprid were 785.4 and 11.62 mg/L, respectively. Fish were exposed to 20% of LC50 of acetamiprid and <i>A. indica</i> leaves extract for 28 days to evaluate changes in the biochemical component of fish blood. A significant decrease in serum calcium, phosphate and albumin, and a significant increase in urea was recorded when fish were exposed to acetamiprid. In contrast, no significant alterations were observed in blood parameters of fish revealed to <i>A. indica</i> leaves extract. The results, therefore, suggest that <i>A. indica</i> leaves extract can be used safely for aquatic pests since it is non-toxic to non-target organisms.
Ecotoxicology	Comparative toxicity of two neonicotinoids and a pyrethroid to forager honeybees (<i>Apis mellifera</i> L, 1758) (Hymenoptera: Apidae) by different exposure methods	Shah, R., Al Maawali, A. S. A., Al Raeesi, A. "Comparative toxicity of two neonicotinoids and a pyrethroid to forager honeybees (<i>Apis mellifera</i> L., 1758) (Hymenoptera: Apidae) by different exposure methods". Turkish Journal of Entomology 44 (2020): 111-121	Honeybees are exposed to insecticides by direct contact with spray droplets or residues on plant, or through ingestion of contaminated pollen or nectar. Direct contact with foliar spray might be the most common exposure route and contact bioassays are preferred as they better simulate field situation. Bioassays were conducted during 2018 at Sultan Qaboos University, Oman. The acute contact and oral toxicity of commercial formulations of deltamethrin 2.5 EC, thiamethoxam 25 WG and acetamiprid 20 SL to <i>Apis mellifera</i> subsp. <i>lamarckii</i> Cockerell 1906 (Hymenoptera: Apidae) foragers were measured by three exposure methods (contact by a 1-µL droplet on thorax, contact by Potter spray tower and oral ingestion). Potter tower exposure gave significantly higher mortality at lower concentration of deltamethrin than contact exposure by single droplet on thorax. Thiamethoxam showed significantly higher mortality through oral exposure at all concentrations. HQoral values were also calculated. Acetamiprid did not give more than 50% mortality even with the highest concentration. Potter tower produced fine droplets ($0.286 \pm 0.071 \mu\text{m}$) and a total of 0.829 µL was deposited on a single honeybee. Forager honeybees are more likely to be exposed to the very fine droplets in field and toxicological results obtained by Potter tower or similar devices will be more realistic than a single droplet on thorax.
8,9	Comparison of uptake, translocation and accumulation of several neonicotinoids in <i>komatsuna</i> (<i>Brassica rapa</i> var. <i>perviridis</i>) from contaminated soils	Li, Y., et al. (2018). "Comparison of uptake, translocation and accumulation of several neonicotinoids in <i>komatsuna</i> (<i>Brassica rapa</i> var. <i>perviridis</i>) from contaminated soils." Chemosphere 200: 603-611.	The accumulation of pesticides in vegetables may have serious effects on human health and ecosystems via food chains; therefore, it is of great importance to investigate the uptake and accumulation behaviours of pesticides in vegetable tissues. In the present study, the uptake, translocation and accumulation of five neonicotinoids, thiamethoxam (THIM), clothianidin (CLO), thiacloprid (THID), acetamiprid (ACE) and dinotefuran (DIN), in <i>komatsuna</i> (<i>Brassica rapa</i> var. <i>perviridis</i> , a vegetable) were investigated. The concentrations of neonicotinoids in vegetable tissues ranged from 0.068 ± 0.002 to $29.6 \pm 2.5 \text{ mg/kg}$. During the cultivation (except for the first day), the concentration of each neonicotinoid in shoots was the highest, followed by roots and the soil. The concentrating of neonicotinoids from the soil to roots followed the order of THIM > CLO > THID > DIN > ACE, while the order of the ability of translocation neonicotinoids from roots to shoots was the just opposite. The difference in uptake and translocation behaviours of the test neonicotinoids seems to be not correlated with the octanol/water partition coefficient (logKow), water solubility or dissociation constant (pKa), but significantly correlated with molecular weight. In addition, a greater concentration of the THIM-metabolite clothianidin (M-CLO) was detected in vegetable shoots than in roots and the soil.
5	Comprehensive solution for acetamiprid degradation: Combined electro-Fenton and adsorption process	Meijide, J., et al. (2018). "Comprehensive solution for acetamiprid degradation: Combined electro-Fenton and adsorption process." Journal of Electroanalytical Chemistry 808: 446-454.	In recent times, electro-Fenton treatment has become a very interesting approach in which the powerful oxidants, hydroxyl radicals, are generated by the combination of Fenton's reaction and electrochemical process. However, in several cases, total removal of pollutants such as acetamiprid from effluents after advanced oxidation processes was not completely reduced because of the presence of inorganic ions. In this work, the development of heterogeneous catalyst was performed by the manufacture of iron-base-hydrogel catalysts. The catalytic activity and physical resistance of the different iron-base-hydrogels were assessed at different operational conditions and the catalyst which provided the best performance was a mixture of polyvinyl alcohol-alginate-goethite. After electro-Fenton treatment of acetamiprid, the presence of inorganic pollutants, Cl^- , NO_3^- and NH_4^+ , was detected and a combined electro-Fenton and adsorption process was developed for a total remediation. Under optimal conditions, the simulation of the continuous operation in an electro-Fenton reactor and the subsequent treatment of the water stream generated by fixed-bed adsorption filter containing activated carbon were performed. The obtained results permit to conclude that a combined treatment of electro-Fenton and adsorption process can be an appropriate approach for the comprehensive remediation of water streams.

Phase 1 Conformity category	Title	Citation	Abstract
Epidemiology	Comprehensive toxicological study over 160 processing factors of pesticides in selected fruit and vegetables after water, mechanical and thermal processing treatments and their application to human health risk assessment	Jankowska, M., et al. (2019). "Comprehensive toxicological study over 160 processing factors of pesticides in selected fruit and vegetables after water, mechanical and thermal processing treatments and their application to human health risk assessment." <i>Science of The Total Environment</i> 652: 1156-1167.	The challenge of the present comprehensive toxicological study was to evaluate water, mechanical and thermal processing factors (PFs) of twenty four pesticides (acetamiprid, alpha-cypermethrin, azoxystrobin, boscalid, bupyrimate, chlorpyrifos, chlorothalonil, cyprodinil, deltamethrin, difenoconazole, fenazaquin, fenhexamid, fludioxonil, folpet, iprodione, lambda-cyhalothrin, metalaxyl, pirymicarb, propargite, pyraclostrobin, tetraconazole, tiophanate methyl, thiram, trifloxystrobin) in different fruit and vegetables and estimate health risk for adults and children. The water (PF = 0,09–0,94), mechanical (PF = 0,13–0,32) and thermal (PF = 0,02–0,57) technology significantly or completely reduced concentrations of twenty one active substances in broccoli, tomatoes, strawberries and black currants. Pyrethroid insecticides (alpha-cypermethrin, deltamethrin and lambda-cyhalothrin) exhibited PF above one in berries influenced by high temperatures. Comprehensive processing factor database technology/pesticide/matrix (over 160 PFs) for 24 pesticides in selected fruit and vegetable species after different processing treatments was created. This paper for the first time compares health risk assessments of acute and chronic of two subpopulations of adults and the most critical group of small children using two mathematical models, without (I) and with including (II) calculated PF values. More realistic estimation of the dietary intakes of the pesticides was achieved using PFs. The hazard quotients (HQs) estimated from chronic and acute dietary exposure (Model I) were above 20% and after intake correction (Model II) were reduced to HQs = 11.5% after water, 3% mechanical and 9.5% thermal treatment.
8,9	Concentration- and time-dependent toxicity of commonly encountered pesticides and pesticide mixtures to honeybees (<i>Apis mellifera</i> L.)	V. C. Bommuraj, Y., et. al. <i>Chemosphere</i> 266, , 128974 https://www.ncbi.nlm.nih.gov/pubmed/33228988	Honeybees are exposed to a wide range of pesticides for long periods via contaminated water, pollen and nectar. Some of those pesticides might constitute health hazards in a time- and dose-dependent manner. Time-dependent toxicity profiles for many applied pesticides are lacking, despite the fact that such profiles are crucial for toxicological evaluations. Therefore, we sought to determine the time-dependent toxicities of pesticides/pesticide metabolites frequently found in Israeli beehives, namely, amitraz metabolites, N'-(2,4-dimethylphenyl)-N-methylformamidide (DMPF) and N-(2,4-dimethylphenyl)-formamide (DMF), coumaphos, imidacloprid, thiacloprid, acetamiprid and dimethoate (toxic reference). By applying accepted methodological approaches such as the modified Haber's rule (product of concentration and exposure duration leads to a constant effect) and comparisons between cumulative doses at different time points, we determined the time-dependent toxicities of these pesticides. We also studied the mixture toxicities of frequently occurring pesticide combinations and estimated their potential contributions to the overall toxicities of neonicotinoids. Thiacloprid was the only pesticide that complied with Haber's rule. DMPF, dimethoate and imidacloprid exhibited time-diminished - toxicities. In contrast, DMF and acetamiprid exhibited time-reinforced toxicities. Neither the binary mixtures nor the tertiary mixtures of DMF, DMPF and coumaphos at 10 times their environmentally relevant concentrations potentiated the neonicotinoids' toxicities. DMPF and imidacloprid were found to present the greatest hazard to honeybees, based on their 50% lethal cumulative dose and 50% lethal time. Amitraz's instability, its low detection frequency and high toxicity profile of its metabolite, DMPF, lead us to the conclusion that DMPF constitutes the actual toxic entity responsible for amitraz's toxic effect.
5,8,9	Constructed wetland microcosms for the removal of organic micropollutants from freshwater aquaculture effluents	A. M. R. Gorito, A. R., et. al. <i>Sci Total Environ</i> 644, , 1171-1180 https://www.ncbi.nlm.nih.gov/pubmed/30743830	The presence of organic micropollutants (MPs) in the aquatic environment is strongly related to their difficult elimination by conventional water and wastewater treatment processes. Therefore, alternative treatment technologies are required to overcome this problem. In this domain, constructed wetlands (CWs) have gained increasing attention in the last years, mainly due to the low-cost, simple operation/maintenance and environmental friendliness of these systems. However, studies on the application of CWs to remove MPs from freshwater aquaculture effluents are still scarce. In this work, planted (<i>Phragmites australis</i>) vertical subsurface flow CWs, at microcosm scale, were investigated for the removal of MPs found in non-spiked freshwater aquaculture effluents, namely atrazine, isoproturon, perfluorooctanesulfonic acid (PFOS), clarithromycin, erythromycin, fluoxetine, norfluoxetine, and 2-ethylhexyl-4-methoxycinnamate (EHMC). A wider multi-component set of 36 MPs was also studied by adding these MPs at 100ngL(-1) to the same matrix (alachlor, atrazine, chlorfenvinphos, isoproturon, PFOS, azithromycin, clarithromycin, erythromycin, diclofenac, methiocarb, acetamiprid, clothianidin, thiacloprid, thiamethoxam, EHMC, simazine, atorvastatin, bezafibrate, carbamazepine, cephalixin, ceftiofur, citalopram, clindamycin, clofibric acid, diphenhydramine, enrofloxacin, fluoxetine, ketoprofen, metoprolol, norfluoxetine, ofloxacin, propranolol, tramadol, trimethoprim, venlafaxine, and warfarin). High weekly removal efficiencies (>87%) were observed for all MPs in both non-spiked and spiked experiments, with the exception of EHMC (removal rates between 0 and 86%). These results emphasize the potential of CWs to remove MPs from freshwater aquaculture effluents, but also the need to enhance the performance of these systems for the elimination of some recalcitrant MPs, such as EHMC, which was found at high concentrations in the studied effluents.
Ecotoxicology	Contact application of neonicotinoids suppresses the predation rate in different densities of prey and induces paralysis of common farmland spiders	M. R. Rezac, V., et. al. <i>Sci Rep</i> 9, 1, 5724 https://www.ncbi.nlm.nih.gov/pubmed/30952926	Neonicotinoids are very effective in controlling crop pests but have adverse effects on predators and pollinators. Spiders are less sensitive to neonicotinoids compared to insects because of the different structure of their acetylcholine receptors, the binding targets of neonicotinoids. We tested whether short-term exposure to neonicotinoids affected the predation rate in different densities of prey of spiders and led to their paralysis or eventual death. To examine these effects, we topically exposed dominant epigeic, epiphytic and sheet-weaving farmland spiders to four widely used neonicotinoids (imidacloprid, thiamethoxam, acetamiprid and thiacloprid). We applied the neonicotinoids at concentrations recommended by the manufacturers for spray application under field conditions. Short-term exposure to the formulations of all four tested neonicotinoids had adverse effects on the predation rate of spiders, with imidacloprid (Confidor) associated with the most severe effects on the predation rate and exhibiting partial acute lethality after one hour (15-32%). Acetamiprid also displayed strong sublethal effects, particularly when applied dorsally to <i>Philodromus cespitum</i> . Day-long exposure to dorsally applied acetamiprid or thiacloprid led to paralysis or death of multiple <i>Linyphiidae</i> spp., with the effects particularly prominent in males. To conclude, we provided multiple lines of evidence that short-term exposure to neonicotinoids, which were applied at recommended field concentrations, caused severe health effects or death in multiple families of spiders. Even acetamiprid caused strong effects, despite being subject to less strict regulations in the European Union, compared with those for imidacloprid because of claims of its negligible off-target toxicity.
8,9	Contamination by neonicotinoid insecticides in barn owls (<i>Tyto alba</i>) and Alpine swifts (<i>Tachymartus melba</i>)	Humann-Guillemot, S., et al. (2021). "Contamination by neonicotinoid insecticides in barn owls (<i>Tyto alba</i>) and Alpine swifts (<i>Tachymartus melba</i>)." <i>Science of The Total Environment</i> 785: 147403.	Monitoring the extent to which wildlife is exposed to the broadly used neonicotinoid insecticides (NNIs) is essential to assess their potential negative effects on biodiversity. Birds are good subjects to assess such exposure, because they inhabit various habitats and they feed at different trophic levels. However, so far, most studies have focused on the contamination of granivorous species. In this study, we assess the concentrations of five NNIs (acetamiprid, clothianidin, imidacloprid, thiacloprid, thiamethoxam) in the carnivorous Barn owl (<i>Tyto alba</i>), and the insectivorous Alpine swift (<i>Tachymartus melba</i>). NNIs were measured in the Barn owl in feathers collected from nestlings in 2012 (n = 49 broods) and adults in 2016 (n = 58 individuals), and in the Alpine swift from feathers collected from 50 pooled nestling samples from 50 nests between 2004 and 2017 (nestlings raised in five different nests over ten years; n = 50 broods), plasma samples from adults in 2018 (n = 15), and food boluses collected from nestling provisioning adults in 2018 (n = 12). We found that 69% and 56.9% of Barn owl feathers from nestlings and adults respectively contained at least one NNI at measurable concentration. Mean ± SE and median concentrations (in ppb) of total NNIs were 0.66 ± 1.13 and 0.42 for nestlings, and 0.17 ± 0.57 and 0.04 for adults. In the Alpine swift, although we detected no NNI in nestling feathers, we found that 75% of food boluses and 20% adult plasma samples contained at least one NNI at measurable concentration. Mean ± SE and median concentrations (in ppb) of total NNIs were 0.24 ± 0.20 and 0.24 in food boluses, and 0.06 ± 0.13 and 0 in plasma. In view of these results, further research is warranted to determine the extent of contamination in non-granivorous birds and their potential effects.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Contamination of neonicotinoid insecticides in soil-water-sediment systems of the urban and rural areas in a rapidly developing region: Guangzhou, South China	C. Y. Zhang, X., et. al. Environ Int 139, , 105719 https://www.ncbi.nlm.nih.gov/pubmed/32283356	Residues and distribution of neonicotinoid insecticides (NEOs) in soil-water-sediment systems of the urban and rural areas of Guangzhou, South China were investigated. A total of 104 soil samples from 7 different functional zones and 29 water/sediment samples from creeks were collected. The results showed that at least one neonicotinoid insecticide was detected in all samples. The summed levels of five target neonicotinoids (summation operator5neonics) were in the range of 0.003-229 ng/g dw for soil samples, 7.94-636 ng/L for water samples, and 0.017-31.3 ng/g dw for sediment samples, with a geometric mean of 0.59 ng/g dw, 153 ng/L and 1.11 ng/g dw, respectively. Soils from agricultural areas contained the highest residual NEOs, followed by commercial, traffic, residential, industrial, educational zones and parks. Among the seven different functional zones studied, imidacloprid was the most dominant NEO in the agricultural areas and commercial zones, whereas acetamiprid was dominant in the other five functional zones with different land-use types. Thiamethoxam and acetamiprid were the main NEOs in water and sediment samples collected from 29 creeks. The pollution of NEOs in soils, water and sediments from rural areas was higher than that in the counterparts from urban areas. Residual concentration of NEOs detected in soils, water and sediments showed significant correlations with each other. The distribution of NEOs in soil-water-sediment systems indicated that NEOs tended to concentrate in water, followed by sediments and soils, especially in urban areas. An evaluation of the exposure to the current level of the summation operator5NEOs in Guangzhou suggests a significant risk for aquatic and soil organisms, particularly under chronic exposures. The results of the present study offer valuable data to better understand the contamination and ecological risks of neonicotinoid insecticides in the rapidly developing urbanized region of South China.
10	A critical review of neonicotinoid insecticides for developmental neurotoxicity	L. P. L. Sheets, A. A. , et. al. Crit Rev Toxicol 46, 2, 153-90 https://www.ncbi.nlm.nih.gov/pubmed/26513508	A comprehensive review of published and previously unpublished studies was performed to evaluate the neonicotinoid insecticides for evidence of developmental neurotoxicity (DNT). These insecticides have favorable safety profiles, due to their preferential affinity for nicotinic receptor (nAChR) subtypes in insects, poor penetration of the mammalian blood-brain barrier, and low application rates. Nevertheless, examination of this issue is warranted, due to their insecticidal mode of action and potential exposure with agricultural and residential uses. This review identified in vitro, in vivo, and epidemiology studies in the literature and studies performed in rats in accordance with GLP standards and EPA guidelines with imidacloprid, acetamiprid, thiacloprid, clothianidin, thiamethoxam, and dinotefuran, which are all the neonicotinoids currently registered in major markets. For the guideline-based studies, treatment was administered via the diet or gavage to primiparous female rats at three dose levels, plus a vehicle control ($>/=20$ /dose level), from gestation day 0 or 6 to lactation day 21. F1 males and females were evaluated using measures of motor activity, acoustic startle response, cognition, brain morphometry, and neuropathology. The principal effects in F1 animals were associated with decreased body weight (delayed sexual maturation, decreased brain weight, and morphometric measurements) and acute toxicity (decreased activity during exposure) at high doses, without neuropathology or impaired cognition. No common effects were identified among the neonicotinoids that were consistent with DNT or the neurodevelopmental effects associated with nicotine. Findings at high doses were associated with evidence of systemic toxicity, which indicates that these insecticides do not selectively affect the developing nervous system.
1	Cyclooxygenase-2-Derived Prostaglandins Mediate Cerebral Microcirculation in a Juvenile Ischemic Rat Model	P. L. P. Leger, J., et. al. Stroke 47, 12, 3048-3052 https://www.ncbi.nlm.nih.gov/pubmed/27834752	BACKGROUND AND PURPOSE: We previously showed that the selective neuronal nitric oxide synthase inhibitor 7-nitroindazole (7-NI) increases cerebral microcirculation in a juvenile ischemic rat model. We address the roles of cyclooxygenase (COX)-elaborated prostaglandins in collateral recruitment and blood supply. METHODS: Fourteen-day-old rats were subjected to ischemia-reperfusion and treated with either PBS or 7-NI (25 mg/kg) at the reperfusion onset. Six-keto-prostaglandin F1alpha was measured using ELISA. COX-1 and COX-2 and prostaglandin terminal synthesizing enzymes were evaluated using reverse-transcriptase polymerase chain reaction and immunofluorescence. Microvascular blood flow indexes (artery diameter and capillaries number) were measured using sidestream dark-field videomicroscopy in PBS- and 7-NI-treated ischemic rats in the absence or presence of the COX-2 inhibitor NS-398 (5 mg/kg). Cell death was measured with the TUNEL (terminal transferase dUTP nick end labeling) assay and cleaved-caspase-3 immunostaining. RESULTS: Six-keto-prostaglandin F1alpha and COX-2, associated with a prostaglandin E synthase, were significantly increased in PBS- and 7-NI-treated animals 15 minutes and 1 hour after ischemia-reperfusion, respectively. In contrast and as compared with PBS, 7-NI significantly decreased prostacyclin synthase and cytosolic prostaglandins E synthase mRNA. Selective COX-2 inhibition significantly decreased blood flow indexes and significantly reversed the effects of 7-NI, including the number of TUNEL(+) and cleaved-caspase-3(+) nuclei. CONCLUSIONS: These results show that the juvenile rat brains mostly respond to ischemia by a COX-2-dependent prostaglandins production and suggest that the transcriptional responses observed under 7-NI facilitate and reorient COX-2-dependent prostaglandins production.
5	Degradation and monitoring of acetamiprid, thiabendazole and their transformation products in an agro-food industry effluent during solar photo-Fenton treatment in a raceway pond reactor	Carra, I., et al. (2015). "Degradation and monitoring of acetamiprid, thiabendazole and their transformation products in an agro-food industry effluent during solar photo-Fenton treatment in a raceway pond reactor." Chemosphere 130: 73-81.	In this study, pesticides acetamiprid and thiabendazole and their transformation products (TPs), seven from each pesticide, were successfully monitored during solar photo-Fenton treatment in a real secondary effluent from an agro-food industry spiked with 100 μ g/L of each pesticide. To this end, a highly sensitive procedure was developed, based on liquid chromatography (LC) coupled to hybrid quadrupole-linear ion trap mass spectrometry (QqLIT-MS). In addition, finding low-cost and operational technology for the application of AOPs would then facilitate their use on a commercial level. Simple and extensive photoreactors such as raceway pond reactors (RPRs) are therefore proposed as an alternative for the application of solar photo-Fenton. Results showed that high degradation could be achieved in a complex water matrix ($>99\%$ TBZ and 91% ACTM in 240min) using a 120-L RPR pilot plant as novel technology. The analyses indicated that after the treatment only three TPs from ACTM were still present in the effluent, while the others had been removed. The study showed that the goal of either just removing the parent compounds, or going one step further and removing all the TPs, can significantly change the treatment time, which would affect process costs.
5	Degradation of acetamiprid in UV/H2O2 and UV/persulfate systems: A comparative study	Chen, L., et al. (2018). "Degradation of acetamiprid in UV/H2O2 and UV/persulfate systems: A comparative study." Chemical Engineering Journal 351: 1137-1146.	Acetamiprid (ACE) was degraded by using ultraviolet (UV) irradiation and UV based advanced oxidation processes (AOPs) including UV/hydrogen peroxide (UV/H2O2) and UV/potassium persulfate (UV/PS). Among them, UV/PS process exhibited the best performance for the elimination of ACE and reduction of total organic carbon (TOC). The degradation kinetics was comprehensively compared in terms of dose of oxidants, solution pH, and water matrix species. A linear relationship was tentatively developed between the [Oxidant]/[ACE] ratio and the pseudo-first-order kinetic rate constant (k). The degradation was significantly inhibited at basic conditions no matter for UV/H2O2 process or UV/PS process. The effects induced by the water matrix species including inorganic anions and natural organic matter (NOM) were also non-negligible. For UV/PS process, both SO4 ²⁻ and HO contributed to the ACE degradation, whereas only HO participated in the degradation in the UV/H2O2 process. The corresponding second-order rate constants of ACE with HO and SO4 ²⁻ were determined to be 7.59×10^8 and $3.68 \times 10^8 \text{ M}^{-1} \text{ s}^{-1}$, respectively. Due to the different active radical species, different degradation products were detected through the HPLC-MS analysis. This work would be meaningful for the remediation of ACE from water by AOPs.
13	Degradation of neonicotinoid insecticide acetamiprid by two different nitrile hydratases of Pseudaminobacter salicylatoxidans CGMCC 1.17248	Guo, L., et al. (2021). "Degradation of neonicotinoid insecticide acetamiprid by two different nitrile hydratases of Pseudaminobacter salicylatoxidans CGMCC 1.17248." International Biodeterioration & Biodegradation 157: 105141.	Acetamiprid is a neonicotinoid insecticide used worldwide that has caused environmental pollution and adverse effects on ecosystems. Here, a novel bacterium, Pseudaminobacter salicylatoxidans CGMCC 1.17248, was isolated to rapidly degrade acetamiprid to IM-1-2 via hydration. Gene cloning and overexpression demonstrated that two nitrile hydratases, AnhA and AnhB, converted acetamiprid to IM-1-2. Escherichia coli overexpressing AnhA and AnhB degraded 98.1% and 94.0% of acetamiprid (1.0 mmol L ⁻¹) in 5 min and 8 h, respectively. The pure AnhA and AnhB had a Vmax value of 14.12 and 1.20 μ mol mg ⁻¹ min ⁻¹ , respectively, and a Km value of 1.02 mmol L ⁻¹ and 2.95 mmol L ⁻¹ , respectively. Compared with AnhA, AnhB had broad pH stability, as well as metal ions and organic solvents tolerance. Expression of AnhA and AnhB was induced by decreasing the nutrient concentration of culture broth and addition of urea and therefore significantly enhanced acetamiprid degradation of CGMCC 1.17248. qPCR indicated that the expression of AnhA and AnhB under the cultured conditions of 1/15 lysogeny broth or 0.5% urea addition was improved by from 2.2 to 5.3 times. The results presented herein will facilitate development of bioremediation agents for acetamiprid pollution and understanding of the functional role of bacterial nitrile hydratase.

Phase 1 Conformity category	Title	Citation	Abstract
13	Degradation of neonicotinoids by UV irradiation: Kinetics and effect of real water constituents	Acero, J. L., et al. (2019). "Degradation of neonicotinoids by UV irradiation: Kinetics and effect of real water constituents." Separation and Purification Technology 211: 218-226.	Neonicotinoids are a new class of insecticides whose potential side-effects on the human health and the environment have not yet been well investigated. Recently, the EU approved the Decision 2015/495 establishing a watch list of substances for Union-wide monitoring in the field of water policy, which includes five neonicotinoids: thiamethoxam (TMX), imidacloprid (ICP), clothianidin (CTD), thiacloprid (TCP) and acetamiprid (AMP). The photodegradation of neonicotinoids by monochromatic UV irradiation (254 nm) has been investigated. The photolysis rate followed pseudo-first order kinetics, with rate constant values depending on the nature of the specific compound, pH, and the presence or absence of radical scavengers. A method based on atrazine actinometry provided the following quantum yields at pH = 7: $(77 \pm 3) \times 10^{-3}$, $(43 \pm 2) \times 10^{-3}$, $(48 \pm 1) \times 10^{-3}$, $(17 \pm 2) \times 10^{-3}$ and $(5 \pm 2) \times 10^{-3}$ mol E ⁻¹ for TMX, CTD, ICP, TCP and AMP, respectively. The effects of the presence of bicarbonate, nitrate, nitrite and chloride ions on the simultaneous photodegradation of nicotinoids were not very significant, and only the removal of AMP, the least photosensitive neonicotinoid, was negatively affected. However, the photodegradation of neonicotinoids was clearly inhibited by the addition of humic acids. The results obtained in experiments performed in the presence of hydrogen peroxide or persulfate indicated that while direct UV photolysis was the main degradation pathway for TMX and even for CTD, ICP and TCP, the contribution of indirect photolysis (radical pathway) was important in the case of pollutants with low values of quantum yield such as AMP. Although the presence of natural organic and inorganic matter in real water matrices decreased the degradation rate of the selected neonicotinoids, UV photolysis and the AOPs UV/H ₂ O ₂ and UV/PS processes constitute efficient technologies for the removal of these pollutants from contaminated waters.
13	Degradation of the Neonicotinoid Insecticide Acetamiprid via the N-Carbamoylimine Derivate (IM-1-2) Mediated by the Nitrile Hydratase of the Nitrogen-Fixing Bacterium Ensifer melliloti CGMCC 7333	L. Y. Z. Zhou, L. J., et. al. J Agric Food Chem 62, 41, 9957-64 https://www.ncbi.nlm.nih.gov/pubmed/25285354	The metabolism of the widely used neonicotinoid insecticide acetamiprid (ACE) has been extensively studied in plants, animals, soils, and microbes. However, hydration of the N-cyanoimine group in ACE to the N-carbamoylimine derivate (IM-1-2) by purified microbes, the enzyme responsible for this biotransformation, and further degradation of IM-1-2 have not been studied. The present study used liquid chromatography-mass spectrometry and nuclear magnetic resonance spectroscopy to determine that the nitrogen-fixing bacterium Ensifer melliloti CGMCC 7333 transforms ACE to IM-1-2. CGMCC 7333 cells degraded 65.1% of ACE in 96 h, with a half-life of 2.6 days. Escherichia coli Rosetta (DE3) overexpressing the nitrile hydratase (NHase) from CGMCC 7333 and purified NHase converted ACE to IM-1-2 with degradation ratios of 97.1% in 100 min and 93.9% in 120 min, respectively. Interestingly, IM-1-2 was not further degraded by CGMCC 7333, whereas it was spontaneously hydrolyzed at the N-carbamoylimine group to the derivate ACE-NH, which was further converted to the derivate ACE-NH ₂ . Then, ACE-NH ₂ was cleaved to the major metabolite IM-1-4. IM-1-2 showed significantly lower insecticidal activity than ACE against the aphid Aphis craccivora Koch. The present findings will improve the understanding of the environmental fate of ACE and the corresponding enzymatic mechanisms of degradation.
13	Degradation of the Neonicotinoid Pesticides in the Atmospheric Pressure Ionization Source	Y. C. Chai, H., et. al. J Am Soc Mass Spectrom 29, 2, 373-381 https://www.ncbi.nlm.nih.gov/pubmed/29260456	During the analysis of neonicotinoid pesticide standards (thiamethoxam, clothianidin, imidacloprid, acetamiprid, and thiacloprid) by mass spectrometry, the degradation of these pesticides (M-C=N-R is degraded into M-C=O, M is the skeleton moiety, and R is NO ₂ or CN) was observed in the atmospheric pressure ionization interfaces (ESI and APCI). In APCI, the degradation of all the five neonicotinoid pesticides studied took place, and the primary mechanism was in-source ion/molecule reaction, in which a molecule of water (confirmed by use of H ₂ (18)O) attacked the carbon of the imine group accompanying with loss of NH ₂ R (R=NO ₂ , CN). For the nitroguanidine neonicotinoid pesticides (R=NO ₂ , including thiamethoxam, clothianidin, and imidacloprid), higher auxiliary gas heater temperature also contributed to their degradation in APCI due to in-source pyrolysis. The degradation of the five neonicotinoid pesticides studied in ESI was not significant. In ESI, only the nitroguanidine neonicotinoid pesticides could generate the degradation products through in-source fragmentation mechanism. The degradation of cyanoamidine neonicotinoid pesticides (R=CN, including acetamiprid and thiacloprid) in ESI was not observed. The degradation of neonicotinoid pesticides in the ion source of mass spectrometer renders some adverse consequences, such as difficulty interpreting the full-scan mass spectrum, reducing the sensitivity and accuracy of quantitative analysis, and misleading whether these pesticides have degraded in the real samples. Therefore, a clear understanding of these unusual degradation reactions should facilitate the analysis of neonicotinoid pesticides by atmospheric pressure ionization mass spectrometry. Graphical Abstract.
13	A density functional theoretical study of the hydrolysis mechanism of three neonicotinoid based pesticides	Nelson, P. N. (2021). "A density functional theoretical study of the hydrolysis mechanism of three neonicotinoid based pesticides." Journal of Molecular Structure 1230: 129909.	The hydrolysis mechanisms for three popular neonicotinoid based pesticides: Imidacloprid, Thiacloprid and Acetamiprid, are investigated via Density Functional Theoretical (DFT) modelling. Their complete hydrolysis proceeds via three successive cyclic transition states which differ in structure; the activation energetics and hence, kinetics of which are controlled primarily by the structure of the leaving group whereas the overall reaction potentials are dictated by enthalpic factors. Overall, their hydrolysis pathways can be separated into primary and secondary: successive addition of two water molecules, first to the starting neonicotinoids and then to the products of this first process. Of all three compounds, lowest primary hydrolysis activation barriers allow fastest hydrolysis of imidacloprid whereas the secondary hydrolysis occurs fastest for acetamiprid. Overall, a shorter environmental residence time is most probable for imidacloprid.
1	Depressive-like behavior induced by tumor necrosis factor-alpha is abolished by agmatine administration	Neis VB, Manosso LM, Moretti M, Freitas AE, Daufenbach J, Rodrigues AL. Depressive-like behavior induced by tumor necrosis factor- α is abolished by agmatine administration. Behav Brain Res. 2014 Mar 15;261:336-44.	Agmatine, an endogenous cationic amine, has been shown to exert antidepressant-like effects. This study investigated the ability of agmatine administered orally to abolish the depressive-like behavior induced by the administration of the pro-inflammatory cytokine, tumor necrosis factor (TNF- α) in mice. In control animals, agmatine (0.001, 0.01, 0.1, and 1 mg/kg) reduced the immobility time in the tail suspension test (TST). Acute administration of TNF- α (0.001 fg/mouse, i.c.v.) increased immobility time in the TST, indicative of a depressive-like behavior, and agmatine (0.0001, 0.1, and 1 mg/kg) prevented this effect. Additionally, we examined the effects of the combined administration of sub-effective doses of agmatine with antidepressants, the NMDA receptor antagonist MK-801 and the neuronal nitric oxide synthase inhibitor 7-nitroindazole (7-NI) in mice exposed to either TNF- α or saline. In control mice, administration of a sub-effective dose of agmatine (0.0001 mg/kg) combined with sub-effective doses of either fluoxetine (5 mg/kg, p.o.), imipramine (0.1 mg/kg, p.o.), bupropion (1 mg/kg, p.o.), MK-801 (0.001 mg/kg, p.o.) or 7-NI (25 mg/kg, i.p.) produced a synergistic antidepressant-like effect in the TST. All these administrations prevented the increased immobility time induced by TNF- α . The effect of agmatine in the TNF- α model of depression appears to be associated, at least partially, with an activation of the monoaminergic systems and inhibition of NMDA receptors and nitric oxide synthesis, although converging signal transduction pathways that may underlie the effect of agmatine should be further investigated. This set of results indicates that agmatine may constitute a new therapeutic alternative for the treatment of depression associated with inflammation.
13	Desalination of Groundwater from a Well in Puglia Region (Italy) by Al ₂ O ₃ -Doped Silica and Polymeric Nanofiltration Membranes	X. Q.-J. Ma, C. A., et. al. Nanomaterials (Basel) 10, 9, https://www.ncbi.nlm.nih.gov/pubmed/32882979	Some of the groundwater aquifers in the Puglia Region, Italy, suffer from high salinity and potential micropollutant contamination due to seawater infiltration and chemical discharge. The objective of this study is twofold: to evaluate the performance of the recently reported alumina-doped silica nanofiltration membranes for water potabilization, and to provide a possible solution to improve the groundwater quality in the Puglia Region while maintaining a low energy-footprint. Two lab-made alumina-doped silica membranes with different pore structures, namely S/O = 0.5 and S/O = 2, were tested with real groundwater samples and their performances were compared with those of a commercial polymeric membrane (Dow NF90). Moreover, groundwater samples were spiked with acetamiprid, imidacloprid, and thiacloprid to test the membrane performance in the presence of potential contamination by pesticides. At a trans-membrane pressure of 5 bar, NF90 could reduce the groundwater conductivity from 4.6 to around 1.3 mS.cm ⁻¹ and reject 56-85% of the model pesticides, with a permeate flux of 14.2 L.m ⁻² .h ⁻¹ (-1). The two inorganic membranes S/O = 2 and S/O = 0.5 reduced the permeate conductivity to 3.8 and 2.4 mS.cm ⁻¹ (-1), respectively. The specific energy consumption for all three membranes was below 0.2 kWh.m ⁻³ (-3) which indicates that the potabilization of this groundwater by nanofiltration is commercially feasible.

Phase 1 Conformity category	Title	Citation	Abstract
1	Determination of background levels and pollution assessment for seven metals (Cd, Cu, Ni, Pb, Zn, Fe, Mn) in sediments of a Mediterranean coastal lagoon	Hernández-Crespo, C. and M. Martín (2015). "Determination of background levels and pollution assessment for seven metals (Cd, Cu, Ni, Pb, Zn, Fe, Mn) in sediments of a Mediterranean coastal lagoon." Catena 133: 206-214.	The determination of background levels of trace metals in soils and sediments is a key point for the proper assessment of pollution degree. This study demonstrates the suitability of integrating geological and statistical methods for the reliable determination of background levels, applying it to the sediments of Lake Albufera, a wetland of international importance that is highly eutrophic. The procedure followed includes sampling of sediment cores at different points of the lake, including reference sites, and the subsequent statistical analysis of the data, comprising descriptive statistics, probabilistic plots and modal analysis. The final proposal of background levels considers the data subset separated by the statistical analysis and the spatial and age characteristics of sediments, proving the usefulness of jointly using geological and statistical methods. The upper limits of the background populations, defined as the mean + 2 σ and expressed in mg/kg, are Cd (0.38), Cu (28.8), Ni (25.9), Pb (25.5), Zn (88.6), Fe (2.2%) and Mn (345.7). Background levels proposed for different parts of Spain, found in an extensive literature review, are also provided in this article. Once determined the background levels, the assessment of pollution degree of sediments using pollution indexes indicates that the top 25 to 30 cm of sediments has a pollution level between moderate and severe in the peripheral sites, which are nearest to the pathways of contamination, and that the north zone of the lake is the most polluted by the group of the five metals, including Cd, Cu, Ni, Pb and Zn.
13	Determination of H2O2 by MnO2 modified screen printed carbon electrode during Fenton and visible light-assisted photo-Fenton based removal of acetamiprid from water	Zbiljić, J., et al. (2015). "Determination of H2O2 by MnO2 modified screen printed carbon electrode during Fenton and visible light-assisted photo-Fenton based removal of acetamiprid from water." Journal of Electroanalytical Chemistry 755: 77-86.	In this work, the applicability of screen printed carbon electrode bulk modified with MnO2 as a mediator was investigated for hydrodynamic chronoamperometric determination of the H2O2 content during the Fenton (Fe2+, H2O2) and the catalytic, visible light-assisted, photo-Fenton (Fe2+, H2O2, h ν) based removal of the worldwide used neonicotinoid insecticide acetamiprid which has a pyridine ring and a cyano-imine group in its basic skeleton. For the optimisation of the analytical method cyclic voltammetric, differential pulse voltammetric and hydrodynamic chronoamperometric experiments were performed in model solutions containing the phosphate buffer supporting electrolyte pH7.5, H2O2, and/or Fe2+ and acetamiprid. Under optimized conditions at the working potential of 0.40V vs. saturated calomel electrode in the slightly alkaline supporting electrolyte, electrocatalytic hydrodynamic chronoamperometric determination of H2O2 showed a linear dynamic range from 0.01–1.24mM, and the relative standard deviation did not exceed 4.2%. In the investigated samples (after appropriate pH adjustment, filtering, and storage of the deep-frozen sample with defrosting immediately before the measurements) the H2O2 contents were determined from the hydrodynamic chronoamperometric curves by the standard addition method. Parallel HPLC-DAD measurements were performed to monitor the concentration/removal of acetamiprid. In the case of the photo-Fenton process (initial concentrations: 0.31; 2.0 and 3.0mM of acetamiprid, Fe2+ and H2O2, respectively) after 10min of irradiation H2O2 was consumed, while during the Fenton process acetamiprid was removed after 20min of treatment and around 10% of the initial concentration of the H2O2 remained still unused.
5	Determination of Neonicotinoid Insecticides and Strobilurin Fungicides in Particle Phase Atmospheric Samples by Liquid Chromatography-Tandem Mass Spectrometry	R. Raina-Fulton J Agric Food Chem 63, 21, 5152-62 https://www.ncbi.nlm.nih.gov/pubmed/25961332	A liquid chromatography-tandem mass spectrometry method has been developed for the determination of neonicotinoids and strobilurin fungicides in the particle phase fraction of atmosphere samples. Filter samples were extracted with pressurized solvent extraction, followed by a cleanup step with solid phase extraction. Method detection limits for the seven neonicotinoid insecticides and six strobilurin fungicides were in the range of 1.0-4.0 pg/m(3). Samples were collected from June to September 2013 at two locations (Osoyoos and Oliver) in the southern Okanagan Valley Agricultural Region of British Columbia, where these insecticides and fungicides are recommended for use on tree fruit crops (apples, pears, cherries, peaches, apricots) and vineyards. This work represents the first detection of acetamiprid, imidacloprid, clothianidin, kresoxim-methyl, pyraclostrobin, and trifloxystrobin in particle phase atmospheric samples collected in the Okanagan Valley in Canada. The highest particle phase atmospheric concentrations were observed for imidacloprid, pyraclostrobin, and trifloxystrobin at 360.0, 655.6, and 1908.2 pg/m(3), respectively.
8,9	Determination of neonicotinoids and butenolide residues in avian and insect pollinators and their ambient environment in Western Canada (2017-2018)	Bishop, C. A., et al. (2020). "Determination of neonicotinoids and butenolide residues in avian and insect pollinators and their ambient environment in Western Canada (2017, 2018)." Science of The Total Environment 737: 139386.	To examine the spatial, and temporal variation and potential sources of pesticide concentrations, primarily neonicotinoid insecticides, in hummingbirds in western Canada, we sampled their cloacal fluid from sites in British Columbia and Saskatchewan, Canada in 2017–2018. At a sub-sample of those sites, we also measured pesticides in honey bee (<i>Apis mellifera</i>) nectar, water, and sediment. We collected cloacal fluid from 5 species of hummingbirds (n = 26 sites) in British Columbia (BC) and Saskatchewan, Canada, and nectar from honey bee hives (n = 4 sites), water and sediment (n = 18 sites) in the Fraser Valley, BC. Among those, multiple types of samples were collected at 6 sites. We report the first measurement of flupyradifurone, a relatively new butenolide insecticide, in wildlife which was detected at 4.58 ng/mL in hummingbird cloacal fluid and 2.18 ng/g in honey bee nectar. We also detected three other neonicotinoids (imidacloprid, clothianidin, acetamiprid) and one metabolite desnitro-imidacloprid, and MGK264, a pesticide synergist, in our samples. Among 49 samples of cloacal fluid from rufous (<i>Selasphorus rufus</i>), Anna's (<i>Calypte anna</i>), calliope (<i>Selasphorus calliope</i>) black-chinned (<i>Archilocus alexandri</i>) and ruby-throated hummingbirds (<i>Archilocus colubris</i>), 26.5% (n = 13) contained neonicotinoids. Maximum pesticide concentrations in hummingbirds, water and sediment were found in samples collected in the Fraser Valley, BC within 0.5 km of conventionally sprayed blueberry fields (CSBF) but highest levels in honey bee nectar were detected at a site 1.5 km from a CSBF. Imidacloprid in honey bee nectar at one site exceeded concentrations (>1 ng/g) that can sublethally affect worker bee foraging efficiency. In water, imidacloprid concentrations at another site exceeded Canadian guidelines (230 ng/mL) for the protection of aquatic invertebrates.
5	Determination of Pesticides in Water and Sediment by Hplc-Hrms and Its Relationship with the Use and Land Occupation	Chiarello, M., et. al. Determination of Pesticides in Water and Sediment by Hplc-Hrms and Its Relationship with the Use and Land Occupation. Artigo • Quim. Nova 40 (2) • Feb 2017	In present times, the Brazil is in the middle of the largest pesticide consumers worldwide, which demands proper control of environmental contamination. This study evaluated herbicides, acaricide, insecticides and fungicides in water and sediment carried-out from Lageado Tacongava hydrographic basin, Rio Grande do Sul, Brazil. For analysis, a QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe), and/or SPE (Solid-Phase Extraction) using HPLC (High Performance Liquid Chromatography) with MS (Mass Detector) was optimized. As result, the Linearity R2 > 0.99; Recuperation between 78 a 117%; and RSD < 20% for the 70 compounds simultaneously analyzed. The Acetamiprid, Azoxystrobin, Bendiocarb, Fenamidone, metribuzin, Pendimethalin, pyridaben, Thiophanate-methyl and Trifluralin found in water, and Acetamiprid, Azoxystrobin, Bendiocarb, boscalid and thiophanate-methyl in sediment, at concentrations from 0.1 µg kg-1 to 39.6 µg kg-1. Standard of pesticide residues in water and sediment studies are needed to evaluate such contamination. Regional samplings standard, as was done here, will be useful in a future water resources contamination mapping.
15	Development and Calibration of the Polar Organic Chemical Integrative Sampler (POCIS) for Neonicotinoid Pesticides	K. E. Noro, S., et. al. Environ Toxicol Chem 39, 7, 1325-1333 https://www.ncbi.nlm.nih.gov/pubmed/32348590	Neonicotinoid pesticides are highly hydrophilic systemic insecticides that have been extensively used worldwide. To evaluate their environmental risks, the concentrations of these pesticides in the aquatic environment must be monitored. Although the polar organic chemical integrative sampler (POCIS) has proved to be a suitable passive sampler for many highly hydrophilic compounds, Oasis HLB (Waters) POCIS has shown limitations for the monitoring of neonicotinoid pesticides, such as short linear uptake ranges. In the present study we optimized POCIS for neonicotinoid pesticides by selecting suitable adsorbents and filters. The ENVI-Carb (Supelco) nonporous carbon-based adsorbent demonstrated a good balance between strong sorption and high recovery. Static renewal experiments showed that the our POCIS device using ENVI-Carb with a polyethersulfone membrane filter had a 3 d (dinotefuran) to 28 d (clothianidin, imidacloprid, acetamiprid, and thiacloprid) linear range, which is longer than that of HLB POCIS (</=1 [dinotefuran] to 14 d). The POCIS using ENVI-Carb with a polytetrafluoroethylene membrane had higher sampling rates (0.270 L/d [clothianidin] to 0.686 [imidacloprid] L/d) than those of the HLB POCIS for short-term deployment. The time-weighted average concentrations in actual river water measured by the new POCIS were in good agreement with those obtained by repeated grab sampling, within 30%. Moreover, POCIS detected 2 neonicotinoid pesticides that were not detected by grab sampling. Thus, the proposed POCIS is a promising tool for the monitoring of neonicotinoid pesticides. Environ Toxicol Chem 2020;39:1325-1333. (c) 2020 SETAC.

Phase 1 Conformity category	Title	Citation	Abstract
13	Development and evaluation of alginate-chitosan nanocapsules for controlled release of acetamiprid	S. C. Kumar, N., et. al. Int J Biol Macromol 81, , 631-7 https://www.ncbi.nlm.nih.gov/pubmed/26321424	Smart formulations based on nanomaterials have the capability to reduce the consumption of hazardous pesticides and their impact on human health and environment. Nanoformulations of agrochemicals have the potential to improve food productivity without compromising with the ecosystem. In the present work, controlled release nanocapsules containing acetamiprid were prepared by polyelectrolyte complexation of two natural macromolecules, i.e. alginate and chitosan. The size, morphology and chemical interaction studies of the prepared nanocapsules were investigated by Dynamic Light Scattering (DLS), Transmission Electron Microscopy (TEM), and Fourier Transform Infrared Spectroscopy (FTIR). The zetapotential studies revealed stability of the nanocapsules. TEM results show spherical morphology of the nanocapsules. The encapsulation efficiency was found to be 62% as quantified by Ultra High Pressure Liquid Chromatography (UHPLC). Nanocapsules were analysed for controlled release in vitro at three different pH. Maximum release was observed at pH 10 followed by pH 7 and 4, respectively. A non-Fickian release mechanism was found to be followed by the nanoformulation. A controlled release pattern was also found from nanoformulation as compared to commercial formulation in soil. Thus this formulation can reduce the frequency of application of pesticides by controlling the release and will subsequently reduce their side effects.
5	Development and Validation of an Ultra-Sensitive UHPLC-MS/MS Method for Neonicotinoid Analysis in Milk	L. G. Lachat, G. J Agric Food Chem 66, 32, 8639-8646 https://www.ncbi.nlm.nih.gov/pubmed/30025459	A very sensitive ultrahigh performance liquid chromatography-tandem mass spectrometry (UHPLC-MS/MS) method was developed and validated for the quantitation of the most common neonicotinoids (thiamethoxam, clothianidin, imidacloprid, acetamiprid, and thiacloprid) at trace levels in milk. Using fast and selective liquid-liquid extraction (LLE) starting from 0.5 mL of milk, lowest limits of quantitation (LLOQ) equal or lower than 10 pg/mL for all analytes were achieved. Precision and accuracy were evaluated at four different concentrations (5, 10, 500, and 10000 pg/mL) and ranged between 2 and 16% (RSD) and 77-125%, respectively. Extraction recoveries and matrix effects ranged between 64 and 76% and 88-98%, respectively. The method was applied to measure neonicotinoid levels in a series of conventional and organic Swiss milks as well as in human breast milk and commercial powdered milk. More than 90% of the samples tested positive for at least one neonicotinoid. However, all animal samples were far below the maximum residue limits authorized for human consumption with average total neonicotinoid levels of 16.1 +/- 13.1 pg/mL. Human breast milks and powdered milks contained similar amounts of neonicotinoids. Taken together, our results demonstrate the high prevalence of neonicotinoids in milk from all origins, albeit at levels considered to be safe for human consumption.
5	Development and validation of two robust simple chromatographic methods for estimation of tomatoes specific pesticides' residues for safety monitoring prior to food processing line and evaluation of local samples	A. M. A. Hegazy, R. M., et. al. Food Chem 306, , 125640 https://www.ncbi.nlm.nih.gov/pubmed/31606625	Combination of pesticides; acetamiprid, flutolanil and etofenprox are usually used for tomato fruits for protecting them against pest infection. Generally, pesticides, residues could be one of the health hazard sources. Two specific simple sensitive chromatographic methods are developed for simultaneous estimation of the concerning pesticides' residues using simple economic steps of field sample preparation. The first method is HP- TLC method. Hexane: methanol: acetone: glacial acetic acid (8:2:0.5:0.1, by volume) is proposed as a developing system. The second one is RP- HPLC. Acetonitrile: water (75:25, v/v) is proposed as a mobile phase. The recommended methods are completely validated regarding ICH guidelines. Their means percentages and standard deviations of accuracy range 100.32+/-0.89 to 99.27+/-0.9. The methods' repeatability and intermediate precision relative standard deviation percentages range 0.395-0.894. They are successfully applied for estimating the pesticides in pure and commercial forms and field samples.
5	Development of a Facile and High-Throughput Bioluminescence Assay Using Vibrio fischeri to Determine the Chronic Toxicity of Contaminated Samples	Nasuhoglu D, Westlund P, Isazadeh S, Neamatallah S, Yargeau V. Development of a Facile and High-Throughput Bioluminescence Assay Using Vibrio fischeri to Determine the Chronic Toxicity of Contaminated Samples. Bull Environ Contam Toxicol. 2017 Feb;98(2):196-203.	Chronic toxicity testing using the luminescent bacterium, Vibrio fischeri, has recently been demonstrated to be a suitable bioassay for water quality monitoring. The toxicity evaluation is typically based on determining the EC50 at specific time points which may lead to overlooking the dynamic nature of luminescence response and limits information regarding the possible mechanisms of action of target compounds. This study investigated various approaches (standard, integral, and luminescence rate inhibition) to evaluate the chronic toxicity of three target compounds (atrazine, trimethoprim, and acetamiprid) using a 96-well plate based method. The chronic toxicity assay and the methods used for EC50 calculation provided in this work resulted in a high-throughput method of chronic toxicity testing and indicated lower EC50 than the values provided by the standard short term methods, indicating higher toxicity. This study emphasizes the need for additional chronic toxicity testing to further evaluate the toxicity of compounds or unknown samples.
5	Development of a high-throughput multi-residue method for analysis of common pesticides in aquatic environments by automated online solid phase extraction coupled with LC-MS/MS	T. Z. Wang, M. , et. al. Anal Methods 13, 28, 3160-3171 https://www.ncbi.nlm.nih.gov/pubmed/34164633	The present work describes the development of a fully automated method based on online solid phase extraction (SPE)-liquid chromatography-tandem mass spectrometry (LC-MS/MS) for the simultaneous analysis of multiple classes of pesticides or metabolites in drinking water (DW), surface water (SW), and wastewater effluents (WWEs). The target list covers 111 pesticides or metabolites of various properties and families. LC-MS/MS and online SPE parameters were optimized with regard to the sorbent type, mobile phase composition, wash volume, and flowrate as well as the injection volume. The method showed good linearity in two concentration ranges with 97% and 94% of the coefficients (R(2)) being higher than 0.99 in the low concentration range (0.1-100 ng L ⁻¹) and high concentration range (100-2500 ng L ⁻¹), respectively. High sensitivity was observed with method quantification limits (MQLs) of 0.03-5.3 ng L ⁻¹ , 0.06-17 ng L ⁻¹ , and 0.08-21 ng L ⁻¹ , for DW, SW, and WWE, respectively. The recoveries showed an accuracy of 94%, 91%, and 91% in the range of 70-130% for three matrices with satisfactory precision. The overall analysis time per sample was 30 min with minimum pretreatment. To the best of our knowledge, for the first time, 64 pesticides were identified by the high throughput online SPE-based method. The optimized method was used for WWE sample analysis, and 49 pesticides were detected in 12 WWE samples from an economically active city in China. Five pesticides were detected in all the samples, i.e. paclobutrazol, atrazine, diuron, acetamiprid, and triadimenol, and the highest median concentration was observed for carbendazim (324 ng L ⁻¹). The advantages of the proposed method over offline ones make it have broad prospects in high throughput and reliable analysis of pesticides in aquatic environments.
5	Development of Artificial Urine Certified Reference Material for Quantification of Neonicotinoid Insecticides	T. N. Otake, S. F..et. al. J AOAC Int 103, 6, 1469-1477 https://www.ncbi.nlm.nih.gov/pubmed/33247745	BACKGROUND: Neonicotinoid insecticides (neonicotinoids) are widely used, however, they can negatively affect human health. Thus, neonicotinoids and their metabolites in human urine are analyzed globally to assess exposure levels and health risks. To properly assess the exposure levels and health risks, accurate analytical results are a necessity. OBJECTIVE: This study aims to develop urine certified reference material (CRM), NMJ CRM 7408-a, for the quantification of neonicotinoids. METHOD: To develop NMJ CRM 7408-a, commercially available artificial urine was used as the raw material to which the target neonicotinoids were added. Analyses of neonicotinoids in NMJ CRM 7408-a were carried out by isotope dilution mass spectrometry (IDMS). RESULTS: Sample homogeneity was assessed, with the results showing that acetamiprid, clothianidin, thiacloprid, and thiamethoxam exhibited sufficiently homogeneous distributions in the material. The relative uncertainties due to inhomogeneity were 1.2-7.0%. The results obtained from long-term stability assessment indicated that the target neonicotinoids were stable. The relative uncertainties due to instability were 9.4-17.2% (for an expiry date of 21 months). The characterization for providing concentration values was carried out using one (clothianidin and thiacloprid) or two (acetamiprid and thiamethoxam) analytical methods. The certified values of the target neonicotinoids (acetamiprid, clothianidin, thiacloprid, and thiamethoxam) were 0.19-1.38 microg/kg. CONCLUSIONS: This is the first frozen artificial urine CRM in which neonicotinoids were quantified by IDMS and will be useful for evaluating the accuracy of analysis and validation of analytical methods for the determination of neonicotinoids in urine. HIGHLIGHTS: NMJ CRM 7408-a, which has been certified for four neonicotinoids, was developed by NMJ.

Phase 1 Conformity category	Title	Citation	Abstract
5	Development of Fluorescence Polarization Immunoassay for Imidacloprid in Environmental and Agricultural Samples	L. Y. Zhou, J., et. al. Front Chem 8, , 615594 https://www.ncbi.nlm.nih.gov/pubmed/33344425	A fluorescence polarization immunoassay (FPIA) for the determination of imidacloprid (IMI) was developed with advantages of simple operation and short assay time. The haptens of IMI, acetamiprid (ACE), and thiamethoxam (THI) were conjugated with fluorescein isothiocyanate ethylenediamine (EDF) and 4'-Aminomethyl fluorescein (AMF), respectively, to prepare six fluorescence tracers. The conjugation of IMI hapten and EDF (IMI-EDF) was selected to develop the FPIA due to the largest fluorescent polarization value increase in the presence of anti-IMI monoclonal antibody. Under the optimum condition, the limit of detection, 50% inhibition concentration and detection range of the FPIA were 1.7, 4.8, and 1.7-16.3 mug/L, respectively. The cross-reactivities (CRs) with the analogs of IMI were negligible except for imidacloprid with CR of 79.13%. The average recovery of spiked paddy water, corn and cucumber samples were 82.4-118.5% with the RSDs of 7.0-15.9%, which indicated the FPIA had good accuracy. Thus, the developed FPIA was a potential tool for the rapid and accurate determination of IMI in agricultural and environmental samples.
5	Development of HPLC-DAD method for determination of neonicotinoids in honey	Jovanov, P., et al. (2015). "Development of HPLC-DAD method for determination of neonicotinoids in honey." Journal of Food Composition and Analysis 40: 106-113.	After the EU banned the use of the neonicotinoids in flowering crops that honeybees might visit, there has been an increased interest in determining the neonicotinoid residues in honeybee products such as honey. The aim of this study was to develop and optimize an HPLC-DAD analytical method with dispersive liquid-liquid microextraction (DLLME) and QuEChERS sample preparation procedures for the simultaneous analysis of seven neonicotinoids (dinotefuran, nitenpyram, thiametoxam, clothianidin, imidacloprid, acetamiprid and thiacloprid) in honey samples. The liquid chromatographic conditions were optimized by Response surface methodology with Box-Behnken design and Derringer's desirability. The optimized method was validated to fulfill the requirements of SANCO/12571/2013 standard for both sample pretreatment procedures providing results for accuracy (73.1–118.3%), repeatability (3.28–10.40%) and within-laboratory reproducibility (6.45–17.70%), limits of detection (1.5–2.5 µg/kg) and quantification (5.0–10.0 µg/kg) with the use of matrix-matched calibration to compensate the matrix effects. For the first time 104 honey samples from Vojvodina were analyzed. The presence of thiacloprid, imidacloprid and thiametoxam was found in a small number of samples implicating the usefulness of ongoing control of honey. Residues were confirmed by LC-MS/MS.
5	Development of hydrophobic deep eutectic solvents for extraction of pesticides from aqueous environments	Florindo, C., et al. (2017). "Development of hydrophobic deep eutectic solvents for extraction of pesticides from aqueous environments." Fluid Phase Equilibria 448: 135-142.	Wastewater treatment plants do not properly address the removal of emerging micropollutants, such as pesticides, and thus these compounds contaminate water sources of public drinking water systems. In this context, this work focuses on the development of hydrophobic deep eutectic solvents (DESSs), as cheap extractants for the removal of four neonicotinoids, Imidacloprid, Acetamiprid, Nitenpyram and Thiamethoxam, from diluted aqueous solutions. In particular, two different families of DESs, one based on natural neutral ingredients (DL-Menthol and natural organic acids) and the other based on quaternary ammonium salts and organic acids were prepared and their water stability carefully studied through 1H NMR. Only the chemically stable DESs were selected to be used as solvents in the extraction of the four neonicotinoids so that no contamination of the water cycle is attained, while reuse of the DES is possible. The final results were compared with those obtained for liquid-liquid extraction using hydrophobic imidazolium-based ionic liquids as solvents.
Ecotoxicology	The development of the solitary bee <i>Osmia bicornis</i> is affected by some insecticide agrochemicals at environmentally relevant concentrations	Mokkapati, J. S., et al. (2021). "The development of the solitary bee <i>Osmia bicornis</i> is affected by some insecticide agrochemicals at environmentally relevant concentrations." Science of The Total Environment 775: 145588.	Solitary bees provide essential pollination services for many arable crops, but are prone to global decline. Agricultural intensification, which is connected with pesticide usage, is among major threats to bees and, thus, to the food security and ecosystem stability. As it may not be possible to cease pesticide usage currently because of the growing demand for food, it is crucial to understand the pesticide toxicities to bees for better protection of pollinator populations. The majority of studies have focused on social bees, and those on solitary bees studied effects of adult exposure, whereas these bees are also likely to be exposed as larvae via the consumption of contaminated pollen. Here, the effects of three commonly used insecticide-based plant protection products on the development of the solitary bee, <i>Osmia bicornis</i> (red mason bee), were studied by exposing larvae to insecticide-contaminated multifloral pollen. The tested insecticides were: Dursban480EC, containing the organophosphate chlorpyrifos (CHP), Sherpa100EC, containing the pyrethroid cypermethrin (CYP), and Mospilan20SP with the neonicotinoid acetamiprid (ACT). When compared to the control larvae fed with uncontaminated-pollen, both CHP and CYP significantly reduced the <i>O. bicornis</i> larval survival and their body mass at all tested concentrations. In contrast, ACT did not affect either larval survival or body mass, but the length of larval stage to cocoon formation was significantly shortened compared to controls. None of studied insecticides affected the mass of cocooned individuals. However, at least 80% of individuals exposed to any of the tested insecticides died before reaching the adult stage, whereas 43% of the controls emerged successfully after overwintering. Although no clear monotonic dose-response relationships were found, our study showed that at least some insecticide formulations affect the development of <i>O. bicornis</i> even at concentrations actually found in pollen in the field, indicating an urgent need for revising current pesticide usage recommendations.
Toxicology	Developmental neurotoxicity of different pesticides in PC-12 cells in vitro	V. R. Christen, M., et. al. Toxicol Appl Pharmacol 325, , 25-36 https://www.ncbi.nlm.nih.gov/pubmed/28385489	The detection of developmental neurotoxicity (DNT) of chemicals has high relevance for protection of human health. However, DNT of many pesticides is only little known. Furthermore, validated in vitro systems for assessment of DNT are not well established. Here we employed the rat phaeochromocytoma cell line PC-12 to evaluate DNT of 18 frequently used pesticides of different classes, including neonicotinoids, pyrethroids, organophosphates, organochlorines, as well as quaternary ammonium compounds, the organic compound used in pesticides, piperonyl butoxide, as well as the insect repellent diethyltoluamide (DEET). We determined the outgrowth of neurites in PC-12 cells co-treated with nerve growth factor and different concentrations of biocides for 5days. Furthermore, we determined transcriptional alterations of selected genes that may be associated with DNT, such as camk2alpha and camk2beta, gap-43, neurofilament-h, tubulin-alpha and tubulin-beta. Strong and dose- dependent inhibition of neurite outgrowth was induced by azamethiphos and chlorpyrifos, and dieldrin and heptachlor, which was correlated with up-regulation of gap-43. No or only weak effects on neurite outgrowth and transcriptional alterations occurred for neonicotinoids acetamiprid, clothianidin, imidacloprid and thiamethoxam, the pyrethroids lambda-cyhalothrin, cyfluthrin, deltamethrin, and permethrin, the biocidal disinfectants C12-C14-alkyl(ethylbenzyl)dimethylammonium (BAC), benzalkonium chloride and barquat (dimethyl benzyl ammonium chloride), and piperonyl butoxide and DEET. Our study confirms potential developmental neurotoxicity of some pesticides and provides first evidence that azamethiphos has the potential to act as a developmental neurotoxic compound. We also demonstrate that inhibition of neurite outgrowth and transcriptional alterations of gap-43 expression correlate, which suggests the employment of gap-43 expression as a biomarker for detection and initial evaluation of potential DNT of chemicals.
Ecotoxicology	Developmental Toxicity of a Neonicotinoid Insecticide, Acetamiprid to Zebrafish Embryos	X. L. Ma, H., et. al. J Agric Food Chem 67, 9, 2429-2436 https://www.ncbi.nlm.nih.gov/pubmed/30735371	Agricultural use of neonicotinoid insecticides is increasing worldwide, posing a risk to nontarget organisms. The present study investigated developmental toxicity of a widely used neonicotinoid, acetamiprid, to zebrafish embryos. Sublethal (malformations, hatchability, heart rate, body length, alteration of spontaneous movement and touch responses) and lethal effects were monitored during exposure period from 6 h post fertilization (hpf) to 120 hpf. Zebrafish embryos exhibited significant mortality and teratogenic effects at acetamiprid concentration greater than 263 mg/L, with bent spine being the main malformation. Toxicity spectra were constructed to rank the sensitivity of individual end points to acetamiprid exposure and impaired spontaneous movement was the most sensitive end point of those tested. The present study provides the basis for understanding developmental toxicity of acetamiprid exposure to zebrafish embryos. This information is critical for future studies evaluating aquatic risk from neonicotinoids as little is known regarding adverse effects of neonicotinoids to aquatic vertebrate species.

Phase 1 Conformity category	Title	Citation	Abstract
Epidemiology	Dietary exposure to neonicotinoid insecticides and health risks in the Chinese general population through two consecutive total diet studies	Chen, D., et al. (2020). "Dietary exposure to neonicotinoid insecticides and health risks in the Chinese general population through two consecutive total diet studies." <i>Environment International</i> 135: 105399.	Neonicotinoid insecticides are ubiquitous in food and the environment due to their wide use. Growing evidence suggests the adverse effects of neonicotinoids in many species, including mammals. Some studies have reported the urinary concentrations of neonicotinoids in human biological monitoring, but the potential risks of neonicotinoids on human health based on long-term chronic exposure studies in any general population have been rarely tackled. In this study, the dietary exposure to neonicotinoids of the Chinese adult population was studied on the basis of composite dietary samples collected from the 5th (2009–2012) and 6th (2015–2018) Chinese total diet studies (TDS). Residue levels of ten neonicotinoids were determined in 528 composite dietary samples from 24 provinces in China. Most of the samples (53.3% and 70.5% in the 5th and 6th TDS, respectively) that we analyzed contained the multi-residue of neonicotinoids. Imidacloprid and acetamiprid were the most frequently detected neonicotinoids, and thiamethoxam and clothianidin were increasingly used and found in the 6th TDS. The estimated daily intake (EDI) for total neonicotinoids was calculated to evaluate health risk of the Chinese adult population based on a relative potency factor assessment method. The mean EDIs of total neonicotinoids in the 5th and 6th TDS respectively reached 598.95 and 710.38 ng/kg bw per day. Although the mean EDIs of total neonicotinoids in 6th TDS was relatively higher than that in 5th TDS, no statistical difference was observed ($p > 0.05$). Vegetables were the main source of dietary exposure, but exposure via cereals and beverages and water must also be addressed in China. Although the average exposure for total neonicotinoids was much lower than the current chronic reference dose (57 $\mu\text{g/kg bw}$ per day), the dietary exposure risks of a general population for total neonicotinoids should not be overlooked due to the ubiquity of neonicotinoids in food and the environment.
Epidemiology	Dietary risk assessment of pesticides from vegetables and drinking water in gardening areas in Burkina Faso	E. T. Lehmann, N., et. al. <i>Sci Total Environ</i> 601-602, , 1208-1216 https://www.ncbi.nlm.nih.gov/pubmed/28605838	Vegetables and water samples have been collected around the lake of Loumbila in Burkina Faso. Pesticides residues in food commodities were analyzed using a modified QuEChERS extraction method prior analysis on GC-MS and UPLC-MS/MS of 31 pesticides. Maximum Residue Limits (MRLs) were exceeded in 36% of the samples for seven pesticides: acetamiprid, carbofuran, chlorpyrifos, lambda-cyhalothrin, dieldrin, imidacloprid and profenofos. Exceedance of MRLs suggests a risk for the consumers and limits the opportunities of exportation. In order to define estimated daily intake, dietary surveys were conducted on 126 gardeners using a 24hours recall method. Single pesticide and cumulative exposure risks were assessed for children and adults. Risk was identified for: chlorpyrifos and lambda-cyhalothrin in acute and chronic exposure scenarios. Hazardous chronic exposure to the endocrine disruptor and probable carcinogen dieldrin was also detected. In the studied population, cumulative dietary exposure presented a risk (acute and chronic) for children and adults in respectively >17% and 4% of the cases when considering the worst case scenarios. Processing factor largely influenced the risk of occurrence suggesting that simple washing of vegetables with water considerably reduced the risk of hazardous exposure.
9	Differential metabolism of neonicotinoids by <i>Myzus persicae</i> CYP6CY3 stably expressed in <i>Drosophila</i> S2 cells	T. K. Nakao, M., et. al. <i>J Pestic Sci</i> 44, 3, 177-180 https://www.ncbi.nlm.nih.gov/pubmed/31530975	The peach-potato aphid, <i>Myzus persicae</i> , is a serious crop pest that has developed imidacloprid resistance, mainly through overexpression of CYP6CY3. Here, we established a metabolic assay using <i>Drosophila</i> S2 cells that stably expressed CYP6CY3. We found that CYP6CY3 showed metabolic activity against imidacloprid, as well as acetamiprid, clothianidin, and thiacloprid, but had no activity against dinotefuran. Our study suggested that stable gene expression in <i>Drosophila</i> S2 cells is useful for examining which insecticide is metabolized by P450 monooxygenases.
9	Dissipation behavior, residue distribution and dietary risk assessment of cyromazine, acetamiprid and their mixture in cowpea and cowpea field soil	Fu D, Zhang S, Wang M, Liang X, Xie Y, Zhang Y, Zhang C. Dissipation behavior, residue distribution and dietary risk assessment of cyromazine, acetamiprid and their mixture in cowpea and cowpea field soil. <i>J Sci Food Agric</i> . 2020 Sep;100(12):4540-4548.	Background: Cyromazine and acetamiprid are widely applied as pesticides in agriculture, causing increasing concerns about their residues in crops. In this study, cyromazine, acetamiprid and their mixture were applied to cowpea to investigate their degradation dynamics and perform a dietary risk assessment. Results: The dissipation behavior of cyromazine and acetamiprid in the single- and mixed-pesticide groups followed first-order kinetics, with a linear correlation coefficient of 0.910 to 0.987. The half-lives of cyromazine and acetamiprid were 1.56-11.18 days in the four different matrices. The half-life of cyromazine in the mixed-pesticide group was similar to or even shorter than that in the single-pesticide group. The highest levels of cyromazine and acetamiprid in cowpea occurred with a preharvest interval of 7 days and after two or three applications. These levels are below the maximum residue limits recommended by the Chinese Ministry of Agriculture for cyromazine and acetamiprid in cowpea. The risk quotient of cyromazine and acetamiprid ranged from 0.0018 to 0.0418, and the national estimated short-term intake values of the cyromazine and acetamiprid were far below the acute reference dose as recommended by the European Food Safety Authority. Conclusion: These results suggest that the use of cyromazine and acetamiprid and a cyromazine-acetamiprid mixture in cowpea is safe under the Good Agricultural Practices for Chinese fields, and the use of a cyromazine-acetamiprid mixture affords even better results than the application of cyromazine alone. Moreover, the residue dynamics information will support the label claims for the application of cyromazine, acetamiprid and a cyromazine-acetamiprid mixture to cowpea fruit. © 2020 Society of Chemical Industry.
8	Distribution and ecological risk of neonicotinoid insecticides in sediment in South China: Impact of regional characteristics and chemical properties	Z. L. Huang, H., et. al. <i>Sci Total Environ</i> 714, , 136878 https://www.ncbi.nlm.nih.gov/pubmed/32018995	Neonicotinoid insecticides have been frequently detected in surface water due to extensive use worldwide, however, little information is available for the regional characteristics and ecological risk of neonicotinoids in sediment. In the current study, six neonicotinoids were analyzed in 58 sediment samples from agricultural (vegetable and rice planting) and urban areas in South China. Neonicotinoids were ubiquitous in the sediments, with maximum, mean and median concentrations of 23.8, 4.21 and 2.73 ng.g ⁻¹ (-1) dry weight, respectively. Neonicotinoids were detected more often and at higher concentrations in vegetable planting and urban areas while clothianidin and imidacloprid dominated neonicotinoid composition in the rice-planting area. Multiple correspondence analysis showed the distribution of sediment-bound neonicotinoids were significantly affected by crop type, distance to the source, and physicochemical properties of neonicotinoids. While more hydrophilic neonicotinoids tended to migrate to the streams, those with log Kow > 0 are usually retained in the ditches near the treated fields. Neonicotinoids with shorter half-lives (acetamiprid and thiacloprid) were detected more frequently in vegetable planting areas, yet more persistent imidacloprid and clothianidin were more likely to be detected in rice planting areas. It was in accordance with application patterns of neonicotinoids in different crops. Environmental exposure distributions indicated that sediment-bound neonicotinoids, except for thiacloprid, posed considerable risk to aquatic invertebrates, which are important for ecological functioning of aquatic ecosystems, calling for better measures to control and manage of neonicotinoid risks.
8	Distribution, Dissipation, and Metabolism of Neonicotinoid Insecticides in the Cotton Ecosystem under Foliar Spray and Root Irrigation	C. D. Wu, F., et. al. <i>J Agric Food Chem</i> 67, 45, 12374-12381 https://www.ncbi.nlm.nih.gov/pubmed/31613611	The uptake, distribution, metabolism, and degradation of three neonicotinoid insecticides (NIs)-imidacloprid (IMI), acetamiprid (ACE), and thiamethoxam (THI) in different parts of cotton plants were investigated under field conditions. Insecticides were either applied by foliar spraying or root irrigation. Foliar application resulted in high tissue concentration (average tissue concentration ratio, TCR: 46.78-68.61% for leaves and 12.2-31.40% for flowers). The flowers showed high NI residual. The metabolism and trends of NIs in different parts of cotton were reported here for the first time. Metabolites, toxic to bees, were detected in the flowers. The translocation factor was around 0.004 for the spray treatment and 0.2-0.7 for the root irrigation treatment. The average root concentration factors of IMI, ACE, and THI were 0.838, 8.027, and 1.014, respectively, indicating that the three NIs can be transported from the soil to the plant. The high concentrations of NIs and their metabolites in flowers indicate exposure risk to pollinators, such as bees.
Toxicology	Does Repeat Low-Dose Oral Exposure to Acetamiprid (Neonicotinoid Insecticide) during Gestation Alter the Physiology of the Triad Mother- Placenta- Fetus in the Rat?	Kandel Gambarte, P. C., et al. (2019). "Does repeat low-dose oral exposure to acetamiprid (neonicotinoid insecticide) during gestation alter the physiology of the triad mother- placenta- fetus in the rat?" <i>Placenta</i> 83: e112.	no abstract available

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Does Waterborne Exposure Explain Effects Caused by Neonicotinoid-Contaminated Plant Material in Aquatic Systems?	Englert D, Zubrod JP, Link M, Mertins S, Schulz R, Bundschuh M. Does Waterborne Exposure Explain Effects Caused by Neonicotinoid-Contaminated Plant Material in Aquatic Systems? Environ Sci Technol. 2017 May 16;51(10):5793-5802.	Neonicotinoids are increasingly applied on trees as protection measure against insect pests. Consequently, neonicotinoids are inevitably transferred into aquatic environments either via spray drift or surface runoff or (due to neonicotinoids' systemic nature) via senescent leaves. There particularly leaf-shredding invertebrates may be exposed to neonicotinoids through both the water phase and the consumption of contaminated leaves. In 7 day bioassays (n = 30), we examined ecotoxicological differences between these two exposure scenarios for an amphipod and an insect nymph with their feeding rate as the response variable. Organisms either experienced waterborne neonicotinoid (i.e., imidacloprid, thiacloprid, and acetamiprid) exposure only or a combined exposure (waterborne and dietary) through both the consumption of contaminated leaves and neonicotinoids leaching from leaves into water. The amphipod (7 day EC50s from 0.3 to 8.4 $\mu\text{g/L}$) was more sensitive than the insect nymph (7 day EC50s from 7.0 to 19.4 $\mu\text{g/L}$). Moreover, for both species, concentration-response models derived from water concentrations indicated higher effects under the combined exposure. Together with the observed inability of shredders to avoid neonicotinoid-contaminated leaves, our results emphasize the relevance of dietary exposure (e.g., via leaves) for systemic insecticides. Thus, it would be prudent to consider dietary exposure during the registration of systemic insecticides to safeguard ecosystem integrity.
8	Ecological risk assessment of the increasing use of the neonicotinoid insecticides along the east coast of China	Chen, Y., et al. (2019). "Ecological risk assessment of the increasing use of the neonicotinoid insecticides along the east coast of China." Environment International 127: 550-557.	In the past two decades, neonicotinoid insecticides have been widely used in agricultural activities in China. Many previous studies have investigated the neonicotinoid pollution in aquatic ecosystems, but the status of water safety of neonicotinoid uses in China is very scarce. The present study aims to reveal the spatial and temporal distribution of neonicotinoids in rivers, and then evaluate the ecological risks to aquatic animals. Water samples were collected from all sixteen rivers along the east coast of China during the dry and wet seasons in 2016, and nine individual commercialized neonicotinoids were quantified. Higher concentrations were found during the dry season ($343 \pm 210 \text{ ng/L}$) compared to those during the wet season ($174 \pm 162 \text{ ng/L}$). The concentration of neonicotinoid insecticides in river water is mainly affected by the intensity of agricultural activities. The spatial and temporal pollution patterns we discovered suggested the use of neonicotinoids has shifted from old types (i.e., imidacloprid and acetamiprid) to new types (i.e., dinotefuran and nitenpyram) in some areas. The estimated annual quantity of neonicotinoids released into the adjacent seas totaled 1256 ± 780 tons, most of which (95%) ran into the East China Sea due to heavy agricultural use in the Yangtze River Basin. Using the species sensitive distribution (SSD) method, the thresholds for aquatic animals were determined (acute: 362 ng/L ; chronic: 58 ng/L). Under current agricultural practices, 27% and 84% of the river water samples exceeded the thresholds for acute and chronic ecological risks, suggesting intervention programs are in urgent need to ensure river water safety for aquatic life in China.
Toxicology	Effect of Acetamiprid on spatial memory and hippocampal glutamatergic system	M. S. Shamsi, M., et. al. Environ Sci Pollut Res Int 28, 22, 27933-27941 https://www.ncbi.nlm.nih.gov/pubmed/33523378	Acetamiprid (ACE) is one of the widely used neonicotinoid insecticides. In mammals, in spite of the low-affinity nAChRs, neurotoxic effects following the Acetamiprid exposure have recently been reported, which suggests some concerns regarding the impacts on the nervous system of mammals. This study aims to investigate the effect of Acetamiprid on spatial memory and possible vulnerability of hippocampal glutamatergic system following the Acetamiprid exposure. 10, 20, and 40 mg/kg doses of Acetamiprid were administered to male rats by gavage once per day for 28 days. The spatial memory was examined with the Morris water maze apparatus. The amount of Acetamiprid in the serum and hippocampus was measured. In addition, glutamate level and changes in the expression of NR1, NR2, and NR2B genes were measured in the hippocampus; also, the hippocampus tissue was histologically evaluated. A significant increase in training parameters which consist of escape latency and traveled distance was observed on the first and second day of training in Acetamiprid-treated groups (20 and 40 mg/kg) compared to the control group ($p < 0.001$). In the probe test, rats in all Acetamiprid-treated groups significantly spent less time in the target quadrant compared to the control group ($p < 0.001$). Acetamiprid concentration dose dependently increased in the serum and in the hippocampus followed by Acetamiprid exposure. In all Acetamiprid-treated groups, a significant reduction of glutamate level in the hippocampus was observed ($p < 0.05$). The reduction of NR1, NR2A, and NR2B gene expression in the hippocampus was observed at a dose of 20 mg/kg. The histological evaluation showed neural degeneration in the dentate gyrus area of the hippocampus at a dose of 40 mg/kg in the Acetamiprid-treated group. The results of the present study indicate that Acetamiprid impairs memory consolidation through the reduction of glutamate and the expression of NMDA receptor subunits in the hippocampus at low doses, along with the loss of neural cells in dentate gyrus at high dose.
Toxicology	Effect of acetamiprid on the immature murine testes	H. Q. Terayama, N., et. al. Int J Environ Health Res 28, 6, 683-696 https://www.ncbi.nlm.nih.gov/pubmed/30103633	Neonicotinoids, such as acetamiprid (ACE), a pesticide used worldwide, are believed to be safe for human use. These molecules are structurally similar to nicotine, act as nicotinic acetylcholine receptor (nAChR) agonists, and were shown to be associated with neuromuscular and reproductive disorders, but these experiments were primarily performed in mature animals. In this study, the effects of ACE on the testes of immature mice were examined. The exposure of 3-week-old mice to ACE-containing water for 180 days led to a decrease in body weight and mildly affected spermatogenesis. Additionally, the expression of testosterone-metabolism genes, nAChR subunit genes, and proliferation-associated genes decreased in the testes of ACE-treated mice. Our results show that immature rodents may be less sensitive to ACE than mature ones, that mice may be more likely to accumulate ACE than rats, and that the development of disorders may be affected by the accumulation of ACE in the testes.
1	Effect of in-situ gas changes on thermally grown chromia scales formed on Ni-25Cr alloy at 1000 degrees C in atmospheres with and without water vapour	D. Simon, B. Gorr, M. Hänsel, V. Shemet, H.-J. Christ & W. J. Quadakkers (2015) Effect of in-situ gas changes on thermally grown chromia scales formed on Ni-25Cr alloy at 1000° C in atmospheres with and without water vapour, Materials at High Temperatures, 32:1-2, 238-247	Regarding oxidation resistance, most high temperature alloys rely on the formation of a protective chromia surface scale during service. In the present study, the oxidation behaviour of a Ni-25%Cr model alloy was investigated during single- and two-stage oxidation in Ar-O ₂ and Ar-H ₂ O gas mixtures at 1000° C. In the two-stage experiments, the test gas was changed after a predefined oxidation time from dry to wet gas, and vice versa, without intermediate specimen cooling. Oxidation kinetics were measured using thermogravimetry and post exposure characterisation was accomplished using scanning and transmission electron microscopy, focused ion beam and energy dispersive X-ray spectroscopy techniques. The single stage exposure to Ar-O ₂ resulted in the formation of a voided, poorly adhering chromia scale exhibiting a coarse, equi-axed morphology. In Ar-7%H ₂ O a fine, columnar grained oxide scale was formed which was free of microvoidage within the scale and at the scale/metal interface and therefore exhibited excellent adherence to the metallic substrate. During two-stage exposure to Ar-O ₂ and subsequently to Ar-H ₂ O, a fine grained, columnar shaped oxide developed on top of the coarse oxide scale formed in the first oxidation stage. The opposite effect occurred when the exposure started in the wet environment. The mechanisms which are responsible for the observed oxidation features are discussed on the basis of classical oxidation theory in combination with previous results on oxidation of chromia forming alloys in oxygen rich gases and water vapour containing, low p(O ₂) environments.

Phase 1 Conformity category	Title	Citation	Abstract
4	Effect of insecticide rotations on density and species composition of thrips (Thysanoptera) in Florida strawberry (Rosales: Rosaceae)	Cluever Jeffrey D, et al. "Effect of Insecticide Rotations On Density and Species Composition of Thrips (thysanoptera) In Florida Strawberry (rosales: Rosaceae)." Florida entomologist, v. 99 ,2 pp. 203-209	Feeding by Frankliniella (Thysanoptera: Thripidae) thrips causes economic damage to strawberry (Fragaria ananassa Duchesne; Rosales: Rosaceae) crops in Florida and in other production regions worldwide. Resistance to spinosyn insecticides, particularly in Frankliniella occidentalis (Pergande), is a major concern for strawberry and other crops. Experiments were carried out in 2014 and 2015 to evaluate the effect of 6 insecticide programs on the numbers and species composition of thrips attacking strawberry on a season-long basis in Florida. Five insecticide programs included spinetoram applied once, twice, or 3 times in the rotation, alternated with acetamiprid, cyantraniliprole (Cyazypyr®), novaluron, sulfoxaflor, and/or tolfenpyrad. Also included in the treatments were bifenthrin and a non-treated check. Thrips densities were sampled weekly in flowers, and in both flowers and fruits in 2015, 2 d after treatment applications. The primary thrips species recovered from strawberry flowers and fruit was Frankliniella bispinosa Morgan. Other species included F. occidentalis, Frankliniella schultzei (Trybom), Scirtothrips dorsalis Hood, Scolothrips sp., Thrips spp. (all Thripidae), and Haplothrips gowdeyi (Franklin) (Phlaeothripidae), Frankliniella bispinosa was controlled by all insecticide programs. Numbers of F. occidentalis thrips were not reduced by any spinetoram-based rotation relative to the control in either year. Repeated applications of bifenthrin increased numbers of F. occidentalis thrips relative to the control each year, and increased numbers of F. schultzei thrips relative to the control in 2014. The thrips predator Orius sp. (Hemiptera: Anthocoridae) was not observed in the bifenthrin treatment and was rare in other treatments. Insecticide rotations in Florida strawberry appear to shift the species composition from F. bispinosa to F. occidentalis and other insecticide-tolerant species including F. schultzei. Thrips damage to strawberries may be due to the species that is least susceptible to control rather than the species that is most abundant early in the cropping season. However, the relative importance of various stages or species has yet to be critically determined.
4	Effect of ozone treatments on the removal of pesticide residues and postharvest quality in green pepper	T. K. Ozen, M. A., et. al. J Food Sci Technol 58, 6, 2186-2196 https://www.ncbi.nlm.nih.gov/pubmed/33967316	The use of ozone as a tool in the storage of some horticultural produces is recommended for all steps from harvest to consumption. However, little is known about its effects on the removal of pesticides and postharvest physiology of fresh peppers. In the present study, the effects of ozone treatment on the removal of pesticides, storage life and quality of green peppers were investigated. Malathion, emamectin benzoate and acetamiprid were applied to pepper plants before harvest. Residue contents of peppers were measured at harvest time and after all treatments to determine the effect of ozone on the removal of pesticide residues. Peppers were subjected to four treatments: immersion in ozonated water (2 ppm) and only tap water (control) for 10 min, exposure to 2 ppm ozone gas in air and only air (control) for 45 min. Treated peppers were stored at 20 degrees C and 60 +/- 5% relative humidity for 8 days, and some quality analyses were performed during storage. Ozonated water decreased, remarkable, pesticide residues in peppers compared to harvest time, but there was no meaningful changes in the samples treated with ozone in air. Ozone treatments suppressed clearly respiration rates and decreased weight losses of peppers compared to control groups. Ozonated water also maintained green color of peppers, with minimum change in h degrees values. Additionally, sensory quality of peppers was retarded by ozone application during storage. These findings revealed that ozone could be an alternative treatment to extend storage life of green peppers and remove pesticide residues.
9	Effect of Piperonyl Butoxide on the Toxicity of Four Classes of Insecticides to Navel Orangeworm (Amyelois transitella) (Lepidoptera: Pyralidae)	M. D. Demkovich, C. E., et. al. J Econ Entomol 108, 6, 2753-60 https://www.ncbi.nlm.nih.gov/pubmed/26470383	Amyelois transitella (Walker) (Lepidoptera: Pyralidae), the navel orangeworm, is a highly polyphagous economic pest of almond, pistachio, and walnut crops in California. Increasing demand for these crops and their rising economic value has resulted in substantial increases of insecticide applications to reduce damage to acceptable levels. The effects of piperonyl butoxide (PBO), a methylenedioxyphenyl compound that can act as a synergist by inhibiting cytochrome P450-mediated detoxification on insecticide metabolism by A. transitella, were examined in a series of feeding bioassays with first-instar A. transitella larvae from a laboratory strain. PBO, however, can have a variety of effects on metabolism, including inhibition of glutathione-S-transferases and esterases and induction of P450s. In our study, PBO synergized the toxicity of acetamiprid, lambda-cyhalothrin, and spinosad, suggesting possible involvement of P450s in their detoxification. In contrast, PBO interacted antagonistically with the organophosphate insecticide chlorpyrifos, reducing its toxicity, an effect consistent with inhibition of P450-mediated bioactivation of this pesticide. The toxicity of the anthranilic diamide insecticide chlorantraniliprole was not altered by PBO, suggestive of little or no involvement of P450-mediated metabolism in its detoxification. Because a population of navel orangeworm in Kern County, CA, has already acquired resistance to the pyrethroid insecticide bifenthrin through enhanced P450 activity, determining the effect of adding a synergist such as PBO on detoxification of all insecticide classes registered for use in navel orangeworm management can help to develop rotation practices that may delay resistance acquisition or to implement alternative management practices where resistance is likely to evolve.
9	Effect of Salinity on UVA-Vis Light Driven Photo-Fenton Process at Acidic and Circumneutral pH	Vallés, I., et al. (2021). "Effect of Salinity on UVA-Vis Light Driven Photo-Fenton Process at Acidic and Circumneutral pH." Water 13(9): 1315.	In the present work, the treatment of a mixture of six emerging pollutants (acetamiprid, acetaminophen, caffeine, amoxicillin, clofibrac acid and carbamazepine) by means of photo-Fenton process has been studied, using simulated sunlight as an irradiation source. Removal of these pollutants has been investigated in three different aqueous matrices distinguished by the amount of chlorides (distilled water, 1 g L ⁻¹ of NaCl and 30 g L ⁻¹ of NaCl) at a pH of 2.8 and 5.0. Interestingly, the presence of 1 g L ⁻¹ was able to slightly accelerate the pollutants removal at pH = 5, although the reverse was true at pH = 2.8. This is attributed to the pH-dependent interference of chlorides on photo-Fenton process, that is more acute in an acidic medium. As a matter of fact, the fastest reaction was obtained at pH = 3.5, in agreement with literature results. Monitoring of hydrogen peroxide consumption and iron in solution indicates that interference with chlorides is due to changes in the interaction between iron and the peroxide, rather than a scavenging effect of chloride for hydroxyl radicals. Experiments were also carried out with real seawater and showed higher inhibition than in the NaCl experiments, probably due to the effect of different dissolved salts present in natural water
4	Effect of Three Chemicals and Neem Insecticide against Autumn Populations of Dubas Bug, Ommatissus Lybicus De Bergevin (Tropiduchidae: Homoptera) in Oman	Al-Antary, T., et al. (2018). "EFFECT OF THREE CHEMICALS AND NEEM INSECTICIDE AGAINST AUTUMN POPULATIONS OF DUBAS BUG, OMMATISSUS LYBICUS DE BERGEVIN (TROPIDUCHIDUE: HOMOPTERA) IN OMAN." Fresenius Environmental Bulletin 27: 8594-8599.	The dubas bug, Ommatissus lybicus De Bergevin is an important pest of date palm, Phoenix dactylifera in Gulf countries, Middle East and north Africa regions. The intensive use of insecticides in Oman to control the dubas bug might lead to resistance. An entomological field study was carried out to test pesticides against dubas bug insect on autumn generation in Al-Batinah region in sultanate of Oman. Four insecticides were used: Decis, Oberon, Mospilan and Nimbecidine (which is neem extract) and the control was sprayed by water only. The number of the nymphs were counted visually on the trees before one day and after 3, 7, 10 and 14 days of the treatments. There were no significant differences between the means of densities one day before treatment for the five used plots. The number of alive nymphs for Nimbecidine (azadirachtin) and for Mospilan (acetamiprid) were the least compared with Dices and Oberon after 10 days of treatments, but without significant differences. Insect densities of alive dubas bug nymphs after 14 days of the applied treatments showed significant differences between the treatments. Mospilan treatments showed the least number of alive dubas bug significantly compared with the other tested pesticides. Overall means within the whole experimental work from three days spraying to 14 days of the same applications indicated that all used pesticides were effective in decreasing the dubas bug population, leading to effective control. However, preferable to spray insecticides when dubas bug nymphs in the fourth in-stars, or when more than 75% of egg have hatched, treated the dubas bug in autumn generation with the Mospilan insecticide under field conditions is more effected to control this pest and even the Nimbecidine gave low results in the pest control, but it is good to be used in pesticide application programmes, because they are a biological, eco-friend insecticides, less residues and to avoid pesticide resistance.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Effects of abamectin and acetamiprid pesticides on the survival and behavior of <i>Scaptotrigona</i> aff. <i>xanthotricha</i> (Apidae, Meliponini)	Maria Fernanda de Oliveira Ferreira, Rafael de Fraga, Emerson Cristi de Barros & Solange Cristina Augusto (2020) Effects of abamectin and acetamiprid pesticides on the survival and behavior of <i>Scaptotrigona</i> aff. <i>xanthotricha</i> (Apidae, Meliponini). Journal of Apicultural Research	Pesticides have been described as a major cause of bee mortality, and thus are predictors of population decline and decrease in pollination services. Standardized tests with <i>Apis mellifera</i> are already common, and there is a need to create adequate parameters for the native solitary and eusocial species of stingless bees. In this study, we evaluated lethal dosages (LD50 and LD90), lethal time (LT), and sub-lethal effects (SLE) of two pesticides used in soybean crops, abamectin, and acetamiprid, in <i>Scaptotrigona</i> aff. <i>xanthotricha</i> . All tests were performed through contact poisoning. The LD50 and LD90 for acetamiprid were higher than those obtained for abamectin. Survival analysis of <i>S. aff. xanthotricha</i> exposed to LD90 indicated significant differences between pesticides. The LT50 under abamectin (8.25 hours) was significantly lower than acetamiprid (14.25 hours). Considering the PER tests, our results suggest that positive responses to food offerings were reduced by pesticide effects. It was also observed that only the acetamiprid affected the locomotion of the bees. Our results revealed that both pesticides are highly toxic to <i>S. aff. xanthotricha</i> and that acetamiprid was the most toxic for all parameters evaluated.
8	Effects of acetamiprid and flumethrin on <i>Unio</i> sp. primary cells	Arsilan, P., Yurdakok-Dikmen, B., Kuzkiran, O. et al. Effects of acetamiprid and flumethrin on <i>Unio</i> sp. primary cells. <i>Biologia</i> 76, 1359–1365 (2021)	Synthetic pyrethroids and neonicotinoids are the most common pesticides used globally due to their low toxicity in mammals. Residues at very low concentrations and in mixtures are of concern to benthic species as these organisms are commonly exposed through water, particulate material, or sediments. In the current study, the cytotoxic effects of flumethrin and acetamiprid on primary cell cultures of <i>Unio</i> sp.'s mantle, gill, gonad, and digestive gland tissues were determined using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and neutral red assays. Compared to acetamiprid, flumethrin was more cytotoxic to all tested cells. Gonadal cells were more susceptible to flumethrin compared to other cultured cells, while they were least affected by acetamiprid. Lysosomal and mitochondrial cytotoxicities were different for each tissue and tested drugs, according to Neutral Red and MTT test results. Even though, in vitro cell culture studies can not to display the entire toxicological responses of the organism, culture conditions and cellular mechanisms may still be effectively researched in bivalves. This study demonstrated the potential of <i>Unio</i> sp. cell culture as an alternative for in vitro aquatic invertebrate toxicity testing.
Ecotoxicology	The effects of acetamiprid on the motor coordination and sucrose sensitivity of the honey bee, <i>Apis mellifera</i>	Young, C., et. al. The effects of acetamiprid on the motor coordination and sucrose sensitivity of the honey bee, <i>Apis mellifera</i> . Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB), West Palm Beach, FL, United States Of America, 3 - 07 January 2015, vol.55, pp.355	Neonicotinoid insecticides are used in worldwide commercial farming to control pests and have recently garnered attention for their potentially adverse effects on honey bees. While the relative doses of pesticides encountered in agriculture are typically below the designated LD50, assessment of the sublethal effects could reveal detrimental effects to honey bee foraging behavior. Acetamiprid, a known neonicotinoid pesticide used in farming, acts as a neurological agonist to acetylcholine with a high affinity to nicotinic acetylcholine receptors in invertebrates. Therefore, we expected sublethal doses of acetamiprid to result in impaired motor coordination and central nervous system (CNS) processing. For a comprehensive analysis of the physiological effects of acetamiprid at sublethal doses on honey bees, we tested the motor coordination and sucrose sensitivity of the honey bee. Captured bees were restrained and fed 10 μ L of a designated acetamiprid solution in 1.5 M sucrose, with treatment doses ranging from 1/5 to 1/1000 of the LD50. Control treatments were fed 10 μ L of the 1.5 M sucrose stock solution. Subsequent tests for motor coordination and sucrose sensitivity were performed 4 hours after ingestion, with motor coordination tests assessing the proboscis extension reflex (PER), abdomen movement, leg movement, and wing movement. Bees did not differ in motor coordination and sucrose sensitivity among doses. These results show that acetamiprid, even at the most concentrated sublethal dose tested, had no significant effect on physiological and neurological characteristics fundamental to honey bee foraging behavior.
1	Effects of clothianidin on aquatic communities: Evaluating the impacts of lethal and sublethal exposure to neonicotinoids	Miles JC, Hua J, Sepulveda MS, Krupke CH, Hoverman JT. Effects of clothianidin on aquatic communities: Evaluating the impacts of lethal and sublethal exposure to neonicotinoids. <i>PLoS One</i> . 2017 Mar 23;12(3):e0174171.	The widespread usage of neonicotinoid insecticides has sparked concern over their effects on non-target organisms. While research has largely focused on terrestrial systems, the low soil binding and high water solubility of neonicotinoids, paired with their extensive use on the landscape, puts aquatic environments at high risk for contamination via runoff events. We assessed the potential threat of these compounds to wetland communities using a combination of field surveys and experimental exposures including concentrations that are representative of what invertebrates experience in the field. In laboratory toxicity experiments, LC50 values ranged from 0.002 ppm to 1.2 ppm for aquatic invertebrates exposed to clothianidin. However, freshwater snails and amphibian larvae showed high tolerance to the chemical with no mortality observed at the highest dissolvable concentration of the insecticide. We also observed behavioral effects of clothianidin. Water bugs, <i>Belostoma flumineum</i> , displayed a dose-dependent reduction in feeding rate following exposure to clothianidin. Similarly, crayfish, <i>Orconectes propinquus</i> , exhibited reduced responsiveness to stimulus with increasing clothianidin concentration. Using a semi-natural mesocosm experiment, we manipulated clothianidin concentration (0.6, 5, and 352 ppb) and the presence of predatory invertebrates to explore community-level effects. We observed high invertebrate predator mortality with increases in clothianidin concentration. With increased predator mortality, prey survival increased by 50% at the highest clothianidin concentration. Thus, clothianidin contamination can result in a top-down trophic cascade in a community dominated by invertebrate predators. In our Indiana field study, we detected clothianidin (max = 176 ppb), imidacloprid (max = 141 ppb), and acetamiprid (max = 7 ppb) in soil samples. In water samples, we detected clothianidin (max = 0.67 ppb), imidacloprid (max = 0.18 ppb), and thiamethoxam (max = 2,568 ppb). Neonicotinoids were detected in >56% of soil samples and >90% of the water samples, which reflects a growing understanding that neonicotinoids are ubiquitous environmental contaminants. Collectively, our results underscore the need for additional research into the effects of neonicotinoids on aquatic communities and ecosystems.
4	Effects of dropleg application technique during flowering of oilseed rape on insect pests	Hausmann, J., et al. (2019). "Effects of dropleg application technique during flowering of oilseed rape on insect pests." Crop Protection 126: 104917.	Spraying of insecticides and fungicides during the flowering stage of oilseed rape (<i>Brassica napus</i> L.) could be necessary to control insect pests (such as <i>Ceutorhynchus obstrictus</i> (Marshall) and <i>Dasineura brassicae</i> (Winnertz)) and pathogens (<i>Sclerotinia sclerotiorum</i> (Lib.) de Bary). In contrast to the conventional application technique, dropleg nozzles are kept below the flowering canopy to restrict the exposure of pollinators to active ingredients of insecticides. The Julius Kühn-Institut (JKI) tested the efficacy of different insecticides using the dropleg technique compared to the conventional technique, on insect pests in field trials conducted from 2015 to 2017 in the area of Braunschweig. The crop was treated at full flowering (BBCH 65) for three consecutive years. The tested insecticides were Biscaya (72 g a. i. ha – 1 thiacloprid), Mavrik (48 g a. i. ha – 1 tau-fluvalinate), and Mospilan SG (40 g a. i. ha – 1 acetamiprid). The adults and larvae of oilseed rape pests that drop to the ground were collected using water trays. The emergence of new generation beetles (<i>Brassicogethes aeneus</i> (Fabricius), <i>C. obstrictus</i>) was recorded from BBCH 78 onwards, using photoelectors. At least twice during each season, oilseed rape plants were assessed for <i>D. brassicae</i> injury. The new dropleg application technique showed similar efficacy on pest insects compared to the conventional spraying technique. Nevertheless, the abundance of pests was not always sufficient to get clear results. Results especially on <i>D. brassicae</i> indicate that the dropleg technique had a comparable efficacy under moderate pest pressure conditions observed in our study. Further research under conditions with a higher abundance of <i>C. obstrictus</i> , as well as research on the effects of dropleg technique on parasitoids of oilseed rape pests, is needed. The population of <i>B. aeneus</i> population was reduced slightly less using dropleg instead of conventional application technique. In all the years, the yields did not differ significantly with regard to the conventional and dropleg application techniques.

Phase 1 Conformity category	Title	Citation	Abstract
8,9,12	Effects of fullerene nanoparticles on acetamidiprid induced cytotoxicity and genotoxicity in cultured human lung fibroblasts	T. C. Cavas, N., et. al. Pestic Biochem Physiol 114, , 44203 https://www.ncbi.nlm.nih.gov/pubmed/25175643	The aim of this study was to investigate the effects of water soluble fullerene (fullerenol) nanoparticles on the in vitro genotoxicity induced by the insecticide acetamidiprid. Healthy human lung cells (IMR-90) were treated with fullereneol C60(OH) _n (n: 18-22) alone and in combination with acetamidiprid for 24h. The micronucleus test, comet assay and gamma-H2AX foci formation assays were used as genotoxicity endpoints. Cytotoxicity was evaluated using the clonogenic assay. The maximum tested concentration of fullereneol (1.600 µg/ml) induced 77% survival where as the lowest concentration (25 µg/ml) was not cytotoxic where as acetamidiprid was cytotoxic. Fullereneol did not induce genotoxicity at tested concentrations (50-1600 µg/L). On the other hand, acetamidiprid (>50 µM) significantly induced formation of micronuclei, and double and single stranded DNA breaks in IMR-90 cells. For simultaneous exposure studies, two non-cytotoxic concentrations (50 and 200 µg/ml) of fullereneol and three cytotoxic concentrations of acetamidiprid (100, 200 and 400 µM) were selected. As a result, we observed that co-exposure with fullereneol significantly reduced the cytotoxicity and genotoxicity of acetamidiprid in IMR-90 cells. Our results indicated the protective effect of water soluble fullerene particles on herbicide induced genotoxicity.
8,9,12	Effects of imidacloprid and a neonicotinoid mixture on aquatic invertebrate communities under Mediterranean conditions	A. A.-S. Rico, A., et. al. Aquat Toxicol 204, . 130-143 https://www.ncbi.nlm.nih.gov/pubmed/30245345	Neonicotinoid insecticides are considered contaminants of concern due to their high toxicity potential to non-target terrestrial and aquatic organisms. In this study we evaluated the sensitivity of aquatic invertebrates to a single application of imidacloprid and an equimolar mixture of five neonicotinoids (imidacloprid, acetamidiprid, thiacloprid, thiamethoxam, clothianidin) using mesocosms under Mediterranean conditions. Cyclopoida, Cloeon dipterum and Chironomini showed the highest sensitivity to neonicotinoids, with calculated NOECs below 0.2 µg/L. The sensitivity of these taxa was found to be higher than that reported in previous studies performed under less warm conditions, proving the high influence of temperature on neonicotinoid toxicity. The short-term responses of the zooplankton and the macroinvertebrate communities to similar imidacloprid and neonicotinoid mixture concentrations were very similar, suggesting that the concentration addition model can be used as a plausible hypothesis to assess neonicotinoid mixture effects in aquatic ecosystems. Long-term mixture toxicity assessments, however, should consider the fate of the evaluated substances in the environment of concern. As part of this study, we also demonstrated that Species Sensitivity Distributions constructed with chronic laboratory toxicity data and calculated (multi-substance) Potentially Affected Fractions provide an accurate estimation to assess the ecotoxicological risks of imidacloprid and neonicotinoid mixtures to aquatic invertebrate species assemblages.
5	Effects of Lipids on Analysis of Residue Pesticides in Herbal Medicines	Hwang, JI., Lee, SE. & Kim, JE. Effects of lipids on analysis of residue pesticides in herbal medicines. J Korean Soc Appl Biol Chem 57, 347–354 (2014).	Serious problems in residue analysis of acetamidiprid, chlorpyrifos, and bifenthrin caused by lipids present in herbal medicines, platycodon root, safflower, and persicae semen have been found during the pesticide residue analysis using a currently used analytical method. Particularly, recovery tests for artificially spiked pesticides showed poor recoveries for bifenthrin in persicae semen, which may be due to the low polarity of the pesticide and high lipid content in the matrix. An unclear layer separation between water and organic solvent, methylene chloride, has been also observed during the liquid-liquid partitioning process, which favors modification of the liquid-liquid partitioning by replacement with acetonitrile and a macroporous diatomaceous earth column, respectively. The effectiveness of newly modified methods was evaluated based on the recoveries of three pesticides in the herbal medicines at two fortification levels (1.0 and 4.0 mg/kg). The modified methods increased recoveries to 81.8–98.9%, suggesting those methods could be effective and feasible alternatives to determine acetamidiprid, bifenthrin, and chlorpyrifos in lipidic samples.
4	Effects of microbial, organically acceptable, and reduced risk insecticides on Anthonomus signatus (Curculionidae: Coleoptera) in strawberries (Fragaria x ananassa)	McPhie, D. and H. J. Burrack (2016). "Effects of microbial, organically acceptable, and reduced risk insecticides on Anthonomus signatus (Curculionidae: Coleoptera) in strawberries (Fragaria × ananassa)." Crop Protection 89: 255-258.	Anthonomus signatus, the strawberry bud weevil, is active in early spring coinciding with the bloom period of host plants and when managed and unmanaged pollinators are active. Female A. signatus cause injury to the host plant during egg laying when they deposit a single egg inside an unopened flower bud and then girdle or "clip" the bud at the pedicel. Past efforts to control A. signatus populations have relied on the use of broad spectrum insecticides. Fields are either treated at the first signs of damage, or precautionary treatments may be applied prophylactically in fields with a history of damage. Because A. signatus damage occurs during bloom, there is concern about the potential harm to pollinators caused by these treatments. In order to identify materials more compatible for use during bloom, the efficacy of reduced risk pesticides against A. signatus was tested in semi-field bioassays over two years. Beauveria bassiana, cyantraniliprole, novaluron, and pyrethrins were assessed in the first year, and none caused significant A. signatus mortality. Acetamidiprid, flonicamid, and spinosad were compared in the second year, acetamidiprid and spinosad had higher A. signatus mortality than an untreated control, and exposure to spinosad resulted in similar mortality to bifenthrin, an industry standard material.
9	Effects of Ozone Treatment on the Degradation and Toxicity of Several Pesticides in Different Groups	Velioglu, Y.S., et. al. Effects of Ozone Treatment on the Degradation and Toxicity of Several Pesticides in Different Groups. The Journal of Agricultural Science 24(2):245-255.	The effects of ozone treatment on the degradation and toxicity of nine pesticides were determined with different chromatographic techniques, using bubbled ozone and distilled water and two different buffer solutions as test media. The toxicity experiments were performed using Daphnia magna, a cladoceran fresh water flea. The results revealed that thiacloprid and acetamidiprid can only be degraded by ozonation to a limited extent (max 2.6%). The other seven pesticides were successfully degraded by ozone. The degradation rates (%) were found to be 93, 99, 95, 99, 87, 98, and 85 for fenazaquin, lambda cyhalothrin, azoxystrobin, chlorpyrifos, spiromesifen, clothianidin and thiamethoxam, respectively, after 5 minutes of ozone treatment in distilled water. The ozone treatment yielded reduced toxicity in fenazaquin, lambda cyhalothrin, azoxystrobin, chlorpyrifos and spiromesifen. However, the degradation products of clothianidin and thiamethoxam were found to be more toxic than the pesticide itself. In general, the use of buffer solutions has no significant effect on pesticide degradation compared to water as an ozonation medium.
9	Effects of Rinsing on Residue Level of Chlorpyrifos Ethyl, Acetamidiprid and Penconazole in Grapes	Akyildiz, A., et al. (2014). "Effects of Rinsing on Residue Level of Chlorpyrifos Ethyl, Acetamidiprid and Penconazole in Grapes." Tarim Bilimleri Dergisi 20: 112-119.	Effects of various rinsing conditions were investigated to remove residues of three pesticides including chlorpyrifos ethyl, acetamidiprid and penconazole from grapes. The rinsing conditions included five different temperatures of rinsing water, three different fruit-to-water ratios and three different dipping times. The residue levels of all three pesticides decreased with decreasing the rinsing water temperature while in most cases, 10, 20 and 30 °C produced lower pesticide residue values when compared to 40 and 50 °C within each of combined treatments. In addition, 4 minutes of dipping time was not as effective as 2 and 3 minutes dipping times to eliminate chlorpyrifos ethyl residue from grape samples at all temperatures
Ecotoxicology	Effects of sublethal acetamidiprid doses on the lifespan and memory-related characteristics of honey bee (Apis mellifera) workers	Shi, J., Liao, C., Wang, Z. et al. Effects of sublethal acetamidiprid doses on the lifespan and memory-related characteristics of honey bee (Apis mellifera) workers. Apidologie 50, 553–563 (2019).	Honey bees that leave the hive and collect nectar or pollen from pesticide-treated plants are susceptible to be poisoned. Acetamidiprid is a new class of insecticide and a member of the neonicotinoids that has been widely applied in the field for pest control. However, effects of sublethal doses of acetamidiprid on worker bees are not yet fully understood. In this study, we examined effects of sublethal doses of acetamidiprid on lifespan and memory-related characteristics. Newly emerged worker bees from a single colony were randomly divided into four groups, and this experiment was repeated three times using three different colonies. Three doses (0.5, 1, and 2 µg/bee) of acetamidiprid diluted by water were added on the thorax of worker bees while bees were exposed to pure water as a control (0 µg/bee). The lifespan of bees treated with acetamidiprid at a concentration over 1 µg/bee was significantly reduced, while there was no significant difference between the 0.5 µg/bee group and 0 µg/bee group. All three doses of acetamidiprid affected the memory-related characteristics of bees, reduced the success of proboscis extension response (PER), affected homing ability, and influenced expression levels of two learning- and memory-related genes compared with the control group. This research confirms that sublethal doses of acetamidiprid affect the survival of honey bees.

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Ecotoxicology	Effects of the Neonicotinoid Acetamiprid in Pollen on Bombus impatiens Microcolony Development	A. A. B. Camp, M. A. , et. al. Environ Toxicol Chem 39, 12, 2560-2569 https://www.ncbi.nlm.nih.gov/pubmed/32997831	Honey bees and other wild bee species including bumble bees have experienced population declines in recent decades. Although many stressors are implicated in bee population declines, much attention has focused on neonicotinoid pesticides, which are widely used and known to be toxic to pollinators. One neonicotinoid, acetamiprid, has been studied very little in bumble bees, despite its use on bumble bee-pollinated crops. We assessed the impacts of acetamiprid to the North American bumble bee <i>Bombus impatiens</i> using the microcolony model. We examined nest growth, development, and subsequent nest productivity as measured by drone production. We found that high concentrations of acetamiprid in pollen (4520 microg/kg) significantly impacted nest growth, development, and, ultimately, reproduction (drone production). We found the no-observable-adverse effect level to be 45.2 microg/kg. Overall, acetamiprid has the potential to negatively impact reproductive endpoints for <i>B. impatiens</i> . However, effects occurred at concentrations substantially higher than expected environmental concentrations that would be achieved when following label rates. Further work is required to assess the effects of this pesticide on <i>B. impatiens</i> via alternate routes of exposure and on queenright colonies. Environ Toxicol Chem 2020;39:2560-2569. (c) 2020 SETAC. This article has been contributed to by US Government employees and their work is in the public domain in the USA.
Ecotoxicology	Effects of the neonicotinoid acetamiprid in syrup on <i>Bombus impatiens</i> (Hymenoptera: Apidae) microcolony development	A. A. W. Camp, W. C., et. al. PLoS One 15, 10, e0241111 https://www.ncbi.nlm.nih.gov/pubmed/33119659	Worldwide, many pollinator populations are in decline. Population reductions have been documented for the agriculturally important honey bee (<i>Apis mellifera</i>), and other bee species such as bumble bees that are also critical for pollinating crops and natural landscapes. A variety of factors contribute to the observed population reductions, including exposure to agrochemicals. In recent decades, neonicotinoid pesticide use has dramatically increased, as have concerns regarding the safety of these chemicals for pollinator health. Here we assessed the toxicity of the neonicotinoid acetamiprid to the bumble bee <i>Bombus impatiens</i> , a species commercially available for use in agricultural settings in North America. Using the microcolony model, we examined nest growth, development and subsequent nest productivity as measured by drone production. We found that high concentrations of acetamiprid in syrup (11,300 mug/L) significantly impacted nest growth and development, and ultimately drone production, and exposure to 1,130 mug/L acetamiprid also significantly decreased drone production. The no observable adverse effect level was 113 mug/L. Overall, acetamiprid delivered in syrup can negatively impact <i>B. impatiens</i> nest development and productivity, however only at concentrations above which would be expected in the environment when used according to label rates.
9	Effects of Types of Washing and Peeling in Relation to Pesticide Residues in Tomatoes	Andrade, G., et al. (2015). "Effects of Types of Washing and Peeling in Relation to Pesticide Residues in Tomatoes." Journal of the Brazilian Chemical Society 26 (10).	Tomatoes are widely consumed and most often without cooking, therefore it is important to estimate the reduction of residues using simple washing procedures. An experiment was carried out to evaluate the effects of household processing such as: washing with water, washing with 10% of vinegar solution and washing with 10% of sodium bicarbonate solution on pesticide residue levels of acetamiprid, azoxystrobin, diflubenzuron, dimethoate, fipronil, imidacloprid, procymidone and thiamethoxam, in spiked tomato samples. The amount of residue remaining in the peel and pulp was also investigated. The pesticide residues were monitored using the quick, easy, cheap, effective, rugged and safe (QuEChERS) extraction and analysed by liquid chromatography tandem mass spectrometry method (LC-MS/MS) in dynamic multiple-reaction monitoring mode (DMRM). The effect of the number of washing treatments (n = 3) and control, with six replicates, differed significantly for all pesticides evaluated (n = 8), but despite washing, fipronil residues were not removed from the tomato samples. Overall, washing with water or other solutions, and peeling before consumption are shown to reduce pesticide residues in tomatoes.
Ecotoxicology	Efficacies of Common Ready to Use Insecticides against <i>Halyomorpha Halys</i> (Hemiptera: Pentatomidae)	Erik J. Bergmann, Michael J. Raupp "Efficacies of Common Ready to Use Insecticides Against <i>Halyomorpha halys</i> (Hemiptera: Pentatomidae)," Florida Entomologist, 97(2), 791-800, (1 June 2014)	Efficacies of topical applications and dry residues of 9 common ready-to-use (RTU) insecticides were evaluated against brown marmorated stink bug, <i>Halyomorpha halys</i> (Stål) (Hemiptera: Pentatomidae) at intervals of exposure of 1 and 48 h. Permethrin and acetamiprid, were further evaluated to determine if <i>H. halys</i> recovered after an initial exposure. Topical applications of carbaryl, permethrin, insecticidal soap, petroleum oil, and acetamiprid, and residues of permethrin and acetamiprid increased mortality of adults. Topical applications of spinosad, essential oils, carbaryl, permethrin, insecticidal soap, petroleum oil, and acetamiprid, and residues of carbaryl, permethrin, and acetamiprid increased mortality of nymphs. Topical applications of carbaryl, neem oil, insecticidal soap, and acetamiprid increased egg mortality. In general, nymphs were more susceptible to insecticides than adults. Adult <i>H. halys</i> recovered after exposure to topical applications, but not dry residues of permethrin. Clearly, several RTU insecticides in the marketplace demonstrated potential to help gardeners manage <i>H. halys</i> .
9	Efficacy of Different Decontamination Processes in Mitigation of Pesticide Residues from Chili Crop	A. C. Srivastava, A., et. al. J Food Prot 84, 5, 767-771 https://www.ncbi.nlm.nih.gov/pubmed/33290555	ABSTRACT: This study was conducted to evaluate the efficacy of seven decontamination processes in reducing the pesticide mixture load of six insecticides (quinalphos, profenophos, ethion, lambda-cyhalothrin, imidacloprid, and acetamiprid) from chili (<i>Capsicum annuum</i> L.). In the control treatment, the pesticide residues were extracted without following any decontamination procedure. The extraction of the insecticides from chili was initiated after 48 h of pesticide mixture spray and was done using the QuEChERS (quick, easy, cheap, effective, rugged, and safe) method. The quantitative analysis of four insecticides, namely quinalphos, profenophos, ethion, and lambda-cyhalothrin, was done by coupled gas chromatography-electron capture detection and that of imidacloprid and acetamiprid by high-performance liquid chromatography-UV detection. The results depicted reduction of pesticide residues in all the decontamination treatments compared with the control, although it varied for different insecticides. Solutions of 1 and 5% NaCl and 5% CH ₃ COOH served as efficient decontaminants in removal of quinalphos, profenophos, ethion, and lambda-cyhalothrin residues from chili to ca. 90%, whereas for imidacloprid and acetamiprid there was a mild decontamination only (33.33 to 52.44%). The solutions of 5% NaHCO ₃ and 0.01% KMnO ₄ were effective only in removing lambda-cyhalothrin residues from the chili crop, but for all other pesticides the decontamination was not much pronounced. HIGHLIGHTS:
9	<i>Eichhornia crassipes</i> : a Powerful Bio-indicator for Water Pollution by Emerging Pollutants	C. M. De Laet, T., et. al. Sci Rep 9, 1, 7326 https://www.ncbi.nlm.nih.gov/pubmed/31086238	<i>Eichhornia crassipes</i> is well known as an invasive aquatic plant. It is also used very effectively in phytoremediation, particularly for the rhizofiltration of effluents contaminated by heavy metals. In this article, we show that it is also an excellent bioindicator of water polluted by worrying organic pollutants such as endocrine disruptors and neonicotinoids. As a proof of concept, di-n-hexylphthalate, pentabromodiphenyl ether, nitenpyram, acetamiprid and bis (3-tert-butyl-4-hydroxy-6-methylphenyl) sulfide were clearly identified by UHPLC-HRMS or GC-MS in the root system of <i>E. crassipes</i> after a short period of exposure. These results open up new perspectives for the remediation of water polluted by alarming organic pollutants.
9	Electro-catalytic degradation pathway and mechanism of acetamiprid using an Er doped Ti/SnO ₂ -Sb electrode	Li, S., et al. (2015). "Electro-catalytic degradation pathway and mechanism of acetamiprid using an Er doped Ti/SnO ₂ -Sb electrode." RSC Advances 5(84): 68700-68713.	Acetamiprid, a type of new neonicotinoid pesticide, shows a high threat to water systems. Electro-catalytic degradation of acetamiprid was evaluated using an Er doped Ti/SnO ₂ -Sb electrode prepared by the Pechini method. The acetamiprid degradation obeys first order reaction kinetics and is controlled by mass transport and oxygen evolution. SOC removal efficiency and UV scan curves revealed that some intermediate products were produced by the Er doped Ti/SnO ₂ -Sb electrode. Through electrospray ionization quadrupole time-of-flight tandem mass spectrometry, the ion mass-to-charge ratio of intermediate products was determined. Combining the experimental results, a degradation pathway was proposed for the electro-catalytic degradation of acetamiprid. Electrodes were mainly characterized by linear sweep voltammetry and cyclic voltammetry. The acetamiprid and TOC concentrations were reduced to 87.45% and 69.31%, respectively, after 180 min of electrolysis at 10 mA cm ⁻² .

Phase 1 Conformity category	Title	Citation	Abstract
9	Emerging organic contaminants in groundwater under a rapidly developing city (Patna) in northern India dominated by high concentrations of lifestyle chemicals	L. A. K. Richards, R., et. al. Environ Pollut 268, Pt A, 115765 https://www.ncbi.nlm.nih.gov/pubmed/33038633	Aquatic pollution from emerging organic contaminants (EOCs) is of key environmental importance in India and globally, particularly due to concerns of antimicrobial resistance, ecotoxicity and drinking water supply vulnerability. Here, using a broad screening approach, we characterize the composition and distribution of EOCs in groundwater in the Gangetic Plain around Patna (Bihar), as an exemplar of a rapidly developing urban area in northern India. A total of 73 EOCs were detected in 51 samples, typically at ng.L ⁻¹ to low mug.L ⁻¹ concentrations, relating to medical and veterinary, agrochemical, industrial and lifestyle usage. Concentrations were often dominated by the lifestyle chemical and artificial sweetener sucralose. Seventeen identified EOCs are flagged as priority compounds by the European Commission, World Health Organisation and/or World Organisation for Animal Health: namely, herbicides diuron and atrazine; insecticides imidacloprid, thiamethoxam, clothianidin and acetamiprid; the surfactant perfluorooctane sulfonate (and related perfluorobutane sulfonate, perfluorohexane sulfonate, perfluorooctanoic acid and perfluoropentane sulfonate); and medical/veterinary compounds sulfamethoxazole, sulfanilamide, dapson, sulfathiazole, sulfamethazine and diclofenac. The spatial distribution of EOCs varies widely, with concentrations declining with depth, consistent with a strong dominant vertical flow control. Groundwater EOC concentrations in Patna were found to peak within approximately 10 km distance from the River Ganges, indicating mainly urban inputs with some local pollution hotspots. A heterogeneous relationship between EOCs and population density likely reflects confounding factors including varying input types and controls (e.g. spatial, temporal), wastewater treatment infrastructure and groundwater abstraction. Strong seasonal agreement in EOC concentrations was observed. Co-existence of limited transformation products with associated parent compounds indicate active microbial degradation processes. This study characterizes key controls on the distribution of groundwater EOCs across the urban to rural transition near Patna, as a rapidly developing Indian city, and contributes to the wider understanding of the vulnerability of shallow groundwater to surface-derived contamination in similar environments.
5	Enhanced Quenching Effect of Neonicotinoid Pesticides on Time-Resolved Terbium Luminescence in Presence of Surfactants	Ruiz-Medina, A., et al. (2018). "Enhanced Quenching Effect of Neonicotinoid Pesticides on Time-Resolved Terbium Luminescence in Presence of Surfactants." Journal of Chemistry 2018: 5378736.	A luminescence analytical method for the quantification of neonicotinoid pesticides (acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam) in water samples is proposed. The method is based on the quenching effect that these analytes produce on the time-resolved luminescence signal of terbium ions (excitation/emission wavelengths of 256/545 nm/nm). An enhancement on the analytical signal is observed when surfactants are used in the method. The use of a 0.01 mol·L ⁻¹ ^{−1} sodium dodecyl sulfate produced approximately a 30% increase in the sensitivity of the method. Under the optimum conditions, the method presented detection limits between 0.03 and 0.23 <italic>µ</italic>·mL ^{<sup>&#x2212;1</sup>}
9	Environmental impacts of reduced-risk and conventional pesticide programs differ in commercial apple orchards, but similarly influence pollinator community	N. K. L. Joshi, T., et. al. Chemosphere 240, 124926 https://www.ncbi.nlm.nih.gov/pubmed/31726586	Insect pollinators such as bees and syrphid flies play a crucial role in pollinating many food crops, and their diversity and abundance may be influenced by pesticide application patterns. Over three years, we assessed the ecotoxicological impacts on the diversity and abundance of bees and syrphid flies between reduced-risk pesticide programs and standard, conventional pesticide programs in paired plots at six spatially distinct commercial apple orchards. In particular, we quantified pesticide inputs, environmental impact, and community response of bees and syrphids to these pesticide programs. Relative environmental impacts of reduced-risk versus conventional pesticide programs were calculated using Environmental Impact Quotient analysis, while ecological impacts were characterized by assessing the abundance, richness, and species assemblages of bees and syrphids. Adopting a reduced-risk pesticide program for apple pest management reduced the use (in terms of kg a.i./ha) of organophosphate and pyrethroid insecticides by approximately 97.6% and 100% respectively, but increased the use of neonicotinoid pesticides (acetamiprid, imidacloprid, thiacloprid) by 40.4% compared to the orchards under standard conventional pesticide program. Regardless of pesticide inputs, abundance, richness and species assemblages of bees and syrphids did not differ between reduced-risk and conventional pest management programs. However, the environmental impact of pesticide inputs was reduced by 89.8% in reduced-risk pesticide program. These findings suggest that the implementation of reduced-risk pesticide program may reduce pesticide environmental impact, in addition to being safer to farm workers, without adversely affecting the robust community composition of bees and syrphids in commercial apple orchards in the mid-Atlantic region.
8	Estimated exposure of hands inside the protective gloves used by non-occupational handlers of agricultural pesticides	Beránková M, Hojerová J, Peráčková Z. Estimated exposure of hands inside the protective gloves used by non-occupational handlers of agricultural pesticides. J Expo Sci Environ Epidemiol. 2017 Nov;27(6):625-631.	Exposure of handlers'/operators' hands is a main route of agricultural pesticides entry into their body. Non-occupational handlers still lack information about appropriate selection of protective gloves to minimize exposure and reduce adverse effects of these chemicals. According to the results of our previous survey, six commercially available, water-resistant gloves commonly used by non-professional gardeners were evaluated for permeation of Acetamiprid, Pirimicarb, and Chlorpyrifos-methyl (Chlorp-m) pesticides by means of in vitro testing. In-use conditions were mimicked as close as possible. Chlorp-m through latex was observed inside the glove from >10 to ≤15 min; however, Acetamiprid and Pirimicarb through neoprene/latex and all the three pesticides through butyl were not observed inside gloves for the duration of the experiments (the Breakthrough time (BT)>8 h). The 1-h exposure proved the interior glove contamination with Chlorp-m through disposable latex, vinyl, and nitrile gloves (51, 33, and 41% of applied dose (AD), respectively) just as with Acetamiprid and Pirimicarb through latex glove (11 and 14%AD, respectively). However, when storing the used gloves for 4 days after the exposure, no release of the three pesticides from the butyl and Acetamiprid from neoprene/latex gloves was detected. In all other cases, pesticides were found in the interior glove (36-79, 31-63, and 51-81%AD for Acetamiprid, Pirimicarb, and Chlorp-m, respectively). If used repeatedly, gloves contaminated in this way lose their protective function but give the user a false sense of security. The results suggest that (i) water-resistant gloves are not necessarily pesticide resistant; (ii) disposable latex gloves commonly worn by non-professional gardeners provide inadequate protection even for a short-time contact with pesticides; (iii) to assess the efficiency of reusable gloves, not only BT value but also the reservoir/release effect of parent pesticide and its degradation products should be evaluated; and (iv) awareness-raising activities for non-occupational handlers of pesticides should be enhanced.
Ecotoxicology	Evaluation of Highly Detectable Pesticides Sprayed in Brassica napus L.: Degradation Behavior and Risk Assessment for Honeybees	Z. D. Tong, J., et. al. Molecules 23, 10, https://www.ncbi.nlm.nih.gov/pubmed/30262759	Honeybees are major pollinators of agricultural crops and many other plants in natural ecosystems alike. In recent years, managed honeybee colonies have decreased rapidly. The application of pesticides is hypothesized to be an important route leading to colony loss. Herein, a quick, easy, cheap, effective, rugged, and safe (QuEChERS) method was used to determine eight highly detectable pesticides (carbendazim, prochloraz, pyrimethanil, fenpropathrin, chlorpyrifos, imidacloprid, thiamethoxam, and acetamiprid) in rape flowers. A field experiment was conducted at the recommended dose to evaluate the contact exposure risk posed to honeybees for 0(-)14 days after treatment. The initial residue deposits of neonicotinoids and fungicides among these compounds were 0.4(-)1.3 mg/kg and 11.7(-)32.3 mg/kg, respectively, and 6.4 mg/kg for fenpropathrin and 4.2 mg/kg for chlorpyrifos. The risk was quantified using the flower hazard quotient (FHQ) value. According to the data, we considered imidacloprid, thiamethoxam, chlorpyrifos, fenpropathrin, and prochloraz to pose an unacceptable risk to honeybees after spraying in fields, while fungicides (carbendazim and pyrimethanil) and acetamiprid posed moderate or acceptable risks to honeybees. Therefore, acetamiprid can be used instead of imidacloprid and thiamethoxam to protect rape from some insects in agriculture, and the application of prochloraz should be reduced.

Phase 1 Conformity category	Title	Citation	Abstract
4	Evaluation of insecticides for curative, preventive, and rotational use on <i>Scirtothrips dorsalis</i> South Asia 1 (Thysanoptera: Thripidae)	Vivek Kumar, Garima Kakkar, Dakshina R. Seal, Cindy L. McKenzie, Lance S. Osborne "Evaluation of Insecticides for Curative, Preventive, and Rotational Use on <i>Scirtothrips dorsalis</i> South Asia 1 (Thysanoptera: Thripidae)," Florida Entomologist, 100(3), 634-646, (1 September 2017)	The chilli thrips, <i>Scirtothrips dorsalis</i> Hood (Thysanoptera: Thripidae), is a cryptic species complex of at least 9 distinct species, 2 (South Asia 1 and East Asia 1) of which exist in the USA. To integrate chemical insecticides and mycoinsecticides into the preventive and curative tactics used for <i>S. dorsalis</i> , we evaluated 10 older and newer chemical insecticides and 3 mycoinsecticides against <i>S. dorsalis</i> South Asia 1, a dominant member of the species complex in the USA. An insecticide was considered effective when it induced greater than 70% mortality of larvae or adults. The older insecticides (acetamiprid, clothianidin, thiamethoxam [foliar application], and imidacloprid [drench application]) were found to be efficacious in reducing <i>S. dorsalis</i> populations in both curative and preventive situations (≥ 7 d after treatment). Among insecticides with newer chemistries, foliar application of spinetoram, cyantraniliprole, tolfenpyrad, and formulations of chlorantraniliprole thiamethoxam were effective for both preventive and curative control (≥ 10 d after treatment). Among mycoinsecticides, <i>Isaria fumosorosea</i> Wize (Cordycipitaceae) was effective in suppressing thrips curatively (≥ 10 d after treatment). In the insecticide rotation field trial, effectiveness of a <i>Chenopodium</i> (Amaranthaceae) extract and 3 mycoinsecticides alternated with spinetoram was comparable to spinetoram treatment alone. Because <i>S. dorsalis</i> South Asia 1 is a serious pest of several economically important crops in many counties of Florida and Texas, and an emerging pest in California, this study is important in providing information to vegetable and ornamental plant growers regarding effective insecticides with different modes of action that can be rotated to suppress <i>S. dorsalis</i> , and delay the evolution of insecticide resistance. The results also suggest retention of effective products for an extended period in the marketplace.
Ecotoxicology	Evaluation of pesticide toxicity at their field recommended doses to honeybees, <i>Apis cerana</i> and <i>A. mellifera</i> through laboratory, semi-field and field studies	Stanley J, Sah K, Jain SK, Bhatt JC, Sushil SN. Evaluation of pesticide toxicity at their field recommended doses to honeybees, <i>Apis cerana</i> and <i>A. mellifera</i> through laboratory, semi-field and field studies. Chemosphere. 2015 Jan;119:668-674.	A series of experiments were carried out to determine the acute toxicity of pesticides in the laboratory, toxicity through spray on flowering plants of mustard (Tier II evaluation) and field on both <i>Apis cerana</i> and <i>A. mellifera</i> bees. The overall mortality of honey bees through topical (direct contact) were found significantly higher than that of indirect filter paper contamination assays. Insecticides viz., chlorpyrifos, dichlorvos, malathion, profenofos, monocrotophos and deltamethrin when exposed directly or indirectly at their field recommended doses caused very high mortality up to 100% to both the bees at 48 HAT. The insecticides that caused less mortality through filter paper contamination viz., flubendiamide, methyl demeton, imidacloprid and thiamethoxam caused very high mortality through direct exposure. Apart from all the fungicides tested, carbendazim, mancozeb, chlorothalonil and propiconazole, insecticides acetamiprid and endosulfan were found safer to both the bees either by direct or indirect exposures. Tier II evaluation by spray of pesticides at their field recommended doses on potted mustard plants showed monocrotophos as the highly toxic insecticide with 100% mortality even with 1h of exposure followed by thiamethoxam, dichlorvos, profenofos and chlorpyrifos which are not to be recommended for use in pollinator attractive flowering plants. Acetamiprid and endosulfan did not cause any repellent effect on honey bees in the field trials endorse the usage of acetamiprid against sucking pest in flowering plants.
4	Evaluation of potential biocides for control of the earthworm <i>Eukerria saltensis</i> (Oligochaeta: Onerodrilidae), a pest of rice in southern Australia	Stevens, M.M. Evaluation of potential biocides for control of the earthworm <i>Eukerria saltensis</i> (Oligochaeta: Onerodrilidae), a pest of rice in southern Australia. Crop Protection, 84. 2016.	The earthworm <i>Eukerria saltensis</i> can cause severe crop establishment problems in aerially sown rice grown on heavy clay soils in southern Australia. Damage occurs indirectly through destabilization of the topsoil, increased water turbidity, and mobilization of soil nutrients into the water column which leads to increased algal growth. We investigated the possibilities for chemical control of <i>E. saltensis</i> using laboratory bioassays and a series of field trials involving either the use of enclosures in flooded crops or soil incorporation of pesticides into rice fields during fallow periods or shortly before flooding. The four most toxic compounds in 7 day soil/water laboratory bioassays were carbofuran, acetamiprid, bendiocarb and lambda-cyhalothrin which provided corrected mortalities of 86–100% at 2 mg
4	Evaluation of the effects of some insecticides based on neonicotinoids on entomopathogenic nematodes, <i>Steinernema feltiae</i> and <i>S. carpocapsae</i>	Kwizera, V., et. al. Evaluation of the effects of some insecticides based on neonicotinoids on entomopathogenic nematodes, <i>Steinernema feltiae</i> and <i>S. carpocapsae</i> . ISJ - Invertebrate Survival Journal. 14(1) 2017.	Used of entomopathogenic nematodes (EPNs) are one biological control way against some insect pests, which especially pass one stage of their life in the soil. There have been a lot of developments and new discoveries in the field of entomopathogenic nematology. In spite of developments in the field of biological control, pesticides are still widely used for plant protection. These pesticides have side effects on soil biotop such as EPN species. In this study, we evaluated the effects of two insecticides (acetamiprid and imidacloprid) belong to neonicotinoid group on two EPNs (<i>Steinernema carpocapsae</i> and <i>Steinernema feltiae</i>). The present experiments were carried out in the laboratory. Mortality rate of the EPN species was performed at 24, 48 and 96 h, after treatment. Inspired by the compatibility observed between the neonicotinoid insecticides and EPNs against insect pest larvae, it was evaluated the direct effects of those insecticides on EPNs. Our results showed less mortality by imidacloprid and mortality rates are a little higher by acetamiprid. These results confirm the high compatibility of imidacloprid with EPNs and the low synergism with acetamiprid. Despite their effects on pollinators and other useful organisms of the biotop, these insecticides can be used effectively against soil dwelling insect pests without high risk on EPNs.
8	Evaluation of the occurrence and fate of pesticides in a typical Mediterranean delta ecosystem (Ebro River Delta) and risk assessment for aquatic organisms	M. V. P. Barbieri, A., et. al. Environ Pollut 274, , 115813 https://www.ncbi.nlm.nih.gov/pubmed/33257154	Delta ecosystems are areas of high ecologic and economic values, where wildlife commonly shares the territory with intensive agricultural activities, particularly, rice cultivation and seafood production. This work aimed at evaluating the occurrence of a wide spectrum of pesticides and transformation products in the water of irrigation and drainage channels of the Ebro River Delta (NE Spain) during the main rice-growing season, when pesticide application is at its peak. Furthermore, the impact that these contaminants may have on local ecosystems and seafood production activities was assessed. A total of 35 pesticides, mainly associated with rice cultivation, out of the 66 analyzed were detected. Bentazone, propanil, MCPA, acetamiprid, and triallate were found at the $\mu\text{g/L}$ level. Cybutryne, despite being banned in the European Union, was measured for the first time in the area and at concentrations above its environmental quality standard (11-49 ng/L). Sixteen additional banned pesticides were also detected at trace levels, likely due to their desorption from soil and sediment particles. Despite its dilution when discharged into the bay, this study demonstrates that the agricultural use of pesticides may have important effects on water quality and may cause a serious hazard for aquatic non-target organisms, although other factors such as temperature and salinity may play also a relevant role. Bentazone, cybutryne, dicofol, imidacloprid, MCPA, and propanil may pose a moderate to high risk for aquatic organisms at the concentration levels measured during the rice-growing season. The co-occurrence of pesticides may result in a high risk for aquatic organisms in all sampling locations. The finding of the EU Watch List insecticides imidacloprid and acetamiprid at concentrations above their maximum acceptable method detection limit calls for control of their use and revision of their legal status.
8	The Exposure of Honey Bees to Pesticide Residues in the Hive Environment with Regard to Winter Colony Losses	Pohorecka, Krystyna, Szczesna, Teresa, Witek, Monika, Miszczak, Artur and Sikorski, Piotr. "The Exposure of Honey Bees to Pesticide Residues in the Hive Environment with Regard to Winter Colony Losses" Journal of Apicultural Science, vol.61, no.1, 2017, pp.105-125	The present studies are the second part of the research project dedicated to finding the causes for increased winter mortality of honey bee colonies. The aim of this task was to investigate incidents of overwintered colonies' death with regard to the potential interrelation to the exposure to pesticides. The samples of winter stores of bee bread and sugar food (honey or syrup processed by bees), beeswax and bees collected from apiaries with low and high rates of winter colony mortality were searched for acaricides used to control <i>V. destructor</i> and plant protection pesticides. The presence of acaricides used in apiculture has been detected in the 51% beeswax samples. The most abundant acaricide was tau-fluvalinate. The stores of bee bread and sugar food had a similar frequency of plant protection pesticide occurrence, ranging between 50-60%, but the number of active substances and their concentrations were substantially lower in sugar food samples. The most prevalent pesticides in pollen were fungicides (carbendazim and boscalid) and insecticides (acetamiprid and thiacloprid). Only a few pesticides were found in the several dead honey bees. The level of pesticide contamination (frequency, concentration, toxicity) of hive products and bees originating from apiaries with both a high and low winter colony survival rates, was similar, which created a similar extent of risk. Although the multiple varroacides and pesticides were present in the hive environment we not found unequivocal links between their residues and high winter colony mortality.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Exposure to acetamiprid influences the development and survival ability of worker bees (<i>Apis mellifera</i> L.) from larvae to adults	J. Z. Shi, R., et. al. Environ Pollut 266, Pt 2, 115345 https://www.ncbi.nlm.nih.gov/pubmed/32814180	In most cases, honey bees experience pesticide pollution in a long-term period through direct or indirect exposure, such as the development process from larvae to the pre-harvest stage. At present, little is known about how honey bees respond to pesticide stresses during the continuous development period. This study aims to examine effects of long-term acetamiprid exposure on the development and survival of honey bees, and further present the expression profile in larvae, 1-day-old, and 7-day-old adult worker bees that related to immune, detoxification, acetylcholinesterase (AChE) and memory. Honey bees from 2-day-old larvae to 14-day-old adults except the pupal stage were continuously fed with different acetamiprid solutions (0, 5, and 25 mg/L). We found that acetamiprid over 5 mg/L disturbed the development involving birth weight and emergence rate of newly emerged bees, and reduced the proportion of capped cells of larvae at 25 mg/L; gene expression related to immune and detoxification of worker bees exposed to acetamiprid was roughly activated, returned and then inhibited from larval to emerged and to the late adult stage, respectively. Moreover, lifespans of bees treated with acetamiprid at 25 mg/L were significantly reduced. The present study reflects the potential risk for honey bees continuously exposed to acetamiprid in the development stage.
Epidemiology	Exposure to neonicotinoid insecticides in the US general population: Data from the 2015-2016 national health and nutrition examination survey	Ospina M, Wong LY, Baker SE, Serafim AB, Morales-Agudelo P, Calafat AM. Exposure to neonicotinoid insecticides in the U.S. general population: Data from the 2015-2016 national health and nutrition examination survey. Environ Res. 2019 Sep;176:108555.	Background: Neonicotinoids are used for insect control in agriculture, landscaping, and on household pets. Neonicotinoids have become popular replacements for organophosphate and carbamate insecticides, and use is on the rise. Objectives: To assess human exposure to neonicotinoid insecticides in a representative sample of the U.S. general population 3 years and older from the 2015-2016 National Health and Nutrition Examination Survey (NHANES). Methods: We used online solid-phase extraction coupled to isotope dilution high-performance liquid chromatography-tandem mass spectrometry after enzymatic hydrolysis of conjugates to quantify in 3038 samples the urinary concentrations of six neonicotinoid biomarkers: four parent compounds (acetamiprid, clothianidin, imidacloprid, thiacloprid) and two metabolites (N-desmethyl-acetamiprid, 5-hydroxy-imidacloprid). We calculated distribution percentiles, and used regression models to evaluate associations of various demographic parameters and fasting time with urinary concentrations above the 95th percentile (a value selected to represent higher than average concentrations) of neonicotinoid biomarkers. Results: Weighted detection frequencies were 35% (N-desmethyl-acetamiprid), 19.7% (5-hydroxy imidacloprid), 7.7% (clothianidin), 4.3% (imidacloprid), and <0.5% (acetamiprid, thiacloprid). The weighted frequency of having detectable concentrations of at least one of the six biomarkers examined was 49.1%. The 95th percentile concentrations for N-desmethyl-acetamiprid, 5-hydroxy imidacloprid, and clothianidin were 1.29, 1.37, and 0.396 $\mu\text{g/L}$, respectively. For people who fasted <8 h, regardless of race/ethnicity and sex, 3-5 year old children were more likely to have N-desmethyl-acetamiprid concentrations above the 95th percentile than adolescents (adjusted odds ratio (OR) = 3.12; 95% confidence interval [CI], (0.98-9.98)) and adults (adjusted OR = 4.29; 95% CI, (2.04-9.0)); and children 6-11 years of age were more likely than adults to have N-desmethyl-acetamiprid concentrations above the 95th percentile (adjusted OR = 2.65; 95% CI, (1.2-5.84)). Asians were more likely than non-Asians to have concentrations above the 95th percentile of N-desmethyl-acetamiprid (adjusted OR = 1.94; 95% CI, (1.08-3.49)) and 5-hydroxy-imidacloprid (adjusted OR = 2.25; 95% CI, (1.08-4.68)).
Toxicology	Exposure to neonicotinoid insecticides induces embryotoxicity in mice and rabbits	J. S. Babelova, Z., et. al. Toxicology 392, 71-80 https://www.ncbi.nlm.nih.gov/pubmed/29061322	The potential toxicity of neonicotinoids (thiacloprid, acetamiprid, thiamethoxam and clothianidin) as well as related commercial products Calypso 480SC (thiacloprid mixture), Mospilán 20SP (acetamiprid mixture) and Agita 10WG (thiamethoxam mixture) on developmental capacities and quality of preimplantation embryos was evaluated. During in vitro tests, isolated 2-cell stage mice embryos were cultured in media with various concentrations of active compounds or commercial products until blastocyst formation. As found using stereomicroscopic examination, all neonicotinoids at highest (100 μM) concentration negatively affected embryonic development ($P < 0.001$). Fluorescence staining revealed that the blastocysts obtained displayed lower numbers of blastomeres and elevated incidence of cell death. Thiacloprid and acetamiprid decreased quality of blastocysts also at 10 μM concentration. From the tested products only Calypso 480SC containing 10 μM of thiacloprid showed harmful impact on embryo quality. In an experiment using rabbit embryos, similar negative effect of thiacloprid in vitro was recorded. In vivo testing confirmed that blastocysts collected from thiacloprid-treated mice displayed lower total cell counts than blastocysts from controls. The sensitivity of embryonic cells to neonicotinoids is in the order of thiacloprid > acetamiprid, thiamethoxam > clothianidin. Thiacloprid impairs development and quality of both mouse and rabbit preimplantation embryos, and shows embryotoxicity even at acute reference dose.
Toxicology	Exposures of children to neonicotinoids in pine wilt disease control areas	Y. M. Ikenaka, Y., et. al. Environ Toxicol Chem 38, 1, 71-79 https://www.ncbi.nlm.nih.gov/pubmed/30478955	Neonicotinoid insecticides that have been on the market since 1992 have been used globally including in Japan. Because they are sprayed over forests and agricultural areas, inadvertent toxicity in nontarget insects (especially honey bees) and humans is a matter of public concern. However, information on exposure levels and potential health impacts of neonicotinoids in children living around sprayed areas is scarce. Thus, we determined neonicotinoid exposure levels in children living in communities where thiacloprid was used to control pine wilt disease. A total of 46 children (23 males and 23 females) were recruited for the present study, and informed written consent was obtained from their guardians. Urine specimens were collected before, during, and after insecticide spraying events; and atmospheric particulate matter was also collected. Concentrations of thiacloprid and 6 other neonicotinoid compounds were determined in urine samples and in atmospheric particulate matter specimens using liquid chromatography-electrospray ionization-tandem mass spectrometry. In urine specimens, thiacloprid concentrations were <0.13 $\mu\text{g/L}$ and were detectable in approximately 30% of all samples. Concentrations of the other neonicotinoids, N-dm-acetamiprid, thiamethoxam, dinotefuran, and clothianidin, were 18.7, 1.92, 72.3, and 6.02 $\mu\text{g/L}$, respectively. Estimated daily intakes of these neonicotinoids were then calculated from urinary levels; although the estimated daily intakes of the neonicotinoids were lower than current acceptable daily intake values, the children were found to be exposed to multiple neonicotinoids on a daily basis. Environ Toxicol Chem 2019;38:71-79. (c) 2018 SETAC.
9	The expression of soluble functional $\alpha 7$ -nicotinic acetylcholine receptors in <i>E. coli</i> and its high-affinity binding to neonicotinoid pesticides	Xiang D, Xu X, Zhou Q, Yan R, Chen M, Guo Y, Zhu G. The expression of soluble functional $\alpha 7$ -nicotinic acetylcholine receptors in <i>E. coli</i> and its high-affinity binding to neonicotinoid pesticides. Pestic Biochem Physiol. 2020 Mar;164:237-241.	Nicotinic acetylcholine receptors (nAChRs) are ligand-gated ion channels mediating fast cholinergic synaptic transmission in nervous system. In insects, nAChRs are the target sites for several naturally occurring and synthetic compounds, including the neonicotinoid insecticides. So far, one of the major strategies to explore the interaction of nAChR and ligands is based on the heterologous expression of nAChR, which is tough, and needs to be explored. In this study, we expressed and purified extracellular domain of rat $\alpha 7$ subunit (R $\alpha 7$ -ECD), the binding site of the ligands in <i>E. coli</i> and determined the interactions and kinetic constants of neonicotinoid insecticides with R $\alpha 7$ -ECD. The recombinant R $\alpha 7$ -ECD is water-soluble and appears to be correctly folded. The interactions of three neonicotinoid pesticides with R $\alpha 7$ -ECD were assessed by surface plasmon resonance (SPR) biosensor. The results revealed a fast association and fast disassociation binding mode of R $\alpha 7$ -ECD/pesticides complexes with the KD value of clothianidin (6.414E-9 M) > imidacloprid (9.030E-9 M) > acetamiprid (2.874E-6 M), respectively. This study demonstrated that the nAChR expressed from <i>E. coli</i> was functional, and SPR biosensor technology would be a good alternative for characterizing members of nAChR receptor family.

Phase 1 Conformity category	Title	Citation	Abstract
5	Fabrication of a sustained release delivery system for pesticides using interpenetrating polyacrylamide/alginate/montmorillonite nanocomposite hydrogels	He, F., et al. (2019). "Fabrication of a sustained release delivery system for pesticides using interpenetrating polyacrylamide/alginate/montmorillonite nanocomposite hydrogels." Applied Clay Science 183: 105347.	In pest control field, the sustained release of pesticides plays significant roles in effectiveness and environment friendly. In this study, the sodium alginate (SA), polyacrylamide (PAM) and montmorillonite (MMT) were utilized to fabricate the stretchable double-network nanocomposite hydrogel, which apply in a sustained release system of acetamiprid. These nanocomposite hydrogels were fully characterized by X-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), thermal gravimetric analysis (TGA), transmission electron microscopy (TEM), and scanning electron microscopy (SEM). The results indicate that adding MMT could significantly improve the sustained release performances of the hydrogels. The swelling behavior of all the hydrogels well fits into the Fickian diffusion model. The hydrogel with 5.0% MMT content shows the maximum pesticides loading rate of 13.32% and minimum pesticides release rate of 76.11%. The nanocomposite hydrogels take advantages of both the gelation property of alginate and the adsorption capacity of clays, has great potential in the application of pesticides carrier to improve the utilization efficiency of water-insoluble pesticides.
5	A facile strategy for photocatalytic degradation of seven neonicotinoids over sulfur and oxygen co-doped carbon nitride	X. L. Liu, C., et. al. Chemosphere 253, , 126672 https://www.ncbi.nlm.nih.gov/pubmed/32464766	Mounting evidence highlights the negative impacts of neonicotinoids on non-target organisms and ecosystem, yet there are a few of methods to address the residual neonicotinoids in environment. Herein, series of sulfur and oxygen co-doped carbon nitride (SOCNx) were successfully synthesized via one-step thermal polymerization and applied in photodegradation of multi-neonicotinoids (dinotefuran, acetamiprid, clothianidin, thiacloprid, imidacloprid, nitenpyram and thiamethoxam) simultaneously for the first time. Unique tubular structure was observed at the specific doping ratio, which enhanced both mass transfer and specific surface area of graphitic carbon nitride (g-C3N4). The doping process changed the morphology of g-C3N4 materials and also affected its photocatalytic performance. The degradation rate of optimized material (SOCN8) for nitenpyram could surpass 90% just in 30 min under visible light in aqueous matrix. The degradation for target insecticide increased maximum efficiency of 57.6% compared to bulk g-C3N4. Moreover, the possible mechanism of the degradation process was proposed. The results revealed that photon-induced hole (h ⁺) was the primary active species during the degradation of seven investigated neonicotinoids. Moreover, the SOCN8 showed excellent recyclability after four consecutive cycles, which implied promising applications for pesticide-contaminated water remedy.
5	Fast determination of neonicotinoid insecticides in bee pollen using QuEChERS and ultra-high performance liquid chromatography coupled to quadrupole time-of-flight mass spectrometry	Valverde S, Bernal JL, Martín MT, Nozal MJ, Bernal J. Fast determination of neonicotinoid insecticides in bee pollen using QuEChERS and ultra-high performance liquid chromatography coupled to quadrupole time-of-flight mass spectrometry. Electrophoresis. 2016 Oct;37(19):2470-2477.	In this study, a new method has been developed to determine seven neonicotinoid insecticides (acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid and thiamethoxam) in bee pollen using ultra-high performance liquid chromatography coupled to a selective MS detector (qTOF). An efficient sample treatment involving an optimized quick, easy, cheap, effective, rugged and safe method was proposed. In all cases, average analyte recoveries were between 91 and 105%, and no matrix effect was observed. Chromatographic analysis (6.5 min) was performed on a core-shell technology based column (Kinetex® EVO C18 , 50 ×2.1 mm, 1.7 μm, 100 Å). The mobile phase consisted of 0.1% formic acid in water and 0.1% of formic acid in ACN, with a flow rate of 0.3 mL/min in gradient elution mode. The fully validated method was selective, linear from LOQ to 500 μg/kg, precise and accurate; relative standard deviation and relative error values were below 8%. Low limits LODs and LOQs were obtained, ranging from 0.6 to 1.3 μg/kg (LODs) and 2.1 to 4.0 μg/kg (LOQs). The method was applied to neonicotinoid analysis in several commercial bee pollen samples from different Spanish regions.
5	Fast oxidation of the neonicotinoid pesticides listed in the EU Decision 2018/840 from aqueous solutions	Serrano, E., et al. (2020). "Fast oxidation of the neonicotinoid pesticides listed in the EU Decision 2018/840 from aqueous solutions." Separation and Purification Technology 235: 116168	Neonicotinoid pesticides family is nowadays identified as the most important type of insecticides in the world. Their consequent widespread occurrence in the environment represents not only a well-known risk for bees but also a significant negative impact in aquatic ecosystems. In this work, the capability of catalytic wet peroxide oxidation (CWPO) (Fe3O4-R400/H2O2) as a low-cost and environmentally-friendly system for the treatment of the neonicotinoid pesticides listed in the EU Watch List (Decision 2018/840) (acetamiprid (ACT), clothianidin (CLT), imidacloprid (IMD), thiacloprid (THC) and thiamethoxam (THM)) has been investigated. Remarkably, complete elimination of the pollutants (1000 μg L ⁻¹) and the aromatic by-products was reached in 20 min reaction time operating at 25 °C, 1 atm, and pH0 = 5, with the stoichiometric H2O2 amount (~4–5 mg L ⁻¹) and 1 g L ⁻¹ catalyst load. The reactivity order of the insecticides decreased as follows: THC > IMD > THM > CLT > ACT, being the pseudo-first order rate constant values within the range of 0.26–0.61 min ⁻¹ . Notably, high mineralization yields were obtained (>50%), being the final effluents non-toxic. As example, the oxidation pathway of ACT was proposed. Finally, the catalytic system was tested in real surface water.
8,9	The fate of acetamiprid and its degradation during long-term storage of honey	O. A. Yeter, A. Food Addit Contam Part A Chem Anal Control Expo Risk Assess 37, 2, 288-303 https://www.ncbi.nlm.nih.gov/pubmed/31825751	Acetamiprid (ATP) is a neonicotinoid widely used in agriculture, which is less toxic to honeybees and is transported into the hives via the contaminated nectar and pollen as well as physical contact. Although ATP degrades in animal systems mainly through N-desmethylacetamiprid (IM-2-1), it is degraded in honey of different origins mainly through (E)-N(2)-(carbamoyl)-N(1)-(6-chloro-3-pyridyl)methyl)-N(1)-methylacetamidine (IM-1-2). The decomposition of ATP in honey has been followed for storage times up to 180 days at 20 degrees C, 30 degrees C and 40 degrees C to represent geographical regions with different temperatures. Subsequent degradation of IM-1-2 occurred and IM-1-4 was detected as a degradation product of IM-1-2. The apparent decomposition rate constants and half-lives of ATP in honey were determined. ATP degradation to IM-1-2 was faster in honey than the rates observed in aqueous solutions of pH 3.0-5.0. In order to follow actual ATP contamination in honey, IM-1-2 analysis is proposed to be carried out instead of the analyses of ATP and IM-2-1 for safety determination to ensure application of Good Agricultural Practice and to maintain a healthy environment.
5	Fate of micropollutants during sewage sludge disintegration by low-frequency ultrasound	Ibáñez, G. Rivas, et al. "Fate of micropollutants during sewage sludge disintegration by low-frequency ultrasound." Chemical Engineering Journal 280 (2015): 575-587.	The degradation of micropollutants (pesticides) absorbed in agro-food industrial sewage sludge was investigated during its excess reduction by disintegration with ultrasound treatment. Sludge sonication (24 kHz and 323 W) was performed in batch mode in a stainless steel ultrasonic flow-through reactor connected to a recirculation tank. The maximum sludge disintegration was reached by supplying 0.87 MJ L ⁻¹ ultrasound dose (UD) giving rise to 68.7% solubilisation of the carbon content in the disintegrated biomass. The sonicated sludge was biodegradable, thus able to be returned as feed in the secondary wastewater treatment. The ultrasound (US) treatment resulted in a significant reduction in the sludge pesticide content (90% of the total pesticide mass was removed), therefore preventing pollutant accumulation in the sludge. Investigation into the sono-degradation of three characteristic pesticides (thiabendazole, acetamiprid and imazalil) revealed the formation of transformation products (TPs) already reported in studies on the degradation of these compounds by advanced oxidation processes, thus confirming that ultrasonication involves hydroxyl radical reactions. Our results show that this US treatment for the excess sludge reduction is also efficient for pesticides and their TPs removal.
10	Fate of selected neonicotinoid insecticides in soil-water systems: Current state of the art and knowledge gaps	D. K. Pietrzak, J., et. al. Chemosphere 255, , 126981 https://www.ncbi.nlm.nih.gov/pubmed/32408130	The occurrence of emerging contaminants, such as: personal care products, medicines, pharmaceuticals, pesticides, and their transformation products in the environment is of concern for human health and aquatic ecosystems due to their high persistence, toxicity and potential to bioaccumulation. Among pesticides, the main attention and thus our focus is on neonicotinoids: acetamiprid, clothianidin, imidacloprid, thiacloprid and thiamethoxam, which are widely used classes of insecticides in agriculture. Determining the associated risk to humans and ecosystems from neonicotinoid insecticides requires detailed understanding of their fate and transport in the environment which is complex and includes diverse pathways and processes depending on environmental compartments in which they occur. This paper critically reviews the current state of the art about processes, parameters and phenomena influencing the fate of neonicotinoid insecticides in soil-water systems (i.e. soil and groundwater), and reveals existing knowledge gaps. Sorption, biodegradation, chemical transformations of neonicotinoid insecticides in the soil and leaching to the groundwater, as well as groundwater/surface water interactions are highlighted, as they determine their further migration from sources, through soils to groundwater systems and then to other environmental compartments posing ecological and human risks. A number of key knowledge gaps in fate of neonicotinoid insecticides in soil-water systems are identified, that concern mostly processes and pathways occurring in the groundwater, and require further research to assess the associated risk to humans and ecosystems.

Phase 1 Conformity category	Title	Citation	Abstract
5	A Feasible Approach to Detect Pesticides in Food Samples Using THz-FDS and Chemometrics	Chen, Q., et al. (2020). "A Feasible Approach to Detect Pesticides in Food Samples Using THz-FDS and Chemometrics." <i>Journal of Spectroscopy</i> 2020: 3859076.	The use of pesticides will have an impact on food, organisms, and environment. Specifically, pesticide residues in food will damage human health. Because of its high permeability, low energy, high spectral resolution, and fingerprint characteristics, terahertz frequency-domain spectroscopy has been introduced into the determination of pesticides (imidacloprid, acetamiprid, and triadimefon) residues in food samples (glutinous rice flour, wheat flour, and corn flour) in our present study. These three pesticides exhibit their own absorption peaks in the region of 0.4–1.7 THz. For understanding the origins of these peaks, the experimental data are interpreted by using density functional theory calculations at the level of B3LYP/6-31G (d). It is found that these absorption peaks come from the intramolecular and intermolecular interactions. The absorption peaks of pesticides are still detectable in a mixture of pesticides and food samples when they reach a certain concentration. The results from chemometrics analysis show that quantitative detection of pesticides in food samples is feasible. The partial least squares regression models have high correlation coefficient (>0.99), low root-mean-square error of calibration (<1.5%), low root-mean-square error of cross-validation (<2.4%), and low root-mean-square error of prediction (<2.3%), indicating good quality of prediction for pesticides concentration. Our results prove that the terahertz frequency-domain spectrum combined with chemometrics can be used for the detection of pesticides in food samples.
8	First national-scale reconnaissance of neonicotinoid insecticides in streams across the USA	Hladik, M. and D. W. Kolpin (2015). "First national-scale reconnaissance of neonicotinoid insecticides in streams across the USA." <i>Environmental Chemistry</i> 13(1): 12-20.	To better understand the fate and transport of neonicotinoid insecticides, water samples were collected from streams across the United States. In a nationwide study, at least one neonicotinoid was detected in 53 % of the samples collected, with imidacloprid detected most frequently (37 %), followed by clothianidin (24 %), thiamethoxam (21 %), dinotefuran (13 %), acetamiprid (3 %) and thiacloprid (0 %). Clothianidin and thiamethoxam concentrations were positively related to the percentage of the land use in cultivated crop production and imidacloprid concentrations were positively related to the percentage of urban area within the basin. Additional sampling was also conducted in targeted research areas to complement these national-scale results, including determining: (1) neonicotinoid concentrations during elevated flow conditions in an intensely agricultural region; (2) temporal patterns of neonicotinoids in heavily urbanised basins; (3) neonicotinoid concentrations in agricultural basins in a nationally important ecosystem; and (4) in-stream transport of neonicotinoids near a wastewater treatment plant. Across all study areas, at least one neonicotinoid was detected in 63 % of the 48 streams sampled.
10	Focussed assessment of certain existing MRLs of concern for acetamiprid and modification of the existing MRLs for table olives, olives for oil production, barley and oats	A. B. European Food Safety. EFSA J 16, 5, e05262 https://www.ncbi.nlm.nih.gov/pubmed/32625899	In compliance with Article 43 of Regulation (EC) No 396/2005, EFSA received from the European Commission a mandate to provide its reasoned opinion on the existing maximum residue levels (MRLs) for acetamiprid which might lead to consumers intake concerns on the basis of the new toxicological reference values agreed upon by Member States (MSs) in October 2017. In order to identify the MRLs of potential concern that require a more detailed assessment, EFSA performed a preliminary risk assessment, identifying a risk for consumers for 12 commodities. Measures for reduction of the consumer exposure were assessed by EFSA and should be considered by risk managers. Furthermore, in accordance with Article 6 of Regulation (EC) No 396/2005, ADAMA Makhteshim Ltd submitted two requests to modify the existing MRL for acetamiprid in table olives, olives for oil production, barley and oats. The data submitted in support of the requests were found to be sufficient to derive MRL proposals for all crops under assessment. Based on the risk assessment results, EFSA concluded that the short-term and long-term intake of residues resulting from the use of acetamiprid according to the intended agricultural practices on table olives, olives for oil production, barley and oats is unlikely to present a risk to consumer health.
8	Functional alterations by a subgroup of neonicotinoid pesticides in human dopaminergic neurons	D. H. Loser, M. G., et. al. <i>Arch Toxicol</i> 95, 6, 2081-2107 https://www.ncbi.nlm.nih.gov/pubmed/33778899	Neonicotinoid pesticides, originally developed to target the insect nervous system, have been reported to interact with human receptors and to activate rodent neurons. Therefore, we evaluated in how far these compounds may trigger signaling in human neurons, and thus, affect the human adult or developing nervous system. We used SH-SY5Y neuroblastoma cells as established model of nicotinic acetylcholine receptor (nAChR) signaling. In parallel, we profiled dopaminergic neurons, generated from LUHMES neuronal precursor cells, as novel system to study nAChR activation in human post-mitotic neurons. Changes of the free intracellular Ca(2+) concentration ([Ca(2+)]i) were used as readout, and key findings were confirmed by patch clamp recordings. Nicotine triggered typical neuronal signaling responses that were blocked by antagonists, such as tubocurarine and mecamylamine. Pharmacological approaches suggested a functional expression of alpha7 and non-alpha7 nAChRs on LUHMES cells. In this novel test system, the neonicotinoids acetamiprid, imidacloprid, clothianidin and thiacloprid, but not thiamethoxam and dinotefuran, triggered [Ca(2+)]i signaling at 10-100 microM. Strong synergy of the active neonicotinoids (at low micromolar concentrations) with the alpha7 nAChR-positive allosteric modulator PNU-120596 was observed in LUHMES and SH-SY5Y cells, and specific antagonists fully inhibited such signaling. To provide a third line of evidence for neonicotinoid signaling via nAChR, we studied cross-desensitization: pretreatment of LUHMES and SH-SY5Y cells with active neonicotinoids (at 1-10 microM) blunted the signaling response of nicotine. The pesticides (at 3-30 microM) also blunted the response to the non-alpha7 agonist ABT 594 in LUHMES cells. These data show that human neuronal cells are functionally affected by low micromolar concentrations of several neonicotinoids. An effect of such signals on nervous system development is a toxicological concern.
5	Fungal degradation of selected medium to highly polar pesticides by <i>Trametes versicolor</i> : kinetics, biodegradation pathways, and ecotoxicity of treated waters	K. B. Hu, M. V. <i>Anal Bioanal Chem</i> https://www.ncbi.nlm.nih.gov/pubmed/33860335	The massive use of pesticides represents one of the main causes of environmental deterioration, as they have adverse effects on non-target organisms. Thus, the development of technologies capable of reducing their release into the environment is urgently needed. This study reports for the first time the white-rot fungus <i>Trametes versicolor</i> as an alternative towards the degradation of medium to highly polar pesticides such as the organophosphate malathion, and the neonicotinoids acetamiprid and imidacloprid. Specifically, <i>T. versicolor</i> could completely remove 1 mg/L of malathion in an Erlenmeyer flask within 48 h, while experiments of acetamiprid and imidacloprid (4 mg/L), conducted in air-pulse fluidized bioreactors, resulted in degradation percentages of 20% and 64.7%, respectively, after 7 days of operation. Enzymatic exploration studies revealed that the cytochrome P450 system, instead of the extracellular enzyme laccase, is involved in the degradation of acetamiprid and imidacloprid. The degradation pathways were proposed based on the main transformation products (TPs) formed in the solutions: seven in the case of malathion, and two and one in the case of imidacloprid and acetamiprid, respectively. Although the TPs identified were predicted to be less toxic than the investigated pesticides, the toxicity of the individual solutions slightly increased throughout the degradation process, according to the Microtox assay. However, the solution toxicity was always below the threshold established in the local regulation. Although additional research is needed to implement this treatment at a pilot plant scale, this work highlights the potential of <i>T. versicolor</i> to bio-remediate pesticide-contaminated waters.
5	Grab and passive sampling applied to pesticide analysis in the SAo Lourenco river headwater in Campo Verde - MT, Brazil	A. B. Berton, M. F., et. al. <i>J Environ Sci Health B</i> 53, 4, 237-245 https://www.ncbi.nlm.nih.gov/pubmed/29336664	In this study, the quality of surface water in the headwaters of Sao Lourenco River in Mato Grosso, Brazil, was evaluated in relation to contamination by pesticides. For this purpose, samples were collected between December 2015 and June 2016 by grab sampling and by passive sampling using an integrative polar organic compound sampler installed in the field during four 14-day cycles between March and June 2016. The analyses were performed by gas chromatography (CG/MS) and by liquid chromatography (UPLC-MS/MS). The results showed the detection of two pesticides (atrazine and pyraclostrobin) of the five analyzed by passive sampling and eight active principles among the 20 analyzed (malathion, diuron, carbofuran, carbendazim, trifluralin, imidacloprid, metolachlor, and acetamiprid) by grab sampling. The detection of 10 pesticides, even almost a decade after the beginning of a recovery process of the ciliary forest, confirms the headwaters' vulnerability to these contaminants and passive sampling proved to be an important tool in capturing small concentrations of pesticides constituting an interesting complement to grab sampling.

Phase 1 Conformity category	Title	Citation	Abstract
8	Gut Flora-Mediated Metabolic Health, the Risk Produced by Dietary Exposure to Acetamiprid and Tebuconazole	J. Z. Liu, F., et. al. Foods 10, 4 https://www.ncbi.nlm.nih.gov/pubmed/33921314	The low-level and long-term exposure of pesticides was found to induce metabolic syndrome to mice. Metabolic pathways and mechanisms were investigated by detecting gut flora with metabolites, host circulation, and their interrelations. Results showed that the abundances of flora species and their metabolism were altered, consequently leading to metabolic disorders. A correlation analysis between gut flora and their metabolic profiling further explained these changes and associations. The metabolic profiling of host circulation was also performed to characterize metabolic disorders. The associations of host circulation with gut flora were established via their significantly different metabolites. Alterations to the liver metabolism clarified potential pathways and mechanisms for the disorders. Metabolic disorders were evidently released by dietary and micro-ecological intervention, directly proving that gut flora comprise a vital medium in metabolic health risk caused by pesticide exposure. This work supplied theoretical bases and intervention approaches to body metabolic problems caused by pesticide exposure mediated by gut flora.
5	Health risk assessment of neonicotinoid insecticide residues in pistachio using a QuEChERS-based method in combination with HPLC-UV	Mahdavi V, Garshasbi Z, Farimani MM, Farhadpour M, Aboul-Enein HY. Health risk assessment of neonicotinoid insecticide residues in pistachio using a QuEChERS-based method in combination with HPLC-UV. Biomed Chromatogr. 2020 Mar;34(3):e4747.	There is an increasing need to address the potential risks arising from combined exposures to multiple residues from pesticides in the diet. Pesticide residue-related pollution is a problem that arises because of the increased use of pesticides in agriculture to meet the growing demands of food production. In this study, pesticide residue data were obtained based on an optimized extraction method. For this purpose, we established a method based on quick, easy, cheap, effective, rugged, and safe (QuEChERS) extraction for simultaneous determination of imidacloprid (IMI) and acetamiprid (ACT) in pistachio nuts. The parameters influencing the QuEChERS method were the sample-to-water ratio and adsorbent amounts. As a result, both were optimized to improve the recovery of the analytes as well as the clean-up efficiency of the pistachio matrix. Our results indicated that a freeze-out step and use of primary and secondary amines as an adsorbent led to much cleaner chromatograms with lower baseline drift, without using graphitized carbon black and C18 -based adsorbent, which reduced both cost and time of analysis. Following extraction, the pesticide residues were separated and quantified by reverse-phase HPLC. For validation purposes, recovery studies were carried out using a concentration range from 20 to 2500 µg/L at nine levels. The suitable linearity, precision, and accuracy were obtained with HPLC-UV with recoveries of 70.37%-89.80% for IMI and 81.05%-113.57% for ACT, with relative standard deviations <12%. The validated method was successfully applied to the analysis of pistachio samples collected from a field trial to estimate maximum residue limits. There was no significant health risk for consumers via pistachio consumption.
Epidemiology	Health risks to dietary neonicotinoids are low for Chinese residents based on an analysis of 13 daily-consumed foods	K. W. Cui, X., et. al. Environ Int 149, 106385 https://www.ncbi.nlm.nih.gov/pubmed/33503555	Neonicotinoid pesticide residues are ubiquitous in various foodstuffs and may adversely affect human health. We performed a nationwide survey of neonicotinoid residues in foodstuffs collected from Chinese markets and evaluated the risks of chronic and acute exposure in 1-6-year-old children and the general population. Among the 3406 samples of 13 commodities, 62.21% contained neonicotinoids with concentrations ranging from 0.1 to 1471.43 µg/kg, and 37.58% were simultaneously contaminated with 2-7 neonicotinoids. Acetamiprid, thiamethoxam, and imidacloprid were the top three detected neonicotinoids (22.14-34.32% of samples). Chronic and acute cumulative risk assessment using the relative potency factor method revealed that exposure to neonicotinoids was within established safety limits (below 1); however, the acute risk was much greater than the chronic risk (chronic hazard index range, 1.40 x 10 ⁻⁶ -2.33 x 10 ⁻³); acute hazard index range, 1.75 x 10 ⁻⁶ -0.15). A relatively greater acute cumulative risk was found for children with respect to consumption of grapes, mandarins, and cowpeas (acute hazard index range, 0.11-0.15). Despite the low health risk, the potential health hazards of neonicotinoids should be continuously assessed, given their ubiquity and cumulative effects.
Toxicology	Hematological, biochemical, and toxicopathic effects of subchronic acetamiprid toxicity in Wistar rats	S. E. Chakroun, L., et. al. Environ Sci Pollut Res Int 23, 24, 25191-25199 https://www.ncbi.nlm.nih.gov/pubmed/27680006	Acetamiprid is one of the most widely used neonicotinoids. This study investigates toxic effects of repeated oral administration of three doses of acetamiprid (1/20, 1/10, and 1/5 of LD50) during 60 days. For this, male Wistar rats were divided into four different groups. Hematological, biochemical, and toxicopathic effects of acetamiprid were evaluated. According to the results, a significant decrease in the body weight gain at the highest dose 1/5 of LD50 of acetamiprid was noticed. An increase in the relative liver weight was also observed at this dose level. The hematological constituents were affected. A significant decrease in RBC, HGB, and HCT in rats treated with higher doses of acetamiprid (1/10 and 1/5 of LD50) was noted. However, a significant increase in WBC and PLT were observed at the same doses. Furthermore, acetamiprid induced liver toxicity measured by the increased activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphates (ALPs), and lactate dehydrogenase (LDH) which may be due to the loss of hepatic membrane architecture and hepatocellular damage. In addition, exposure to acetamiprid resulted in a significant decrease in the levels of superoxide dismutase and catalase activities (p <= 0.01) with concomitant increase in lipid peroxidation in rat liver. These findings highlight the subchronic hepatotoxicity of acetamiprid.
4	High Levels of Resistance in the Common Bed Bug, Cimex lectularius (Hemiptera: Cimicidae), to Neonicotinoid Insecticides	A. A. Romero, T. D. J Med Entomol 53, 3, 727-731 https://www.ncbi.nlm.nih.gov/pubmed/26823499	The rapid increase of bed bug populations resistant to pyrethroids demands the development of novel control tactics. Products combining pyrethroids and neonicotinoids have become very popular for bed bug control in the United States, but there are concerns about evolution of resistance to these compounds. Laboratory assays were used to measure the toxicity of topical applications of four neonicotinoids to a susceptible population and three pyrethroid-resistant populations. Activity of esterases, glutathione S-transferases, and cytochrome P450s of all strains was also evaluated. High levels of resistance to four neonicotinoids, acetamiprid, imidacloprid, dinotefuran, and thiamethoxam, relative to the susceptible Fort Dix population, were detected in populations collected from human dwellings in Cincinnati and Michigan. Because activity of detoxifying enzymes was increased in these two populations, our results suggest that these enzymes have some involvement in neonicotinoid resistance, but other resistance mechanisms might be involved as well. Detection of high levels of resistance to neonicotinoids further limits the options for chemical control of bed bugs.
5	High-Throughput Quantitation of Neonicotinoids in Lyophilized Surface Water by LC-APCI-MS/MS	L. M. R. Morrison, J. B. J AOAC Int 101, 6, 1940-1947 https://www.ncbi.nlm.nih.gov/pubmed/29784072	Background: Neonicotinoids are among the most widely used insecticides. Recently, there has been concern associated with unintended adverse effects on honeybees and aquatic invertebrates at low parts-per-trillion levels. Objective: There is a need for LC-MS/MS methods that are capable of high-throughput measurements of the most widely used neonicotinoids at environmentally relevant concentrations in surface water. Methods: This method allows for quantitation of acetamiprid, clothianidin, imidacloprid, dinotefuran, nitenpyram, thiacloprid, and thiamethoxam in surface water. Deuterated internal standards are added to 20 mL environmental samples, which are concentrated by lyophilisation and reconstituted with methanol followed by acetonitrile. Results: A large variation of mean recovery efficiencies across five different surface water sampling sites within this study was observed, ranging from 45 to 74%. This demonstrated the need for labelled internal standards to compensate for these differences. Atmospheric pressure chemical ionization (APCI) performed better than electrospray ionization (ESI) with limited matrix suppression, achieving 71-110% of the laboratory fortified blank signal. Neonicotinoids were resolved on a C18 column using a 5 min LC method, in which MQL ranged between 0.93 and 4.88 ng/L. Conclusions: This method enables cost effective, accurate, and reproducible monitoring of these pesticides in the aquatic environment. Highlights: Lyophilization is used for high throughput concentration of neonicotinoids in surface water. Variations in matrix effects between samples was greatly reduced by using APCI compared with ESI. Clothianidin and thiamethoxam were detected in all samples with levels ranging from below method quantitation limit to 65 ng/L.

Phase 1 Conformity category	Title	Citation	Abstract
5	Highly Efficient Removal of Neonicotinoid Insecticides by Thioether-Based (Multivariate) Metal-Organic Frameworks	C. M. P.-C. Negro, H. ACS Appl Mater Interfaces 13, 24, 28424-28432 https://www.ncbi.nlm.nih.gov/pubmed/34121386	Circumventing the impact of agrochemicals on aquatic environments has become a necessity for health and ecological reasons. Herein, we report the use of a family of five eco-friendly water-stable isorecticular metal-organic frameworks (MOFs), prepared from amino acids, as adsorbents for the removal of neonicotinoid insecticides (thiamethoxam, clothianidin, imidacloprid, acetamiprid, and thiacloprid) from water. Among them, the three MOFs containing thioether-based residues show remarkable removal efficiency. In particular, the novel multivariate MOF [Sr(II)Cu(II)6[(S,S)-methox]1.5[(S,S)-Mecysmox]1.50(OH)2(H2O)].36H2O (5), featuring narrow functional channels decorated with both -CH2SCH3 and -CH2CH2SCH3 thioalkyl chains-from l-methionine and l-methylcysteine amino acid-derived ligands, respectively-stands out and exhibits the higher removal efficiency, being capable to capture 100% of acetamiprid and thiacloprid in a single capture step under dynamic solid-phase extraction conditions-less than 30 s. Such unusual combination of outstanding efficiency, high stability in environmental conditions, and low-cost straightforward synthesis in 5 places this material among the most attractive adsorbents reported for the removal of this type of contaminants.
5	Highly Sensitive Silver Nanorod Arrays for Rapid Surface Enhanced Raman Scattering Detection of Acetamiprid Pesticides	Cai-qin Han , Yue Yao , Wen Wang , Liu-qian Tao , Wen-xin Zhang , Whitney Marvella Ingram , Kang-zhen Tian , Ying Liu , Ai-xia Lu , Ying Wu , Chang-chun Yan , Lu-Lu Qu , and Hai-tao Li , "Highly Sensitive Silver Nanorod Arrays for Rapid Surface Enhanced Raman Scattering Detection of Acetamiprid Pesticides", Chinese Journal of Chemical Physics 31, 152-158 (2018)	The determination of pesticide residue on agricultural products is increasingly important. Exposure to pesticides can cause severe acute reactions in humans, including aplastic anemia and leukemia. In this work, we developed a rapid and sensitive method to detect acetamiprid pesticide residue based on surface-enhanced Raman scattering. Silver nanorod (AgNR) arrays were fabricated by oblique angle deposition technology and were used as SERS substrates. Prior to detection, the AgNR arrays were cleaned with nitric acid solution or a mixture of methanol and acetone. Compared to the unwashed AgNR arrays, the AgNR arrays washed with methanol and acetone shows a signal enhancement 1000 times greater than the unwashed AgNR array due to the effective removal of the impurities on its surface. The limit of detection of acetamiprid was determined to be 0.05 mg/L. In addition, the molecular structure of acetamiprid was simulated and the corresponding vibration modes of the characteristic bands of acetamiprid were calculated by density function theory. To demonstrate its practical application, the AgNRs array substrates were applied successfully to the rapid identification of acetamiprid residue on a cucumber's surface. These results confirmed possibility of utilizing the AgNRs SERS substrates as a new method for highly sensitive pesticide residue detection
5	A holistic study of neonicotinoids neuroactive insecticides-properties, applications, occurrence, and analysis	B. B. Buszewski, M., et. al. Environ Sci Pollut Res Int 26, 34, 34723-34740 https://www.ncbi.nlm.nih.gov/pubmed/31520389	Among pesticides and foliar sprays involved in the treatment of seed, soil, and grass, also to crops, an important group is neonicotinoids. Neonicotinoid pesticides present similar properties with nicotine, but the mentioned compounds are less harmful for humans. Nevertheless, neonicotinoids are poisonous to insects and some invertebrates, which can act against insects' central nervous system, leading to their death. Moreover, neonicotinoids can affect the reproduction, foraging, and flying ability of honeybee and other insects including pollinators. In the present study, some neonicotinoids, such as imidacloprid, acetamiprid, clothianidin, thiacloprid, and thiamethoxam together with their toxic effects, have been presented. The Environmental Protection Agency (EPA) classifies these neonicotinoids as II and III class toxicity agents. Due to accumulation of these pesticides into the pollen of treated plants, especially due to their toxic effects against pollinators, the consequences of the occurrence of these insecticides have been discussed. Analytical aspects and methods involved in the isolation and determination of this class of pesticides have been presented in this contribution.
Epidemiology	The human and ecological risks of neonicotinoid insecticides in soils of an agricultural zone within the Pearl River Delta, South China	Yu Z, Li XF, Wang S, Liu LY, Zeng EY. The human and ecological risks of neonicotinoid insecticides in soils of an agricultural zone within the Pearl River Delta, South China. Environ Pollut. 2021 Sep 1;284:117358.	Neonicotinoid insecticides (NIs) are extensively used worldwide and frequently detected in the environment. The human and ecological risks associated with the occurrence of NIs in agricultural zones are of high importance. The present study highlights the regional occurrence and human exposure risks of NIs in agricultural soil within the Pearl River Delta (PRD), South China. Six neonicotinoids, i.e., imidacloprid, clothianidin, acetamiprid, imidaclothiz, dinotefuran, and flonicamid, were measured in 351 soil samples from Zengcheng, a typical agricultural zone. The soil samples were categorized into three groups based on cultivated plants: vegetables, rice, and fruits. At least one of these neonicotinoid insecticides was detected in 95% of the soil samples. The levels of Σ 6NII (range (median)) were 0.26-390 (23), 0.26-280 (6.1), and 0.26-120 (5.0) ng g ⁻¹ dry weight in soil samples from vegetable farms, rice paddies, and fruit farms, respectively. Neonicotinoids were detected more frequently and at statistically higher concentrations in vegetable farms than in both rice paddies and fruit farms. This is likely ascribed to higher application frequencies of NIs in vegetable farms due to higher planting frequencies. The hazard index values for human exposure to NIs in the agricultural soils were all below 1, suggesting negligible non-cancer risks. The current residual levels of NIs in the soils could however pose sub-lethal or acute effects to non-target terrestrial organisms such as earthworms. The present study suggests that more information is needed regarding NIs contamination in soils from agricultural regions of South China to ensure that human and ecological risk from exposure to these compounds can be fully addressed.
8	Human Exposures to Neonicotinoids in Kumasi, Ghana	C. I. Nimako, Y., et. al. Environ Toxicol Chem 40, 8, 2306-2318 https://www.ncbi.nlm.nih.gov/pubmed/33822397	Neonicotinoid insecticides (NNIs) are now popular in many agricultural systems across Africa; however, the extent of human exposures to NNIs in African countries is scarcely reported. The present study evaluates neonicotinoid exposures in the consumer population of Kumasi, a cosmopolitan city in Ghana. A total of 75 human urine samples were collected from healthy volunteers (nonfarmers, aged 13-80 yr) and analyzed with a liquid chromatography electrospray ionization tandem mass spectrometry system. Seven NNIs and 3 NNI metabolites were detected in the following pattern (frequency, median concentration, maximum concentration): N-dm-acetamiprid (94.7%, 0.41 microg/L, 8.79 microg/L) > imidacloprid (70.7%, 0.15 microg/L, 211.62 microg/L) > N-(6-chloro-3-pyridylmethyl)-N-ethyl-N'-methylformamidine (62.2%, 0.43 microg/L, 53.85 microg/L) > 2-[N-(6-chloro-3-pyridylmethyl)-N-ethylamino]-2-(methylimino)acetic acid (56.8%, 0.10 microg/L, 3.53 microg/L) > clothianidin (40%, >limit of quantification [LOQ], 0.45 microg/L) > nitenpyram (18.7%, >LOQ, 0.14 microg/L) approximately thiamethoxam (18.7%, >LOQ, 0.21 microg/L) > dinotefuran (12.0%, >LOQ, 1.01 microg/L) > acetamiprid (2.7%, >LOQ, 0.08 microg/L) approximately thiacloprid (2.7%, >LOQ, 0.14 microg/L). Approximately 92% of the subjects were found to be exposed to multiple neonicotinoids simultaneously. The mean, median, and maximum imidacloprid equivalent of the relative potency factor of NNIs were found to be 1.6, 0.5, and 22.52, respectively. The median estimated daily intakes of acetamiprid, imidacloprid, and nitenpyram were 0.47, 1.27, and 0.02 microg/kg/d for females and 0.91, 0.66, and 0.08 microg/kg/d for males, respectively. The maximum daily intakes of all the NNIs were <1% of their chronic reference doses (cRfDs), except for imidacloprid and thiacloprid which recorded maximum daily intakes corresponding to 17.97 and 8.28% of cRfDs, respectively. To the best of our knowledge, the present study is the first biomonitoring report on neonicotinoid insecticides in Africa. Environ Toxicol Chem 2021;40:2306-2318. (c) 2021 SETAC.

Phase 1 Conformity category	Title	Citation	Abstract
Toxicology	Immunotoxicity assessment of sub-chronic oral administration of acetamiprid in Wistar rats	R. K. P. Shakthi Devan, P. C., et al. Drug Chem Toxicol 38, 3, 328-36 https://www.ncbi.nlm.nih.gov/pubmed/25308553	CONTEXT: Neonicotinoid insecticides are synthetic analogues of nicotine that acts on the central nervous system of insects by blocking post synaptic acetylcholine receptor. Acetamiprid is one of the widely used neonicotinoid class of insecticide used to control sucking insects like aphids, bees, mosquitoes, on crops. Data on the possible immunotoxic nature of acetamiprid are lacking. OBJECTIVE: The present study was conducted in Wistar rats with the objective of evaluating the immunotoxic potential of acetamiprid administered orally at the dose levels of 27.5, 55 and 110 mg/kg b.w. (equivalent to 5.5, 11 and 22 mg/kg b.w.) for a period of 90 days. MATERIALS AND METHODS: In experiment 1, general toxicity testing including the evaluation of clinical signs, hemato-biochemical changes, response of the lymphocytes towards T and B cell mitogens, macrophage function, gross and histopathology of the lymphoid organs (spleen, thymus, lymph nodes, etc.) were performed. In the second experiment, humoral and cell-mediated responses during immunological challenges were evaluated. RESULTS: Significant decreases were observed in the stimulation index of lymphocyte proliferation to B cell mitogen and in the nitrite production of macrophages of rats treated with 110 mg/kg of acetamiprid. Significant decrease in the lymphoproliferative response towards the B cell mitogen indicated the inability of the B lymphocytes to respond on stimulation that might increase the chances of susceptibility to infections. Acetamiprid also caused 15-28% reduction in nitrite production, an important signal for efficient inflammatory response of macrophages. The functional impairment of macrophages may involve aberrations in the enzymatic degradation of microbes, oxidative burst, generation of free radicals, phagocytosis, release of proinflammatory cytokines and thereby, may hamper host defence causing susceptibility to diseases. No significant changes over hematology, biochemistry, organ weights, histopathology of major immune organs, delayed type hypersensitivity test, response to sRBCs and lymphoproliferation assay for T cell mitogen were observed. CONCLUSION: In conclusion, the results demonstrate for the first time that the subchronic administration of acetamiprid (20% SP-soluble powder) cause significant decreases in the lymphocyte proliferation as well as the macrophage function at the dose level of 110 mg/kg. Considering the chronic population adjusted dose (0.023 mg/kg/day) through dietary exposure for acetamiprid, judicious use of acetamiprid is highly essential. Indiscriminate use of acetamiprid exceeding the doses advised might pose a hazard.
4	The impact of four widely used neonicotinoid insecticides on <i>Tetragonisca angustula</i> (Latreille) (Hymenoptera: Apidae)	Jacob, C. R. d. O., et al. (2019). "The impact of four widely used neonicotinoid insecticides on <i>Tetragonisca angustula</i> (Latreille) (Hymenoptera: Apidae)." <i>Chemosphere</i> 224: 65-70.	Application of neonicotinoid insecticides on crops can reduce the pollination services and population levels of the stingless bee <i>Tetragonisca angustula</i> (Latreille) (Hymenoptera: Apidae) in Neotropical agroecosystems. However, the impact of these insecticides on this bee has not been fully investigated. This study assessed the susceptibility levels of <i>T. angustula</i> to four neonicotinoid insecticides (acetamiprid, imidacloprid, thiacloprid and thiamethoxam), widely used to manage pests on different crops, and their effects on locomotion of the bee. Neonicotinoids with the cyano radical caused lower bee mortality (assessed by mean lethal concentration, LC50), while those compounds with the nitro radical were highly harmful to <i>T. angustula</i> . Locomotion activity was strongly impaired in bees treated with thiacloprid and imidacloprid, while acetamiprid did not affect the locomotion activity, which was similar to the control. Application of thiamethoxam caused hyperactivity, as observed by increases of ~4.5 and 5.0-fold in mean speed and distance traveled, respectively. These results suggest that applications of neonicotinoid insecticides can negatively affect the pollination activity of <i>T. angustula</i> . These results can also help to develop strategies to conserve these pollinators in agroecosystems.
5	Implementation of a new modular facility to detoxify agro-wastewater polluted with neonicotinoid insecticides in farms by solar photocatalysis	Fenoll, J., et al. (2019). "Implementation of a new modular facility to detoxify agro-wastewater polluted with neonicotinoid insecticides in farms by solar photocatalysis." <i>Energy</i> 175: 722-729.	As a consequence of phytosanitary treatments on crops a volume of agro-waste water containing pesticide residues from remnants and rinse of the treatment machinery is usually generated. These residues can become a danger to the environment and human health. Therefore, three pilot facility located in different farms were developed and used for wastewater detoxification containing four neonicotinoid insecticides (thiamethoxam, imidacloprid, acetamiprid and thiacloprid) by means of heterogeneous photocatalysis (TiO ₂ in tandem with Na ₂ S ₂ O ₈) and natural sunlight. Previously, the catalyst load (300 mg L ⁻¹) and oxidant concentration (300 mg L ⁻¹) were optimized at lab-scale using a photoreactor. The remaining percentage of the insecticides were in the range 0-47% for thiamethoxam, 0.1-33% for imidacloprid, 2-66% for acetamiprid and 0.02-60% for thiacloprid of the total initial mass. The observed differences for each insecticide in same farm could be due to total initial concentration of pollutant due to others pesticides (non-neonicotinoid insecticides) used in the farms, and the different physical-chemicals characteristics of the water used to fill and wash of treatment equipment. The results obtained have demonstrated a cost-effective viable alternative to degrade the neonicotinoids insecticide residues contained in these agro-wastewater, with an innovative and energetically efficient facility placed in the farms.
Toxicology	In utero and Lactational Exposure to Acetamiprid Induces Abnormalities in Socio-Sexual and Anxiety-Related Behaviors of Male Mice	K. I. Sano, T., et. al. Front Neurosci 10, 228 https://www.ncbi.nlm.nih.gov/pubmed/27375407	Neonicotinoids, a widely used group of pesticides designed to selectively bind to insect nicotinic acetylcholine receptors, were considered relatively safe for mammalian species. However, they have been found to activate vertebrate nicotinic acetylcholine receptors and could be toxic to the mammalian brain. In the present study, we evaluated the developmental neurotoxicity of acetamiprid (ACE), one of the most widely used neonicotinoids, in C57BL/6J mice whose mothers were administered ACE via gavage at doses of either 0 mg/kg (control group), 1.0 mg/kg (low-dose group), or 10.0 mg/kg (high-dose group) from gestational day 6 to lactation day 21. The results of a battery of behavior tests for socio-sexual and anxiety-related behaviors, the numbers of vasopressin-immunoreactive cells in the paraventricular nucleus of the hypothalamus, and testosterone levels were used as endpoints. In addition, behavioral flexibility in mice was assessed in a group-housed environment using the IntelliCage, a fully automated mouse behavioral analysis system. In adult male mice exposed to ACE at both low and high doses, a significant reduction of anxiety level was found in the light-dark transition test. Males in the low-dose group also showed a significant increase in sexual and aggressive behaviors. In contrast, neither the anxiety levels nor the sexual behaviors of females were altered. No reductions in the testosterone level, the number of vasopressin-immunoreactive cells, or behavioral flexibility were detected in either sex. These results suggest the possibility that in utero and lactational ACE exposure interferes with the development of the neural circuits required for executing socio-sexual and anxiety-related behaviors in male mice specifically.
5	In vitro metabolism assessment of thiacloprid in rainbow trout and rat by LC-UV and high resolution-mass spectrometry	J. K. Serrano, R. C., et. al. Xenobiotica 51, 5, 536-548 https://www.ncbi.nlm.nih.gov/pubmed/33086928	Thiacloprid (THI) is a widely used neonicotinoid insecticide where concerns have been raised regarding low absorption by crops, substantial distribution in surrounding areas, and potential adverse effects to terrestrial and aquatic organisms. Prior to this study, there was very limited information addressing the ex vivo (precision-cut liver slices) metabolism of THI by fish species and the metabolic pathways regulating its potential for adverse effects. The in vitro and ex vivo biotransformation pathway of THI is defined by the formation of three primary metabolites (TM1, TM2 and TM3) via separate paths differentiated by reductive decyanation, reductive dechlorination with hydration and dealkylation processes, respectively. Kinetic rates were calculated for the rat microsomal decyanation of THI into TM1 (K _m = 299.2 microM and V _{max} = 5.3 pmol/min/mg), and for the dealkylation of THI into TM3 (K _m = 368.9 microM and V _{max} = 3.95 pmol/min/mg). Formation confirmation and identity inference of THI metabolites in absence of standards were achieved by LC-UV and High Resolution-MS strategies. The in vitro and ex vivo metabolic products of THI are conserved both across species (rat and Rainbow trout) and levels of biological organization (microsomes and liver slices), as previously reported for the neonicotinoid insecticides Imidacloprid and Acetamiprid.

Phase 1 Conformity category	Title	Citation	Abstract
8	In vitro metabolism of imidacloprid and acetamiprid in rainbow trout and rat	R. C. T. Kolanczyk, M. A., et. al. <i>Xenobiotica</i> 50, 7, 805-814 https://www.ncbi.nlm.nih.gov/pubmed/31724896	Providing an alternative to pyrethroids, organophosphates, and carbamates, the neonicotinoids are now the most widely used insecticides in the world. They are water soluble and relatively stable in soil and water which allows for run-off through surface waters and thus potentially impacting aquatic species and environments. While the mammalian metabolism of neonicotinoids has been studied extensively, there is a lack of understanding of their metabolism in fish species. The current study constitutes the first report of the metabolism of imidacloprid (IMI) and acetamiprid (AC) in rainbow trout. Formation of respective metabolites 5-hydroxy-imidacloprid and N-desmethyl-acetamiprid was conserved across orders of biological organization in both microsomal and liver slice assays. Michaelis-Menten kinetics were determined for the microsomal conversion of IMI to 5-hydroxy-imidacloprid in rainbow trout ($K_m = 79.2 \text{ } \mu\text{M}$; $V_{max} = 0.75 \text{ pmole/min/mg}$) and rat ($K_m = 158.7 \text{ } \mu\text{M}$; $V_{max} = 38.4 \text{ pmole/min/mg}$). Kinetics for the microsomal demethylation of AC to N-desmethyl-acetamiprid were determined in the rat ($K_m = 70.9 \text{ } \mu\text{M}$; $V_{max} = 10 \text{ pmoles/min/mg}$). N-desmethyl-acetamiprid was found in detectable but below quantifiable levels across the range of test concentrations which precluded a calculation of kinetic rate constants in rainbow trout (RBT). Ultimately, the formation of the metabolites 5-hydroxy-imidacloprid and N-desmethyl-acetamiprid was conserved across RBT and rat species.
5	In-coupled syringe assisted octanol-water partition microextraction coupled with high-performance liquid chromatography for simultaneous determination of neonicotinoid insecticide residues in honey	J. B. Vichapong, R., et. al. <i>Talanta</i> 139, , 21-6 https://www.ncbi.nlm.nih.gov/pubmed/25882403	A simple and fast method namely in-coupled syringe assisted octanol-water partition microextraction combined with high performance liquid chromatography (HPLC) has been developed for the extraction, preconcentration and determination of neonicotinoid insecticide residues (e.g. imidacloprid, acetamiprid, clothianidin, thiacloprid, thiamethoxam, dinotefuran, and nitenpyram) in honey. The experimental parameters affected the extraction efficiency, including kind and concentration of salt, kind of disperser solvent and its volume, kind of extraction solvent and its volume, shooting times and extraction time were investigated. The extraction process was carried out by rapid shooting of two syringes. Therefore, rapid dispersion and mass transfer processes was created between phases, and thus affects the extraction efficiency of the proposed method. The optimum extraction conditions were 10.00 mL of aqueous sample, 10% (w/v) Na ₂ SO ₄ , 1-octanol (100 μL) as an extraction solvent, shooting 4 times and extraction time 2 min. No disperser solvent and centrifugation step was necessary. Linearity was obtained within the range of 0.1-3000 ng/mL (-1), with the correlation coefficients greater than 0.99. The high enrichment factor of the target analytes was 100 fold and low limit of detection (0.25-0.50 ng/mL (-1)) could be obtained. This proposed method has been successfully applied in the analysis of neonicotinoid residues in honey, and good recoveries in the range of 96.93-107.70% were obtained.
9	Industrial prune processing and its effect on pesticide residue concentrations	C. A. Alister, M., et. al. <i>Food Chem</i> 268, , 264-270 https://www.ncbi.nlm.nih.gov/pubmed/30064756	The aim of this study was to determine the insecticide residue processing factor (PF) from plums to prunes and the effect of the industrial processing of prunes residue concentrations. Our results show an increase of insecticide concentrations during plum dehydration that is explained by fruit water loss; however, the normalized insecticide residue concentration, based on plum dry weights to compensate dehydration, was reduced. The water washing and tenderizing of prunes produced insecticide residue reductions of 22.9+/-4.5% and 21.9+/-4.2%, respectively. PF were: 1.157, 1.872, 1.316, 0.192, 2.198, 0.775 and 0.156 for buprofezin, l-cyhalothrin, spiroticlofen, indoxacarb, acetamiprid, imidacloprid and emamectin benzoate, respectively, being directly related to water solubility, aqueous hydrolysis and degradation point and inversely related to molecular mass and melting point. In plums for the dehydrated agroindustry the final product is prunes, therefore, it is crucial to consider the PF to determine the specific preharvest interval for this important agroindustry.
Ecotoxicology	The influence of acetamiprid and deltamethrin on the mortality and behaviour of honeybees (<i>Apis mellifera carnica</i> Pollman) in oilseed rape cultivations	Dworzanińska, D., Moores, G., Zamojska, J. et al. The influence of acetamiprid and deltamethrin on the mortality and behaviour of honeybees (<i>Apis mellifera carnica</i> Pollman) in oilseed rape cultivations. <i>Apidologie</i> 51, 1143-1154 (2020).	The aim of the research was to determine the influence of acetamiprid and deltamethrin on the mortality and behaviour of honeybees of the same variety, coming from the same source and estimated to be in good condition by a professional beekeeper, but in different years and under different weather conditions. Results of research conducted in field isolators in oilseed rape fields in the years 2012-2018 showed no acetamiprid influence either on the mortality or on the behaviour of honeybees. Deltamethrin activity differed from a lack of influence through causing mortality and a weaker condition of honeybee colonies to the destruction of the colony. This demonstrates the relative safety of acetamiprid to honeybees and the high risk of deltamethrin use. The differences in the bee colonies' reaction to deltamethrin are probably caused by the high acute toxicity of this active ingredient, genetically dependent, variable metabolic capabilities of particular bee colonies, or coexistence of a variety of different stressors—mainly pathogens.
9	Influence of humic substances and iron and aluminum ions on the sorption of acetamiprid to an arable soil	H. S. Murano, K., et. al. <i>Sci Total Environ</i> 615, , 1478-1484 https://www.ncbi.nlm.nih.gov/pubmed/29055598	Humic substances (HS) in soil and sediments, and surface water influence the behavior of organic xenobiotics in the environment. However, our knowledge of the effects of specific HS fractions, i.e., humic acids (HAs), fulvic acids (FAs), and humin (HM), on the sorption of organic xenobiotics is limited. The neonicotinoid insecticide acetamiprid is thought to contribute to the collapse of honeybee colonies. To understand the role that soil organic matter plays in the fate of acetamiprid, interactions between acetamiprid and the above HS fractions were examined. Batch experiments were conducted using various combinations of a field soil sample and the above 3 HS fractions prepared from the same soil, and differences in isotherm values for acetamiprid sorption were investigated based on the structural differences among the HS fractions. The sorption of acetamiprid to soil minerals associated with HM (MHM) (Freundlich isotherm constant, K _f : 6.100) was reduced when HAs or FAs were added (K _f : 4.179 and 4.756, respectively). This can be attributed to hydrophobic interactions between HM and HAs or FAs in which their dissociated carboxyl and phenolic groups become oriented to face the soil solution. The amount of acetamiprid that was adsorbed to (MHM+HA) or (MHM+FA) increased when aluminum ions were added (K _f : 6.933 and 10.48, respectively), or iron ions were added (K _f : 7.303 and 11.29, respectively). Since acetamiprid has no affinity for inorganic components in soil, the formation of HS-metal complexes by cation bridging may have oriented the hydrophobic moieties in the HAs or FAs to face the soil solution and may also have resulted in the formation of dense structures, resulting in an increase in the amount of acetamiprid that becomes adsorbed to these structures. These results highlight the importance of interactions among soil components in the pedospheric diffusion of acetamiprid.
9	The influence of pesticides repellency used in oilseed rape (<i>Brassica napus</i> subsp. <i>napus</i>) on the preference by bees (<i>Apis mellifera</i> L.)	Martina Stejskalová, Veronika Konradová & Jan Kazda (2021) The influence of pesticides repellency used in oilseed rape (<i>Brassica napus</i> subsp. <i>napus</i>) on the preference by bees (<i>Apis mellifera</i> L.), <i>Journal of Apicultural Research</i> , 60:2, 270-276,	The occurrence of honey bees was observed in fields of oilseed rape (<i>Brassica napus</i> subsp. <i>napus</i>) during the flowering period. The investigation revealed that the farmer was using different pesticides against pests and diseases during that time. Experiments using the feeding stations (Free-Choice Trials) method with honey solutions containing pesticides revealed that the repellency effect of pesticide formulations is different with some even attractive to honey bees. Experiments were held outdoors close to bee colonies and indoors in a fly-through hall in controlled conditions and commercial pesticides were used. The highest repellency in outdoors/indoors experiments was observed using the solution with formulations of pesticide Horizon 250 EW (a. c. tebuconazole) – 96.5%/99% and Nurelle D (a. c. chlorpyrifos-cypermethrin) 88%/97%, and the lowest repellency was observed for solution with formulations of Plenum (a. c. pymetrozine) – 19.2%/27.8%, Mospilan 20 SP (a. c. acetamiprid) – 20%/23.8%. The most repellent pesticides were diluted to half and a quarter of the recommended dose. The reducing of the active ingredient concentration improved attractiveness to honey bees, especially with Trebon OSR (74.3% for half dose and 55.8 for quarter dose) and Nurelle D (77.8% for half dose and 66.7 for quarter dose). However, a quarter dose of Horizon 250 EW did not show any substantial change in repellency (90.7%). Further investigations in field conditions will be done.

Phase 1 Conformity category	Title	Citation	Abstract
8	Influence of sublethal doses of acetamiprid and halosulfuron-methyl on metabolites of zebra fish (&ITBrachydanio rerio&IT)	Zhang H, Zhao L. Influence of sublethal doses of acetamiprid and halosulfuron-methyl on metabolites of zebra fish (Brachydanio rerio). Aquat Toxicol. 2017 Oct;191:85-94.	Acetamiprid, a neonicotinoid pesticide, is reported to have adverse sublethal effects on non-target beneficial organisms. Halosulfuron-methyl (HM), one of the most widely used herbicides in agriculture, has high ecotoxicity to aquatic plants and animals. In this study, a GC-MS-based metabolomics approach was used to investigate the toxicity of acetamiprid and HM. The Automated Mass Spectral Deconvolution and Identification System (AMDIS) software program and the retention index method were used to identify 51 metabolites in zebra fish (Brachydanio rerio). Changes in metabolites showed that acetamiprid and HM disturbed amino acid (e.g., leucine, valine, serine, glycine, proline, and alanine) metabolism, the TCA cycle (malic acid and fumaric acid), and the balance of neurotransmitters (glutamic acid, taurine, and glycine). The change in metabolites in the liver, head, and blood indicated that metabolites in the liver were more sensitive than those in the head and blood. Overall, on the basis of the change in metabolites, we identified a potential risk to zebra fish exposed to sublethal doses of acetamiprid and/or HM.
Ecotoxicology	Inhibitory Effects of Four Neonicotinoid Active Ingredients on Acetylcholine Esterase Activity	J. F. Gyor, A., et. al. Acta Biol Hung 68, 4, 345-357 https://www.ncbi.nlm.nih.gov/pubmed/29262703	There is a great concern about the decline of pollinators, and neonicotinoids emerging bee disorders are assumed to play a significant role. Since changes in learning ability has been observed in honey bees exposed to some acetylcholine esterase (AChE) inhibitors, we therefore, tested in vitro the effect of four neonicotinoids on purified eel AChE. AChE activity was inhibited in a concentration-dependent manner, and calculated IC50 values for thiamethoxam (IC50 = 414 µM) and clothianidin (IC50 = 160 µM) were found to be much higher compared to acetamiprid (IC50 = 75.2 µM) and thiacloprid (IC50 = 87.8 µM). The Lineweaver-Burk reciprocal plots for acetamiprid shows unchanged Vmax and increased Km values with inhibitor concentrations, while analysis of Michaelis-Menten plots shows predominantly competitive mechanism. The inhibition constant value (Ki = 24.3 µM) indicates strong binding of the acetamiprid complex to AChE. Finally, the four tested neonicotinoids are not a uniform group regarding their blocking ability. Our results suggest a previously not established, direct AChE blocking mechanism of neonicotinoids tested, thus the neuronal AChE enzyme is likely among the direct targets of the neonicotinoid insecticides. We conclude, that these AChE inhibitory effects may also contribute to toxic effects on the whole exposed animal.
8,9	Insecticide exposure affects DNA and antioxidant enzymes activity in honey bee species Apis florea and A. dorsata: Evidence from Punjab, Pakistan (Retracted article. See vol. 717, 2020)	Hayat, K., et al. (2018). "RETRACTED: Insecticide exposure affects DNA and antioxidant enzymes activity in honey bee species Apis florea and A. dorsata: Evidence from Punjab, Pakistan." Science of The Total Environment 635: 1292-1301	[This article has been retracted] After a thorough investigation, the Editors have concluded that the acceptance of this article was partly based upon the positive advice of two illegitimate reviewer reports. The reports were submitted from email accounts which were provided by the corresponding author Christos A. Damalas as suggested reviewers during the submission of the article. Although purportedly real reviewer accounts, the Editors have concluded that these were not of appropriate, independent reviewers. This manipulation of the peer-review process represents a clear violation of the fundamentals of peer review, our publishing policies, and publishing ethics standards. Apologies are offered to the reviewers whose identity was assumed and to the readers of the journal that this deception was not detected during the submission process.
9	Insecticide Residues in Head Lettuce, Cabbage, Chinese Cabbage, and Broccoli Grown in Fields	M. F. C. Chen, J. F., et. al. J Agric Food Chem 62, 16, 3644-8 https://www.ncbi.nlm.nih.gov/pubmed/24684565	The residues of four insecticides belonging to different families were studied on head lettuce (Lactuca sativa L. var. capitata L.), cabbage (Brassica oleracea Linn. var. capitata DC.), Chinese cabbage (Brassica pekinensis Skeels), and broccoli (Brassica oleracea var. italica) after pesticide application. To reduce application variability, a tank mix of acetamiprid 20% SP, chlorpyrifos 22.5% EC, deltamethrin 2.4% SC, and methomyl 40% SP was applied at recommended and double doses. Initial deposits of all pesticides on head lettuce were higher than those of the other three crops. The residues of chlorpyrifos and deltamethrin were higher than the maximum residue limits (MRLs) at recommended preharvest intervals (PHIs) on head lettuce and Chinese broccoli treated with higher doses. The residues of methomyl on head lettuce also showed the same phenomenon.
Toxicology	The insecticides chlorpyrifos and acetamiprid induce redox imbalance in umbilical cord blood erythrocytes in vitro	Quintana MM, Rivero Osimani V, Magnarelli G, Rovedatti MG, Guinazu N. The insecticides chlorpyrifos and acetamiprid induce redox imbalance in umbilical cord blood erythrocytes in vitro. Pestic Biochem Physiol. 2018 Jun;148:87-92. 148, , 87-92 https://www.ncbi.nlm.nih.gov/pubmed/29891383	Organophosphate and neonicotinoid compounds belong to different pesticide families, and are used worldwide for agricultural purposes. The potential deleterious health effects associated with pesticide exposure during pregnancy have become a major public health concern. The present study analyzed the effects of the organophosphate chlorpyrifos and the neonicotinoid acetamiprid on oxidative stress biomarkers in human umbilical cord blood erythrocytes (UCBE). The reactive oxygen species (ROS) levels, the catalase (CAT) and superoxide dismutase (SOD) activities, the levels of 4-hydroxynonenal (HNE) and UCBE osmotic fragility were determined. Both pesticides modified the oxidative status of UCBE. Chlorpyrifos increased ROS levels at 40 and 400 nM, while only decreased CAT activity at the higher concentration assayed (400 nM), with no modification in SOD activity. The insecticide acetamiprid increased ROS levels at all concentrations assayed, and decreased CAT and SOD activity at 40 and 400 nM. Chlorpyrifos and acetamiprid (40 and 400 nM) modified HNE content. Non-significant changes in UCBE osmotic fragility were induced by chlorpyrifos or acetamiprid treatments. In conclusion, both pesticides assayed increased ROS production and decreased anti-oxidant enzyme activity in UCBE, even though changes were of different extent and depended on the insecticide analyzed. Interestingly no changes in erythrocyte osmotic fragility were registered; suggesting that the oxidative stress triggered under these experimental conditions was not sufficient to induce a functional damage to the UCBE membrane.
5	Insights into the degradation and toxicity difference mechanism of neonicotinoid pesticides in honeybees by mass spectrometry imaging	Zhang Y, Chen D, Du M, Ma L, Li P, Qin R, Yang J, Yin Z, Wu X, Xu H. Insights into the degradation and toxicity difference mechanism of neonicotinoid pesticides in honeybees by mass spectrometry imaging. Sci Total Environ. 2021 Jun 20;774:145170. doi: 10.1016/j.scitotenv.2021.145170. Epub 2021 Feb 4. PMID: 33607427.	Honeybees are essential for the pollination of a wide variety of crops and flowering plants, whereas they are confronting decline around the world due to the overuse of pesticides, especially neonicotinoids. The mechanism behind the negative impacts of neonicotinoids on honeybees has attracted considerable interest, yet it remains unknown due to the limited insights into the spatiotemporal distribution of pesticides in honeybees. Herein, we demonstrated the use of matrix-assisted laser desorption/ionization mass spectrometry imaging (MALDI-MSI) for the spatiotemporal visualization of neonicotinoids, such as N-nitroguanidine (dinotefuran) and N-cyanoamidine (acetamiprid) compounds, administered by oral application or direct contact, in the whole-body section of honeybees. The MSI results revealed that both dinotefuran and acetamiprid can quickly penetrate various biological barriers and distribute within the whole-body section of honeybees, but acetamiprid can be degraded much faster than dinotefuran. The degradation rate of acetamiprid is significantly decreased when piperonyl butoxide (PBO) is applied, whereas that of dinotefuran remains almost unchanged. These two factors might contribute to the fact that dinotefuran affords a higher toxicity to honeybees than acetamiprid. Moreover, the toxicity and degradation rate of acetamiprid can be affected by co-application with tebuconazole. Taken together, the results presented here indicate that the discrepant toxicity between dinotefuran and acetamiprid does not lie in the difference in their penetration of various biological barriers of honeybees, but in the degradation rate of neonicotinoid pesticides within honeybee tissues. Moreover, new perspectives are given to better understand the causes of the current decline in honeybee populations posed by insecticides, providing guidelines for the precise use of conventional agrochemicals and the rational design of novel pesticide candidates.

Phase 1 Conformity category	Title	Citation	Abstract
5	Insights Into the Microbial Degradation and Biochemical Mechanisms of Neonicotinoids	Pang S, Lin Z, Zhang W, Mishra S, Bhatt P, Chen S. Insights Into the Microbial Degradation and Biochemical Mechanisms of Neonicotinoids. Front Microbiol. 2020 May 19;11:868. doi: 10.3389/fmicb.2020.00868. PMID: 32508767; PMCID: PMC7248232.	Neonicotinoids are derivatives of synthetic nicotine derivatives with better insecticidal capabilities, including imidacloprid, nitenpyram, acetamiprid, thiacloprid, thiamethoxam, clothianidin, and dinotefuran. These are mainly used to control harmful insects and pests to protect crops. Their main targets are nicotinic acetylcholine receptors. In the past two decades, the environmental residues of neonicotinoids have enormously increased due to large-scale applications. More and more neonicotinoids remain in the environment and pose severe toxicity to humans and animals. An increase in toxicological and hazardous pollution due to the introduction of neonicotinoids into the environment causes problems; thus, the systematic remediation of neonicotinoids is essential and in demand. Various technologies have been developed to remove insecticidal residues from soil and water environments. Compared with non-bioremediation methods, bioremediation is a cost-effective and eco-friendly approach for the treatment of pesticide-polluted environments. Certain neonicotinoid-degrading microorganisms, including <i>Bacillus</i> , <i>Mycobacterium</i> , <i>Pseudoxanthomonas</i> , <i>Rhizobium</i> , <i>Rhodococcus</i> , <i>Actinomycetes</i> , and <i>Stenotrophomonas</i> , have been isolated and characterized. These microbes can degrade neonicotinoids under laboratory and field conditions. The microbial degradation pathways of neonicotinoids and the fate of several metabolites have been investigated in the literature. In addition, the neonicotinoid-degrading enzymes and the correlated genes in organisms have been explored. However, few reviews have focused on the neonicotinoid-degrading microorganisms along with metabolic pathways and degradation mechanisms. Therefore, this review aimed to summarize the microbial degradation and biochemical mechanisms of neonicotinoids. The potentials of neonicotinoid-degrading microbes for the bioremediation of contaminated sites were also discussed.
8	An integrated assessment and spatial-temporal variation analysis of neonicotinoids in pollen and honey from noncrop plants in Zhejiang, China	T. C. Tang, W., et. al. Environ Pollut 250, , 397-406 https://www.ncbi.nlm.nih.gov/pubmed/31022645	Recent studies have shown that neonicotinoids in pollen and honey (collected by honeybees) are likely to pose risks to honeybees. However, data on the integrated residue and spatial-temporal variation of neonicotinoids from noncrop plants, the principle sources of pollen for honey bees, are very limited, especially in China. In this study, we employed a novel assessment method based on the relative potency factor to calculate the integrated residue of seven neonicotinoids in pollen and honey samples collected from noncrop plants in 12 stations of Zhejiang province in three consecutive months. The integrated concentration of neonicotinoids (IMIRPF) ranged from no detected (ND) to 34.93ng/g in pollen and ND to 8.51ng/g in honey. Acetamiprid showed the highest detection frequency of 41.7%, followed by clothianidin (33.3%) and dinotefuran (22.2%). The highest IMIRPF occurred in April for stations in the fringe areas of Zhejiang province, whereas for stations in the central areas of Zhejiang province, the IMIRPF in May was relatively higher than the other two months. In terms of spatial change, the pollution variation of pollen samples in Lin'an-Tonglu-Pujiang was relative highly polluted-lightly polluted-highly polluted. For honey samples, spatial variation showed a single trend, and peak values were found in Wenzhou, which may be attributed to the local climate and farming practices. This fundamental information will be helpful to understand the effects of neonicotinoids on honeybees foraging habits.
8	Integrated non-targeted lipidomics and metabolomics analyses for fluctuations of neonicotinoids imidacloprid and acetamiprid on Neuro-2a cells	X. Q. Wang, J., et. al. Environ Pollut 284, , 117327 https://www.ncbi.nlm.nih.gov/pubmed/34030083	Neonicotinoid insecticides are widely used for pest control. However, they are highly water-soluble and easily ingested by organisms, posing potential health risks. In this study, cytotoxicity evaluations of imidacloprid and acetamiprid were conducted in Neuro-2a cells by obtaining their half maximal inhibitory concentration (IC50 values) (1152.1 and 936.5 μM, respectively). The toxic effects at the IC10 and IC20 on cell metabolism were determined by integrated non-targeted lipidomics and metabolomics analyses. Changes in the concentration of acetamiprid caused the most drastic perturbations of metabolism in Neuro-2a cells. Altogether, the detected lipids were mainly attributed to triglyceride, phosphatidylcholine (PC), and diglyceride. These three categories of lipids accounted for more than 67% of the sum in Neuro-2a cells. A total of 14 lipids and other 40 metabolites were screened as differential metabolites based on multivariate data analysis, and PCs were most frequently observed with a proportion of 25.9%. The results demonstrated that lipid metabolism should be paid considerable attention after imidacloprid and acetamiprid exposure. Pathway analysis showed that the metabolisms of glycerophospholipid, sphingolipid, and glutathione were the dominant pathways that were interfered. The present study is the first to investigate the cellular toxic mechanisms after separate imidacloprid and acetamiprid exposure by using lipidomics and metabolomics simultaneously. This research also provides novel insights into the evaluation of the ecological risk of imidacloprid and acetamiprid and contribute to the study of toxicity mechanism of these neonicotinoid insecticides to animals and humans in the future.
12	Interaction patterns and combined toxic effects of acetamiprid in combination with seven pesticides on honey bee (<i>Apis mellifera</i> L.)	Y. Z. Wang, Y. C., et. al. Ecotoxicol Environ Saf 190, , 110100 https://www.ncbi.nlm.nih.gov/pubmed/31869716	The neonicotinoid insecticide acetamiprid (ACT) and seven pesticides [abamectin (ABA), emamectin benzoate (EMB), dicofol (DIC), bifenthrin (BIF), cypermethrin (CYP), lambda-cyhalothrin (LCY) and tetraconazole (TET)] are widely applied agrochemicals worldwide. Since most previous studies on these pesticides are performed merely based on toxicity tests with individual active ingredients, only finite knowledge is available on the mixture toxicities of these formulated compounds to crop pollinators. In this study, we examined their toxicities of binary, ternary, quaternary, quinquenary, senary, septenary and octonary mixtures to honey bee (<i>Apis mellifera</i> L.) with feeding toxicity test. Results showed that EMB and ABA had the highest toxicities to <i>A. mellifera</i> with LC50 values of 0.033 (0.028-0.038) and 0.047 (0.039-0.056) μg a. i. mL(-1) after exposure for 7 days, respectively, followed by DIC with an LC50 value of 1.22 (1.01-1.41) μg a. i. mL(-1). In contrast, relatively low toxicities were found from pyrethroid insecticides, ACT, and TET with their LC50 values ranged from 44.76 (38.75-50.89) to 251.7 (198.4-297.3) μg a. i. mL(-1). Most of pesticide mixtures containing ACT and TET elicited synergistic interactions to honey bees. Besides, four pesticide mixtures of ACT + BIF, ACT + BIF + CYP, ACT + BIF + LCY and ACT + CYP + DIC + EMB also displayed synergistic effects. Among 98 tested binary to octonary mixtures of ACT in combination with seven pesticides, 44.90% of combinations exhibited synergistic effects on honey bees. Considering ACT was permitted to use on flowering crops, more attention should be paid to its application in the fields due to the synergistic effects of ACT in combination with other pesticides on <i>A. mellifera</i> under laboratory conditions.
9	Interactions of food matrix and dietary components on neonicotinoid bioaccessibility in raw fruit and vegetables	Y. H. X. Shi, J. J., et. al. Food Funct 10, 1, 289-295 https://www.ncbi.nlm.nih.gov/pubmed/30566153	Humans are frequently exposed to the residues of various neonicotinoids, highlighting the need to understand human exposure through oral ingestion of contaminated foods. In this study, the effects of different food matrices (tomato, cucumber, and carrot) and their interaction with dietary component additives, including proteins and dietary fiber, was investigated. The results showed that the presence of a food matrix had a significant effect on the bioaccessibility of neonicotinoids (imidacloprid, thiamethoxam, acetamiprid, and thiacloprid) in both the gastric and intestinal environments. Neonicotinoids in tomato presented relatively low bioaccessibility, indicating that the daily intake of the tomato can be regarded as being relatively safer. Moreover, the addition of protein or dietary fiber to fruit and vegetables had a marked influence on neonicotinoid bioaccessibility and the effects varied between the different matrices. In particular, the addition of 2.0% dietary fiber significantly reduced the bioaccessibility (18.38-67.91%). Therefore, we recommend that consuming an increased intake of dietary fiber could improve the safety of fruit and vegetables in daily life. The present results can support the identification of suitable food intake conditions for the significant reduction of pesticide residue levels.

Phase 1 Conformity category	Title	Citation	Abstract
Toxicology	Interspecies differences in cytochrome P450-mediated metabolism of neonicotinoids among cats, dogs, rats, and humans	Khidkhan K, Ikenaka Y, Ichise T, Nakayama SMM, Mizukawa H, Nomiya K, Iwata H, Arizono K, Takahashi K, Kato K, Ishizuka M. Interspecies differences in cytochrome P450-mediated metabolism of neonicotinoids among cats, dogs, rats, and humans. <i>Comp Biochem Physiol C Toxicol Pharmacol</i> . 2021 Jan;239:108898. doi: 10.1016/j.cbpc.2020.108898. Epub 2020 Oct 3. PMID: 32979584.	Neonicotinoid insecticides are used for agricultural and non-agricultural purposes worldwide. Pets are directly exposed to neonicotinoids in veterinary products and through environmental contamination. Cytochrome P450 (CYP) is among the most significant xenobiotic metabolizing enzymes that oxidizes several chemicals, including neonicotinoids. However, CYP activities and metabolite compositions of neonicotinoid metabolites are unknown in most domesticated pet species. Our objectives were to reveal the differences in metabolites of neonicotinoids (imidacloprid, clothianidin, and acetamiprid) and CYP activities among common pet species (cats and dogs), humans, and rats. The results indicated that the CYP-mediated neonicotinoid metabolism was different depending on species and each neonicotinoid. Among these four species, the kinetics of imidacloprid metabolism indicated that rats have the highest rate of oxidation of imidacloprid to 4OH-imidacloprid, while the greatest enzyme kinetics of imidacloprid metabolism to 5OH-imidacloprid were found in rats and humans. Clothianidin was rapidly metabolized to 1-methyl-3-nitroguanidine and dm-clothianidin in rats, but cats and humans showed the lowest formation of dm-clothianidin. CYP activities in metabolism of acetamiprid to dm-acetamiprid and N-acetyl-acetamiprid were determined to be significantly higher in humans compared to other species. However, further studies should be targeted at identifying the differences in hepatic metabolism of neonicotinoids in these species using recombinant CYP enzymes.
5	Investigation of neonicotinoid pesticides in Slovenian honey by LC-MS/MS	Investigation of neonicotinoid pesticides in Slovenian honey by LC-MS/MS M. Mrzlikar, D. Heath, E. Heath, J. Markelj, A. Kandolf Borovšak and H. Prosen <i>LWT</i> 2019 Vol. 104 Pages 45-52 DOI: https://doi.org/10.1016/j.lwt.2019.01.017	A considerable evidence links neonicotinoids and colony collapse disorder in bees. In 2011, Slovenia imposed a moratorium on three neonicotinoids, but there has been no country-wide study on its effectiveness. Using honey is a non-invasive way of checking the exposure of bees to neonicotinoids. In this study, a reliable analytical method for five neonicotinoids in honey was developed, using two extraction techniques (SPE, QuEChERS) and LC-MS/MS (SRM). Validation and calculation of expanded uncertainty was performed at 10 and 50 ng/g. Both methods gave satisfactory recoveries (68.2–113.6%), precision (0.9–8.0%), and low LODs (0.05–0.97 ng/g). QuEChERS had lower uncertainty, better accuracy, and lower matrix effect, and was applied to the analysis of 51 honey samples from Slovenia (2014–2016). Low contamination of acetamiprid and thiacloprid was found. This survey is an important contribution to the worldwide database of honey contamination with neonicotinoids and the threat they pose to the honeybees.
Toxicology	Investigation of the genotoxic and cytotoxic effects of widely used neonicotinoid insecticides in HepG2 and SH-SY5Y cells	Şenyıldız M, Kilinc A, Özden S. Investigation of the genotoxic and cytotoxic effects of widely used neonicotinoid insecticides in HepG2 and SH-SY5Y cells. <i>Toxicol Ind Health</i> . 2018 Jun;34(6):375-383. doi: 10.1177/0748233718762609. Epub 2018 Mar 28. PMID: 29591886.	Neonicotinoids are a relatively new type of insecticide to control a variety of pests. Although they are generally considered to be safe, they can lead to harmful effects on human and environmental health. We aimed to investigate possible effects of common neonicotinoid insecticides (acetamiprid, clothianidin, imidacloprid, thiacloprid, and thiamethoxam) on cytotoxicity and DNA damage in human neuroblastoma (SH-SY5Y) and human hepatocellular carcinoma (HepG2) cells. Our results indicated that 50% of inhibitory concentration values of neonicotinoids are in the range of 0.96 to >4 mM in SH-SY5Y cells and 0.53 to >4 mM in HepG2 cells by the methyl tetrazolium and neutral red uptake tests after 24 and 48 h exposure. We observed significant DNA damage at 500 µM of five neonicotinoids in SHSY-5Y cells, while only imidacloprid, thiametoxam, and thiacloprid showed some alterations in HepG2 cells after 24 h exposure using the alkaline comet assay. In conclusion, neonicotinoid insecticides may induce cytotoxicity and DNA damage in cell cultures; therefore, further studies are needed to better understand the toxicity of neonicotinoids.
1	Investigation of the mechanisms mediating MDMA "Ecstasy"-induced increases in cerebro-cortical perfusion determined by btASL MRI	J. K. Rouine, M. E., et. al. <i>Psychopharmacology (Berl)</i> 232, 9, 1501-13 https://www.ncbi.nlm.nih.gov/pubmed/25366875	RATIONALE: Acute administration of the recreational drug of abuse 3,4-methylenedioxymethamphetamine (MDMA; Ecstasy) has previously been shown to increase cerebro-cortical perfusion as determined by bolus-tracking arterial spin labelling (btASL) MRI. OBJECTIVES: The purpose of the current study was to assess the mechanisms mediating these changes following systemic administration of MDMA to rats. METHODS: Pharmacological manipulation of serotonergic, dopaminergic and nitergic transmission was carried out to determine the mechanism of action of MDMA-induced increases in cortical perfusion using btASL MRI. RESULTS: Fenfluramine (10 mg/kg), like MDMA (20 mg/kg), increased cortical perfusion. Increased cortical perfusion was not obtained with the 5-HT ₂ receptor agonist 2,5-dimethoxy-4-iodophenyl-aminopropane hydrochloride (DOI) (1 mg/kg). Depletion of central 5-HT following systemic administration of the tryptophan hydroxylase inhibitor para-chlorophenylalanine (pCPA) produced effects similar to those observed with MDMA. Pre-treatment with the 5-HT receptor antagonist metergoline (4 mg/kg) or with the 5-HT reuptake inhibitor citalopram (30 mg/kg), however, failed to produce any effect alone or influence the response to MDMA. Pre-treatment with the dopamine D1 receptor antagonist SCH 23390 (1 mg/kg) failed to influence the changes in cortical perfusion obtained with MDMA. Treatment with the neuronal nitric oxide (NO) synthase inhibitor 7-nitroindazole (7-NI) (25 mg/kg) provoked no change in cerebral perfusion alone yet attenuated the MDMA-related increase in cortical perfusion. CONCLUSIONS: Cortical 5-HT depletion is associated with increases in perfusion although this mechanism alone does not account for MDMA-related changes. A role for NO, a key regulator of cerebrovascular perfusion, is implicated in MDMA-induced increases in cortical perfusion.
4	Involvement of oxygenase confers higher resistance to neonicotinoid insecticides in estuarine resident sand shrimp Crangon uritai than in kuruma prawn Penaeus japonicus and mysid Americamysis bahia	Involvement of oxygenase confers higher resistance to neonicotinoid insecticides in estuarine resident sand shrimp Crangon uritai than in kuruma prawn Penaeus japonicus and mysid Americamysis bahia T. Hano, K. Ito, N. Ohkubo, M. Ito, A. Watanabe and H. Sakaji <i>Fisheries Science</i> 2020 Vol. 86 Issue 6 Pages 1079-1086 DOI: 10.1007/s12562-020-01467-5	Globally, neonicotinoid contamination in aquatic environments, including estuarine areas, is a prevailing environmental concern. The estuarine resident marine crustacean sand shrimp Crangon uritai was previously found to have a higher tolerance to neonicotinoids than the marine crustaceans kuruma prawn Penaeus japonicus and mysid Americamysis bahia. Based on these findings, we aimed to explore the mechanisms underlying their differences in insecticide sensitivity. We hypothesized that differences in the structures of their nicotinic acetylcholine receptors (nAChRs) and/or the involvement of a metabolizing enzyme may confer sand shrimp resistance to neonicotinoids. No obvious differences were found in the amino acid residue (position 81) of the loop D region of the nAChR β - subunit among the three crustaceans. A synergistic toxicity bioassay was used to explore candidate metabolizing enzymes, esterase, glutathione S-transferase, and oxygenase. The three species were exposed to two neonicotinoids (acetamiprid and clothianidin) at concentrations equivalent to 1/15–1/10 of 96-h LC50 values and synergists (inhibitors of metabolizing enzyme) or combinations of both. Treatments with the oxygenase inhibitor and the neonicotinoids resulted in increased mortality in sand shrimps but not in kuruma prawns or mysids. Consequently, it was determined that oxygenase may explain the higher resistance of the sand shrimp to neonicotinoid insecticides.
8,12	Joint toxicity of two phytosanitary molecules, lambda-cyhalothrin and acetamiprid, on African catfish (Clarias gariepinus) juveniles	M. A. B. I. T. Houndji, I., et. al. <i>J Environ Sci Health B</i> 55, 7, 669-676 https://www.ncbi.nlm.nih.gov/pubmed/32396780	This study was designed to evaluate the acute toxicity of acetamiprid (neonicotinoid) and lambda-cyhalothrin (pyrethroid), individually and mixtures (Act-LCh mixture and Acer 35 EC(R), 15 g/L of acetamiprid and 20 g/L of lambda-cyhalothrin) in African catfish juveniles (3.35 +/- 0.75 g). The tests were conducted in the laboratory under semi-static conditions according to OECD Guideline 203. Mixture toxicity effects as a function of lethal concentrations were assessed using the additive index (AI) method. Acetamiprid with 96 h-LC50 = 265.7 ppm can be considered to be nontoxic for this species. However, lambda-cyhalothrin was highly toxic to C. gariepinus with 96 h-LC50 = 0.00083 ppm. Acer 35 EC((R)) was less toxic (96 h-LC50 = 0.21 ppm) than the Act-LCh mixture (96 h-LC50 = 0.043 ppm). Marked changes indicating nervous system damage were also recorded. An antagonistic effect was shown for lethal concentrations leading to 5 to 15% mortality in 96 hours (96 h-LC5-15) while an additive effect was obtained for the 96 h-LC20-50. The results indicate that ecological risk assessment of these molecules in aquatic environments should consider their contamination levels. Moreover, particular attention to behavior changes related to their neurotoxicity is recommended for additional monitoring of the negative effects of these insecticides.
1	Kinetic and metallographic study of oxidation at high temperature of cast Ni 25Cr alloy in water vapour rich air	Kinetic and metallographic study of oxidation at high temperature of cast Ni 25Cr alloy in water vapour rich air L. Aranda, T. Schweitzer, L. Mouton, S. Mathieu, O. Rouer, P. Villeger, et al. <i>Materials at High Temperatures</i> 2015 Vol. 32 Issue 5 Pages 530-538 DOI: 10.1179/1878641314Y.0000000041	The high temperature oxidation behaviour of a Ni–25 wt-%Cr alloy in air enriched with water vapour (180 mbars H ₂ O) was studied at 1000, 1100, 1200 and 1300° C. The oxidised samples were characterised by X-ray diffraction, electron microscopy and wavelength dispersion spectroscopy. The obtained data were compared to the ones earlier obtained for the same alloy oxidised in dry air. Water vapour globally induced at all temperatures a decrease of the parabolic constant K _p and an increase in the chromia volatilisation constant K _v . The oxide scales do not present morphologic difference between the two atmospheres. After oxidation in humidified air the scale thickness is thinner and the Cr depleted depth is lower than in dry air.

Phase 1 Conformity category	Title	Citation	Abstract
5	Label-free hairpin-like aptamer and EIS-based practical, biostable sensor for acetamiprid detection	J. L. Zhen, G., et. al. PLoS One 15, 12, e0244297 https://www.ncbi.nlm.nih.gov/pubmed/33362222	Acetamiprid (ACE) is a kind of broad-spectrum pesticide that has potential health risk to human beings. Aptamers (Ap-DNA (1)) have a great potential as analytical tools for pesticide detection. In this work, a label-free electrochemical sensing assay for ACE determination is presented by electrochemical impedance spectroscopy (EIS). And the specific binding model between ACE and Ap-DNA (1) was further investigated for the first time. Circular dichroism (CD) spectroscopy and EIS demonstrated that the single strand AP-DNA (1) first formed a loosely secondary structure in Tris-HClO ₄ (20 mM, pH = 7.4), and then transformed into a more stable hairpin-like structure when incubated in binding buffer (B-buffer). The formed stem-loop bulge provides the specific capturing sites for ACE, forming ACE/AP-DNA (1) complex, and induced the RCT (charge transfer resistance) increase between the solution-based redox probe [Fe(CN) ₆] ^{3-/4-} and the electrode surface. The change of DeltaRCT (charge transfer resistance change, DeltaRCT = RCT(after)-RCT(before)) is positively related to the ACE level. As a result, the AP-DNA (1) biosensor showed a high sensitivity with the ACE concentration range spanning from 5 nM to 200 mM and a detection limit of 1 nM. The impedimetric AP-DNA (1) sensor also showed good selectivity to ACE over other selected pesticides and exhibited excellent performance in environmental water and orange juice samples analysis, with spiked recoveries in the range of 85.8% to 93.4% in lake water and 83.7% to 89.4% in orange juice. With good performance characteristics of practicality, sensitivity and selectivity, the AP-DNA (1) sensor holds a promising application for the on-site ACE detection.
5	A label-free triplex-to-G-qadruplex molecular switch for sensitive fluorescent detection of acetamiprid	X. L. Tang, X., et. al. Talanta 189, , 599-605 https://www.ncbi.nlm.nih.gov/pubmed/30086966	The detection and monitoring of acetamiprid has drawn extensive attentions, due to their potential threat to human health. Herein, a simple, sensitive and label-free fluorescent assay based on triplex-to-G-qadruplex (TTGQ) molecular switch, was developed for the assay of acetamiprid in aqueous solution. In this detection, the proposed TTGQ molecule contained the acetamiprid aptamer sequence at its loop part and the triple-helix structure at its stem part. One single-stranded DNA grafted by two split G-rich DNA sequences at its two ends, participated in the assembly of the triplex part in TTGQ. In the presence of acetamiprid, TTGQ was dissociated, and the split G-rich DNA was released out to result in the fluorescent signal enhancement of a G-qadruplex's probe. By virtue of this TTGQ molecular switch, the proposed assay can sense acetamiprid at the concentration as low as 2.38nM with excellent selectivity. Furthermore, the detection of acetamiprid in three kinds of foods extract demonstrated the high application potential of the detection platform in the field of food safety. Compared with the other reported strategies for acetamiprid assay, this triplex-to-G-qadruplex-based fluorescent molecular switch was just composed of two DNA probes without the labeling procedure, presenting a really simple and low-cost fluorescent detection for acetamiprid assay.
5	Laboratory scale UV-visible degradation of acetamiprid in aqueous marketed mixtures - Structural elucidation of photoproducts and toxicological consequences	E. V. Nicol, Z., et. al. Chemosphere 248, 126040 https://www.ncbi.nlm.nih.gov/pubmed/32041066	Acetamiprid is a neonicotinoid pesticide, which is extensively used on agricultural crops, but has a high toxic effect on beneficial insects and the human body. It is exposed to sunlight irradiation on crops but also in surface waters where it is found at a high level due to its resistance to common water treatments. The aim of the present work was to study the UV-visible photodegradation of acetamiprid, alone and in two marketed mixtures (Polysect Ultra SL(R) and Roseclear Ultra(R)). Ten photoproducts were characterized using LC-HR-MS/MS analysis. Photodegradation pathways were proposed based on the chemical structures of photoproducts and kinetic measurements; a matrix effect has been evidenced for commercial mixtures. Most photoproducts exhibit potential developmental toxicity twice higher than that of the parent compound. Regarding potential mutagenicity, all photoproducts are less toxic than acetamiprid. Estimated oral rat LD50 values show that the potential toxicities of photoproducts are similar or lower than that of acetamiprid. In vitro tests on <i>Vibrio fischeri</i> bacteria showed that the ecotoxicities of marketed mixtures are significantly higher than that of acetamiprid in aqueous solution; they slightly increase after UV-light exposure.
5	LC-ESI/MS/MS analysis of neonicotinoids in urine of very low birth weight infants at birth	Ichikawa G, Kuribayashi R, Ikenaka Y, Ichise T, Nakayama SMM, Ishizuka M, Taira K, Fujioka K, Sairenchi T, Kobashi G, Bonmatin JM, Yoshihara S. LC-ESI/MS/MS analysis of neonicotinoids in urine of very low birth weight infants at birth. PLoS One. 2019 Jul 1;14(7):e0219208. doi: 10.1371/journal.pone.0219208. PMID: 31260498; PMCID: PMC6602294.	Objectives: Neonicotinoid insecticides are widely used systemic pesticides with nicotinic acetylcholine receptor agonist activity that are a concern as environmental pollutants. Neonicotinoids in humans and the environment have been widely reported, but few studies have examined their presence in fetuses and newborns. The objective of this study is to determine exposure to neonicotinoids and metabolites in very low birth weight (VLBW) infants. Methods: An analytical method for seven neonicotinoids and one neonicotinoid metabolite, N-desmethylnacetamiprid (DMAP), in human urine using LC-ESI/MS/MS was developed. This method was used for analysis of 57 urine samples collected within 48 hours after birth from VLBW infants of gestational age 23-34 weeks (male/female = 36/21, small for gestational age (SGA)/appropriate gestational age (AGA) = 6/51) who were admitted to the neonatal intensive care unit of Dokkyo Hospital from January 2009 to December 2010. Sixty-five samples collected on postnatal day 14 (M/F = 37/22, SGA/AGA = 7/52) were also analyzed. Results: DMAP, a metabolite of acetamiprid, was detected in 14 urine samples collected at birth (24.6%, median level 0.048 ppb) and in 7 samples collected on postnatal day 14 (11.9%, median level 0.09 ppb). The urinary DMAP detection rate and level were higher in SGA than in AGA infants (both p<0.05). There were no correlations between the DMAP level and infant physique indexes (length, height, and head circumference SD scores). Conclusion: These results provide the first evidence worldwide of neonicotinoid exposure in newborn babies in the early phase after birth. The findings suggest a need to examine potential neurodevelopmental toxicity of neonicotinoids and metabolites in human fetuses.
5	LC-MS/MS analysis of neonicotinoid insecticides: Residue findings in chilean honeys	Bridi, Raquel; Larena, Arturo; Pizarro, Paula Núñez; Giordano, Ady; Montenegro, Gloria (2018): LC-MS/MS analysis of neonicotinoid insecticides: Residue findings in chilean honeys. SciELO journals. Dataset. https://doi.org/10.6084/m9.figshare.5980105.v1	Neonicotinoids are a relatively new generation of insecticides that have been used for control of pests such as aphids, leafhoppers and whiteflies. This paper presents for the first time a determination of residues of four neonicotinoid insecticides (acetamiprid, thiamethoxam, thiacloprid and imidacloprid) in Chilean honey using QuEChERS extraction and UHPLC-MS/MS analysis. The limits of detection and quantification found for all analytes ranging from 0.34 to 1.43 µg kg ⁻¹ and from 0.30 to 4.76 µg kg ⁻¹ , respectively. The extraction using QuEChERS method provided recoveries over 79% and the precision showed coefficient of variation lower than 20%. These data are in agreement with the international criteria that recommend general recovery limits of 70 - 120%. Of the 16 samples analyzed, in three honey samples neonicotinoids pesticides were detected. These three samples were collected from the same geographical area (Rengo). Fruit and grain production characterize the province of Rengo. The analysis of the botanical origin of these honeys showed the absence of pollen grains of crops and the majority presence of pollen grains of weeds such as <i>Medicago sativa</i> , <i>Galega officinalis</i> and <i>Brassica rapa</i> , which could be associated with crops. Although the residue levels found were low, the results also confirm the actual occurrence of a transfer of neonicotinoid insecticides from exposed honeybees into honey.

Phase 1 Conformity category	Title	Citation	Abstract
5	LC-MS/MS method validation for determination of selected neonicotinoids in groundwater for the purpose of a column experiment	D. W. Pietrzak, K., et. al. J Environ Sci Health B 54, 5, 424-431 https://www.ncbi.nlm.nih.gov/pubmed/30821594	The work was carried out to develop and validate a method based on liquid chromatography tandem mass spectrometry (LC-MS/MS) for the simultaneous detection and quantification of five neonicotinoid insecticides: acetamiprid, clothianidin, imidacloprid, thiacloprid and thiamethoxam in groundwater samples for the purpose of a further column experiment. This experiment will be used to analyze breakthrough curves of neonicotinoids under a saturated water flow to set transport parameters, where the reliability of the results of chemical analysis plays an important role. The validation was performed in a concentration range from 0.09 microg L(-1) to 100 microg L(-1) using an Infinity 1290 (Agilent, USA) chromatograph coupled with a QTrap 5500 mass spectrometer (Sciex, Canada). The calibration curves were obtained on the basis of the results of six standard solution analyses. Linearity was not lower than 0.998. The limit of detection was set at the lowest concentration which can be determined with an acceptable accuracy and precision. All pesticides had recoveries in the range 85-109% with relative standard deviation values less than 8.1%. The estimated measurement uncertainty did not exceed 30%, so the LC-MS/MS method fits for the intended purpose.
1	Leaching behaviour of slag and fly ash from laterite nickel ore smelting (Niquelândia, Brazil)	Leaching behaviour of slag and fly ash from laterite nickel ore smelting (Niquelândia, Brazil) V. Ettler, J. Kvapil, O. Šebek, Z. Johan, M. Mihaljević, G. Ratić, et al. Applied Geochemistry 2016 Vol. 64 Pages 118-127 DOI: https://doi.org/10.1016/j.apgeochem.2015.09.019	The laterite nickel (Ni) ore smelting operation in Niquelândia (Goiás state, Brazil) produced large amounts of smelting wastes, stockpiled on dumps (slags) and in settling ponds (fly ash). In this study we present data on the chemistry, mineralogy and pH-dependent leaching behaviours of these two waste materials. Bulk chemical analyses indicated that both wastes contained significant amounts of potentially toxic elements (PTEs), with substantially higher concentrations in the case of the fly ash (up to 2.51 wt% Ni, 1870 mg/kg Cr and 488 mg/kg Co). The mineralogical investigations carried out using X-ray diffraction analysis (XRD), scanning electron microscopy (SEM) and electron microprobe (EPMA) indicated that the slag was mainly composed of silicate glass, olivine and pyroxene. In contrast, the fly ash was composed of Ni-bearing serpentine-like phases (originating from the furnace feed), Ni-bearing glass, olivine, pyroxene and spinel. The pH-dependent leaching behaviour was performed according to the EU standard experimental protocol (CEN/TS 14997) in the pH range of 3–12. The leaching was highly pH-dependent for both materials, and the highest releases of PTEs occurred at pH 3. The slag generally exhibited an U-shaped leaching behaviour of the PTEs as a function of pH, and was found to release up to 48.0 mg/kg Ni, 25.6 mg/kg Cr, and 1.42 mg/kg Co. The fly ash was significantly more reactive, and exhibited its highest leaching level of PTEs between pH 3 and 7. The maximum observed release corresponded to 5750 mg/kg Ni, 4.35 mg/kg Cr, and 112 mg/kg Co. The leached Ni concentrations after 24 h of leaching in deionized water exceeded the limit for hazardous waste by more than 100x according to the EU legislation (40 mg/kg Ni). X-ray Absorption Near Edge Structure (XANES) and Extended X-ray Absorption Fine Structures (EXAFS) spectra indicated that Ni in the fly ash is predominantly bound in a serpentine-like phase, and during the fly ash experimental alteration it was mainly released from the second shell (corresponding to the atomic distances between Ni and Si, Mg, Fe in high-temperature silicates, glass, and partially dissolved serpentine). This study shows that disposal sites for the fly ash can represent a significant source of local pollution, and direct recycling of the fly ash in the smelting technology (as currently adopted at the Barro Alto new smelter and since few years also at the Niquelândia smelter) is the best environment-friendly option for handling of fly ash in the future.
9	Lethal and Sublethal Effects of Methyl Benzoate on the Predatory Bug <i>Nesidiocoris tenuis</i>	Mostafiz MM, Hassan E, Shim JK, Lee KY. Lethal and Sublethal Effects of Methyl Benzoate on the Predatory Bug <i>Nesidiocoris tenuis</i> . Insects. 2020 Jun 18;11(6):377. doi: 10.3390/insects11060377. PMID: 32570764; PMCID: PMC7349728.	Benzoates (naturally occurring plant toxins) produce pesticidal effects on various pest insects and mites, but their effects on non-target insects are poorly understood. In this study, we evaluate the lethal and sublethal toxicity of methyl benzoate (MB) to adults of the generalist predatory bug <i>Nesidiocoris tenuis</i> (Reuter) (Hemiptera: Miridae). To assess lethal effects, <i>N. tenuis</i> was exposed to plant surfaces treated with 0.25%, 0.5% and 1% MB, as well as negative and positive controls (water and the neonicotinoid acetamiprid, respectively). Exposure to 1% MB resulted in the highest corrected mortality of 17.8% and 13.3% under laboratory and greenhouse conditions, respectively. Thus, 1% MB can be classified as harmless to <i>N. tenuis</i> according to the International Organization for Biological Control rating scheme. At the sublethal level, MB exposure did not significantly affect the consumption of eggs of the whitefly <i>Bemisia tabaci</i> by <i>N. tenuis</i> relative to negative control feeding rates. In contrast, acetamiprid at the manufacturer's recommended concentration reduced <i>N. tenuis</i> feeding activity by 45.4%. Furthermore, in a Y-tube olfactometer assay, there were no significant differences between the olfactory responses of <i>N. tenuis</i> to MB concentrations and the negative control (water). This study therefore suggests that MB could be used safely for pest control in combination with <i>N. tenuis</i> .
4	Lethal and sublethal effects of synthetic insecticides on the locomotory and feeding behavior of <i>Riptortus pedestris</i> (Hemiptera: Alydidae) under laboratory conditions	Minhyung Jung, M. Jung, Soowan Kim, S. Kim, Hong Geun Kim, H. Geun Kim, & Doo-Hyung Lee, D. Lee. (2018). Lethal and sublethal effects of synthetic insecticides on the locomotory and feeding behavior of <i>Riptortus pedestris</i> (Hemiptera: Alydidae) under laboratory conditions. Journal of Asia-Pacific entomology, 21, 179-185. doi: 10.1016/j.aspen.2017.11.019	The bean bug, <i>Riptortus pedestris</i> (Hemiptera: Alydidae) is a polyphagous insect pest and has a wide range of hosts including leguminous plants and tree fruits. Currently, the management of <i>R. pedestris</i> mainly relies on the use of insecticides, and most studies have focused on the lethal effects of insecticides. However, insecticides can not only kill insects directly, but can also affect behavioral changes of survivors when exposed to sub-lethal doses. In this study, we investigated locomotory behaviors (vertical movement, horizontal movement, and flight ability) and feeding behaviors (frequency of insects approaching dried soybean seeds and number of stylet sheaths left on the dried soybean seeds by insects) of surviving <i>R. pedestris</i> pre-exposed to five insecticide residues for 4h. None of the three insecticides (bifenthrin, etofenprox, and acetamiprid) tested had significant effects on the locomotory behaviors of <i>R. pedestris</i> adults compared to the water-treated control group. Fenitrothion- and dinotefuran-treated groups showed a significant decrease in the vertical movement compared to the water-treated control, but the insects recovered mobility 24h after the initial exposure. The frequency of <i>R. pedestris</i> approaching to dried soybean seeds was affected by four insecticides (fenitrothion, etofenprox, bifenthrin, and dinotefuran), but the actual feeding activity of <i>R. pedestris</i> determined by the stylet sheaths remaining on the dried soybean seed was only affected by fenitrothion treatment. Given the relatively low toxic effects of five insecticides tested, a better understanding of the impact of insecticides on the behavior of target species is needed for a more robust pest control strategy and a more effective use of insecticides in IPM programs.
Ecotoxicology	Lethal and sublethal toxicity of neonicotinoid and butenolide insecticides to the mayfly, <i>Hexagenia</i> spp	A. J. H. Bartlett, A. M., et. al. Environ Pollut 238, 63-75 https://www.ncbi.nlm.nih.gov/pubmed/29544197	Neonicotinoid insecticides are environmentally persistent and highly water-soluble, and thus are prone to leaching into surface waters where they may negatively affect non-target aquatic insects. Most of the research to date has focused on imidacloprid, and few data are available regarding the effects of other neonicotinoids or their proposed replacements (butenolide insecticides). The objective of this study was to assess the toxicity of six neonicotinoids (imidacloprid, thiamethoxam, acetamiprid, clothianidin, thiacloprid, and dinotefuran) and one butenolide (flupyradifurone) to <i>Hexagenia</i> spp. (mayfly larvae). Acute (96-h), water-only tests were conducted, and survival and behaviour (number of surviving mayflies inhabiting artificial burrows) were assessed. Acute sublethal tests were also conducted with imidacloprid, acetamiprid, and thiacloprid, and in addition to survival and behaviour, mobility (ability to burrow into sediment) and recovery (survival and growth following 21d in clean sediment) were measured. Sublethal effects occurred at much lower concentrations than survival: 96-h LC50s ranged from 780µg/L (acetamiprid) to >10,000µg/L (dinotefuran), whereas 96-h EC50s ranged from 4.0µg/L (acetamiprid) to 630µg/L (thiamethoxam). Flupyradifurone was intermediate in toxicity, with a 96-h LC50 of 2000µg/L and a 96-h EC50 of 81µg/L. Behaviour and mobility were impaired significantly and to a similar degree in sublethal exposures to 10µg/L imidacloprid, acetamiprid, and thiacloprid, and survival and growth following the recovery period were significantly lower in mayflies exposed to 10µg/L acetamiprid and thiacloprid, respectively. A suite of effects on mayfly swimming behaviour/ability and respiration were also observed, but not quantified, following exposures to imidacloprid, acetamiprid, and thiacloprid at 1µg/L and higher. Imidacloprid concentrations measured in North American surface waters have been found to meet or exceed those causing toxicity to <i>Hexagenia</i> , indicating that environmental concentrations may adversely affect <i>Hexagenia</i> and similarly sensitive non-target aquatic species.

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5	Liquid chromatography-tandem mass spectrometry analysis of neonicotinoid pesticides and 6-chloronicotinic acid in environmental water with direct aqueous injection	C. N. Hao, M. R., et. al. Anal Chim Acta 925, 43-50 https://www.ncbi.nlm.nih.gov/pubmed/27188316	An efficient, high throughput and cost-effective direct aqueous injection approach for the analysis of neonicotinoid pesticides and a common metabolite in environmental water has been described here. The method determines eight neonicotinoid pesticides (acetamiprid, clothianidin, dinotefuran, flonicamid, imidacloprid, nitenpyram, thiacloprid, thiamethoxam) and 6-chloronicotinic acid (a common metabolite of the first generation neonicotinoids, acetamiprid, imidacloprid, nitenpyram and thiacloprid) without any sample enrichment/cleanup steps. The method detection limits are 2-8 ng/L for the neonicotinoids and 93 ng/L for 6-chloronicotinic acid. The performance of the QTRAP((R))5500 mass spectrometer was compared against a 4000QTRAP((R)), and a QTRAP((R))6500, to provide insights for future method transfer among different generations of instrumentations. Critical mass spectrometric parameters such as collision energy were quite consistent among the three instruments evaluated. However, increased chemical background levels for some target compounds on the more sensitive instruments were observed. The application of differential ion mobility spectrometry combined with tandem mass spectrometry was demonstrated to have great potential in reducing chemical background and/or isobaric interferences inherited in sample matrices. This ISO 17025 accredited method was employed to quantitate neonicotinoids in Ontario stream water samples. Good correlation for analytical results of this direct aqueous injection approach and a previously published solid phase extraction approach warrant high confidence in data quality.
5	Liquid chromatography/tandem mass spectrometry analysis of neonicotinoids in environmental water	C. M. Hao, D., et. al. Rapid Commun Mass Spectrom 29, 23, 2225-32 https://www.ncbi.nlm.nih.gov/pubmed/26522314	RATIONALE: Neonicotinoids (NNIs) are the fastest expanding group of pesticides in the world over the last two decades; however, they may be a significant contributing factor to bee mortality. The widespread use of NNIs makes it critical to monitor their residuals in the environment. Published methods for NNI analysis are mainly focused on agricultural and food products, and many of them only measured a portion of the commercially available NNIs. METHODS: Utilizing a biphenyl stationary-phase column, a sensitive liquid chromatography/tandem mass spectrometry (LC/MS/MS) method was developed to determine eight NNIs, including acetamiprid, clothianidin, dinotefuran, flonicamid, imidacloprid, nitenpyram, thiacloprid and thiamethoxam in environmental water. Two multiple reaction monitoring (MRM) transitions were monitored for each compound to ascertain true positive identification. Isotope-labelled NNIs, d3-acetamiprid, d3-clothianidin, d4-imidacloprid and d3-thiamethoxam, were used to compensate for extraction efficiency, matrix effects and instrument variability while monitoring real-time method performance. Target compounds in aqueous samples were analyzed by direct aqueous injection (DAI) or after solid-phase extraction (SPE). RESULTS: The method detection limits (MDLs) of NNIs in drinking water, surface water and groundwater were in the ranges of 50 to 190 and 2 to 7 ng/L for DAI and SPE procedures, respectively, and target compound recoveries ranged from 78 to 110%. The stability of target compounds in water samples and SPE extracts was also investigated for the first time to ensure accurate results. No obvious degradation was observed for target compounds within four weeks in either water samples or SPE extracts. CONCLUSIONS: The method developed for neonicotinoid pesticide analysis is very sensitive and efficient. It provides good flexibility to meet various environmental monitoring needs and is employed for an extensive study to determine the distribution of NNIs in Ontario's water.
5	Liquid-phase membrane extraction of targeted pesticides from manufacturing wastewaters in a hollow fibre contactor with feed-stream recycle	J. V. Dordevic, G. T., et. al. Environ Technol 38, 1, 78-84 https://www.ncbi.nlm.nih.gov/pubmed/27156531	A two-phase membrane extraction in a hollow fibre contactor with feed-stream recycle was applied to remove selected pesticides (tebufenozide, linuron, imidacloprid, acetamiprid and dimethoate) from their mixed aqueous solutions. The contactor consisted of 50 polypropylene hollow fibres impregnated with 5% tri-n-octylphosphine oxide in di-n-hexyl ether. For low-polar pesticides with log P >= 2 (tebufenozide and linuron), the maximum removal efficiency increased linearly from 85% to 96% with increasing the feed flow rate. The maximum removal efficiencies of more polar pesticides were significantly higher under feed recirculation (86%) than in a continuous single-pass operation (30%). It was found from the Wilson's plot that the mass transfer resistance of the liquid membrane can be neglected for low-polar pesticides. The pesticide removals from commercial formulations were similar to those from pure pesticide solutions, indicating that built-in adjuvants did not affect the extraction process.
9	Loss of soil microbial diversity may increase insecticide uptake by crop	Loss of soil microbial diversity may increase insecticide uptake by crop M. Zhang, Y. Liang, A. Song, B. Yu, X. Zeng, M.-S. Chen, et al. Agriculture, Ecosystems & Environment 2017 Vol. 240 Pages 84-91 DOI: https://doi.org/10.1016/j.agee.2017.02.010	Belowground biodiversity is essential for soil functioning, but the effect of belowground biodiversity loss on food safety is unknown. We investigated the loss of soil microbial diversity on insecticides accumulation in Brassica. We manipulated soil biodiversity using the dilution-to-extinction approach in a Brassica-soil-insecticide system, monitored microbial communities via high-throughput sequencing, and identified potential functional microbes. Compared with unsterilized soil, the richness of functional bacteria was reduced by 14.1%, 36.2%, 51.6% and 73.2%, respectively, in the corresponding sterilized soil inoculated with 1-, 10-2-, 10-4- and 10-6-fold diluted soil suspension. The acetamiprid and imidacloprid concentrations increased significantly in Brassica tissues grown in sterilized soil inoculated with 10-6-fold diluted suspension. A bacterial group predominated in functional microbes of soils inoculated with 1-, 10-2- or 10-4-fold diluted suspension, but the relative abundance declined in soil inoculated with a 10-6-fold diluted suspension. Our findings revealed that undesirable impacts by the loss of soil biodiversity at an intermediate level on the accumulation of soil contaminant in plants could be alleviated by microbial functional redundancy through disproportionately complementary growth of specific functional microbial taxa, but severe loss of soil biodiversity would threaten food safety.
5	Low cost UVA-LED as a radiation source for the photo-Fenton process: a new approach for micropollutant removal from urban wastewater	Low cost UVA-LED as a radiation source for the photo-Fenton process: a new approach for micropollutant removal from urban wastewater I. de la Obra, B. Esteban García, J. L. García Sánchez, J. L. Casas López and J. A. Sánchez Pérez Photochemical & Photobiological Sciences 2017 Vol. 16 Issue 1 Pages 72-78 DOI: 10.1039/C6PP00245E	Light Emitting Diode (LED) technology has matured sufficiently to be considered as an alternative UVA radiation source in photoreactors. Currently, low energy consuming LEDs with a wide range of wavelengths and radiant flux are readily available. In this study, UVA-LEDs were used as a radiation source for the photo-Fenton process as tertiary treatment. The water matrix used was a simulated secondary effluent doped with 200 µg L ⁻¹ of the pesticide acetamiprid (ACTM) due to its recalcitrant nature. All experiments were carried out in a LED-box reactor at pH 2.8. The main purpose of this research was to gain some insight into the relationships among energy supply, LED consumption, UVA irradiance and reaction rate. The effect of LED wavelength on energy efficiency for ACTM degradation was studied by varying the iron concentration and liquid depth. Three wavelengths (365, 385 and 400 nm) and two iron concentrations (5 and 11 mg L ⁻¹) for two different liquid depths (5 and 15 cm) were evaluated in order to obtain more energy efficient conditions. The results suggest that while the wavelength of 365 nm with 11 mg Fe2+ L ⁻¹ was the best condition for ACTM degradation, the wavelength of 385 nm had slower kinetics, but higher energy efficiency.
5	Magnetic porous carbon based solid-phase extraction coupled with high performance liquid chromatography for the determination of neonicotinoid insecticides in environmental water and peanut milk samples	Magnetic porous carbon based solid-phase extraction coupled with high performance liquid chromatography for the determination of neonicotinoid insecticides in environmental water and peanut milk samples L. Liu, Y. Hao, X. Zhou, C. Wang, Q. Wu and Z. Wang Analytical Methods 2015 Vol. 7 Issue 6 Pages 2762-2769 DOI: 10.1039/C4AY02990A	Magnetic ordered porous carbon (MOPC-ZSM-5) was synthesized using zeolite ZSM-5 as a template and sucrose as a carbon source. It was used as a magnetic solid-phase extraction adsorbent for the extraction of four neonicotinoid insecticides (acetamiprid, imidacloprid, thiacloprid and thiamethoxam) from river water and peanut milk samples prior to high performance liquid chromatography-ultraviolet detection. The calibration curves for the four neonicotinoid insecticides in the water samples showed linearity from 1.0 to 200.0 ng mL ⁻¹ for thiamethoxam, imidacloprid, thiacloprid and 0.5 to 200.0 ng mL ⁻¹ for acetamiprid. For the peanut milk samples, the linearity was observed in the range of 6.0-1000.0 ng mL ⁻¹ for thiamethoxam, imidacloprid, thiacloprid, and 3.0-1000.0 ng mL ⁻¹ for acetamiprid, respectively. The developed method has been successfully applied for the determination of the four neonicotinoid insecticides in river water and peanut milk samples, and a satisfactory result was obtained.

Phase 1 Conformity category	Title	Citation	Abstract
5	Magnetic Solid Phase Extraction Based on Nanostructured Magnetic Porous Porphyrin Organic Polymer for Simultaneous Extraction and Preconcentration of Neonicotinoid Insecticides From Surface Water	S. K. W. Selahle, N. J., et. al. Front Chem 8, , 555847 https://www.ncbi.nlm.nih.gov/pubmed/33195047	In this study, a magnetic porphyrin-based porous organic polymer (MP-POP) nanocomposite was successfully synthesized according previous studies and applied as an adsorbent for simultaneous extraction and preconcentration of four neonicotinoid insecticides from surface river water. The MP-POP was characterized using X-ray diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscopy/energy dispersive x-ray spectroscopy (SEM/EDS), N2-adsorption/desorption analysis, Fourier Transform infrared spectroscopy (FTIR). The neonicotinoid insecticides were quantified using high performance chromatography coupled with diode array detector (HPLC-DAD). The MP-POP shown to have a high surface area, highly porous structure and strong affinity toward the investigated analytes. The adsorption capacities were 99.0, 85.5, 90.0, and 79.4 mg g ⁻¹ for acetamiprid, clothianidin, thiacloprid and imidacloprid, respectively. The influential parameters affecting the magmatic mu-solid phase extraction (M-mu-SPE) procedure were investigated using fractional factorial design and surface response methodology (RSM). Under optimum conditions, the method exhibited relatively low limit of detection in the range of 1.3-3.2 ng L ⁻¹), limit of quantification in the range of 4.3-11 ng L ⁻¹) and wide linearity (up to 600 mug L ⁻¹)). The intraday and interday precision, expressed as the relative standard deviation (RSD) were <5%. The percentage recoveries for the four target analytes ranged from 91 to 99.3% for the spiked river water samples. The method was applied for determination of neonicotinoids in river water samples and concentrations ranged from 0 to 190 ng L ⁻¹).
5	A Magnetic Zeolitic Imidazolate Framework Nanohybrid for Fast and Efficient Extraction of Clothianidin, Imidacloprid, Acetamiprid, and Thiacloprid in Water	Y. C. Qi, X., et. al. J Nanosci Nanotechnol 19, 6, 3310-3318 https://www.ncbi.nlm.nih.gov/pubmed/30744758	A magnetic zeolitic imidazolate framework nanohybrid (Fe(3)O(4)/ZIF-8) was synthesized and applied as an efficient magnetic solid-phase extraction (MSPE) adsorbent for fast adsorption and separation of clothianidin, imidacloprid, acetamiprid, and thiacloprid from various water samples. Fe(3)O(4) and ZIF-8 were combined via a simple modified in situ method and the obtained nanohybrid (Fe(3)O(4)/ZIF-8) showed both excellent adsorption capacity and convenient magnetic property. ZIF-8 was found to play a dominant role in adsorbing the analytes and pi-pi interaction was found to be the main adsorption mechanism of analytes by Fe(3)O(4)/ZIF-8. Parameters affecting the MSPE efficiency, such as the Fe(3)O(4) amount loaded onto the ZIF-8, salt and pH of the sample solution, extraction time, and the type and volume of desorption solvent, were systematically evaluated. Under the optimum conditions, the developed MSPE coupled with LC-MS/MS achieved good linearities (R(2) > 0.9940) in the range of 10-800 mug L ⁻¹) with low limits of detection (0.03-0.3 mug L ⁻¹)) and satisfactory recoveries of 79.5-108.2% with relative standard deviations (RSDs) <10%. The method was successfully applied to monitor various water samples and conclusively highlighted the excellent flexibility and practicability of Fe(3)O(4)/ZIF-8 for analyzing emerging environmental contaminants in various types of water samples.
9	Major Pesticides Are More Toxic to Human Cells Than Their Declared Active Principles	Mesnage R, Defarge N, Spiroux de Vendômois J, Séralini GE. Major pesticides are more toxic to human cells than their declared active principles. Biomed Res Int. 2014;2014:179691. doi: 10.1155/2014/179691. Epub 2014 Feb 26. PMID: 24719846; PMCID: PMC3955666.	Pesticides are used throughout the world as mixtures called formulations. They contain adjuvants, which are often kept confidential and are called inerts by the manufacturing companies, plus a declared active principle, which is usually tested alone. We tested the toxicity of 9 pesticides, comparing active principles and their formulations, on three human cell lines (HepG2, HEK293, and JEG3). Glyphosate, isoproturon, fluroxypyr, pirimicarb, imidacloprid, acetamiprid, tebuconazole, epoxiconazole, and prochloraz constitute, respectively, the active principles of 3 major herbicides, 3 insecticides, and 3 fungicides. We measured mitochondrial activities, membrane degradations, and caspases 3/7 activities. Fungicides were the most toxic from concentrations 300-600 times lower than agricultural dilutions, followed by herbicides and then insecticides, with very similar profiles in all cell types. Despite its relatively benign reputation, Roundup was among the most toxic herbicides and insecticides tested. Most importantly, 8 formulations out of 9 were up to one thousand times more toxic than their active principles. Our results challenge the relevance of the acceptable daily intake for pesticides because this norm is calculated from the toxicity of the active principle alone. Chronic tests on pesticides may not reflect relevant environmental exposures if only one ingredient of these mixtures is tested alone.
8,9	Mass Balance Assessment for Six Neonicotinoid Insecticides During Conventional Wastewater and Wetland Treatment: Nationwide Reconnaissance in United States Wastewater	A. M. S. Sadaria, S. D., et. al. Environ Sci Technol 50, 12, 6199-206 https://www.ncbi.nlm.nih.gov/pubmed/27196423	Occurrence and removal of six high-production high-volume neonicotinoids was investigated in 13 conventional wastewater treatment plants (WWTPs) and one engineered wetland. Flow-weighted daily composites were analyzed by isotope dilution liquid chromatography tandem mass spectrometry, revealing the occurrence of imidacloprid, acetamiprid, and clothianidin at ng/L concentrations in WWTP influent (60.5 +/- 40.0; 2.9 +/- 1.9; 149.7 +/- 289.5, respectively) and effluent (58.5 +/- 29.1; 2.3 +/- 1.4; 70.2 +/- 121.8, respectively). A mass balance showed insignificant removal of imidacloprid (p = 0.09, CI = 95%) and limited removal of the sum of acetamiprid and its degradate, acetamiprid-N-desmethyl (18 +/- 4%, p = 0.01, CI = 95%). Clothianidin was found only intermittently, whereas thiamethoxam, thiacloprid, and dinotefuran were never detected. In the wetland, no removal of imidacloprid or acetamiprid was observed. Extrapolation of data from 13 WWTPs to the nation as a whole suggests annual discharges on the order of 1000-3400 kg/y of imidacloprid contained in treated effluent to surface waters nationwide. This first mass balance and first United States nationwide wastewater reconnaissance identified imidacloprid, acetamiprid, and clothianidin as recalcitrant sewage constituents that persist through wastewater treatment to enter water bodies at significant loadings, potentially harmful to sensitive aquatic invertebrates.
5	Matrix solid-phase dispersion associated to gas chromatography for the assessment in honey bee of a group of pesticides of concern in the apicultural field	A. B. Balsebre, M. E., et. al. J Chromatogr A 1567, , 47-54 https://www.ncbi.nlm.nih.gov/pubmed/29960737	A method based on matrix solid-phase dispersion (MSPD) associated to gas chromatography-flame photometric detection (GC-FPD), GC-electron capture detection (GC-ECD) and GC-mass spectrometry (GC-MS) for confirmation purposes, was developed for the determination of a representative group of twelve pesticides in honeybee with particular concern in the apicultural field (fipronil, thiamethoxam, acetamiprid, acrinathrin, metamidophos, dimethoate, diazinon, chlorpyrifos, methidathion, profenophos, azinphos methyl and coumaphos). Factors influencing the extraction efficiency of MSPD were investigated and optimized through response surface method. The use of octadecylsilyl (C18) sorbent combined with a florilis clean-up and acetonitrile-methanol (99:1) elution was the optimal condition for the extraction of the selected pesticides. Under this condition the recovery of pesticides at the limit of quantification of the method (0.007 to 0.050mugg(-1)) ranged from 68 to 102% with RSDs for within-laboratory reproducibility < /=20%. The proposed method was applied to the analysis of honeybees collected in 68 field hives from areas of great apicultural and agricultural development in central Chile. In 65% of these samples eight different pesticides were detected. Pesticides most frequently found were chlorpyrifos (34% of the samples, <0.017-0.067mugg(-1)), acrinathrin (32% of the samples, <0.020-0.026mugg(-1)) and diazinon (10% of the samples at values <0.015mugg(-1)). The incidence of these pesticides in bees can be related to their high employ in central Chile, use to combat the varroosis in hives and hydrophobicity.
13	Mechanistic modeling of solar photo-Fenton process with Fe3+ -EDDS at neutral pH	Mechanistic modeling of solar photo-Fenton process with Fe3+ -EDDS at neutral pH P. Soriano-Molina, J. L. García Sánchez, O. M. Alfano, L. O. Conte, S. Malato and J. A. Sánchez Pérez Applied Catalysis B: Environmental 2018 Vol. 233 Pages 234-242 DOI: https://doi.org/10.1016/j.apcatb.2018.04.005	This paper presents, for first time, a mechanistic model of the solar photo-Fenton process at neutral pH with the Fe3+-EDDS complex for micropollutant removal, taking into account irradiance and reactor geometry. Due to its high photon absorptivity, this biodegradable complex allows high percentages of micropollutant removal to be achieved for short reaction times. Nonetheless, no model of the process with the Fe3+-EDDS has yet been developed, meaning the proposed mechanism relies on photochemical reactions with the complex previously reported, and hypotheses deduced from experimental observation. The data for acetamiprid (ACTM) removal (100 µg L ⁻¹) in stirred tank reactors with different liquid depths, under controlled conditions of irradiance and temperature, was used to obtain the model parameters. The model successfully fitted the experimental results obtained outdoors in a raceway pond reactor (RPR), with a change of scale from 0.85 to 19 L. For the calculation of the average volumetric rate of photon absorption (VRPA), the effect of the two components of solar UV radiation (direct and diffuse) as a function of the environmental conditions and the reactor layout was considered. The results showed an important contribution by diffuse radiation, even at noon under spring conditions (~40% of the total VRPA). In addition, the applicability of the model has been demonstrated in water matrices containing organic matter and HCO3 ⁻ /CO3 ²⁻ ions, usually found in secondary wastewater treatment plant (WWTP) effluents. This approach allows for the development of control and optimization tools for the photo-Fenton process at neutral pH in low-cost photoreactors.

Phase 1 Conformity category	Title	Citation	Abstract
5	A mechanistic study and in-vivo toxicity bioassay on acetamiprid photodegradation over the zeolite supported cerium-based photocatalyst	A mechanistic study and in-vivo toxicity bioassay on acetamiprid photodegradation over the zeolite supported cerium-based photocatalyst M. Padervand, H. Heidarpour and A. Bargahi Journal of Photochemistry and Photobiology A: Chemistry 2020 Vol. 395 Pages 112526 DOI: https://doi.org/10.1016/j.jphotochem.2020.112526	Photocatalysis is well-known as an effective tool for the removal of pollutants but its eco-friendly aspect has not been well explored in the literature. In this study, we prepared an ultraviolet-active photocatalyst by the growth of cerium oxide/sulfide nanoparticles in the zeolite channels via a facile coprecipitation method. The photocatalyst was comprehensively characterized by different analysis methods and showed good activity toward removal of acetamiprid, ACP, a commonly used insecticide. As the main focus of the current work, an in vivo bioassay was carried out to investigate the acute toxicity of the contaminant solutions before and after photoreaction. Accordingly, acetamiprid and the phototreated solutions were orally injected to different groups of laboratory rats. The results indicated that the number of white blood cells and hemoglobin level of the rats exposed to the phototreated solutions decreased from 7.57 ± 1.17 and 15.47 ± 0.85 - 6.15 ± 0.84 and 14.07 ± 1.31 , respectively, compared to the control group's pathological markers. Also, the level of ALT and AST enzymes increased from 268 ± 33 and 66.7 ± 19.2 - 375 ± 29 and 98.7 ± 32.3 , respectively, indicating the liver dysfunction. These results along with the weight loss and increase in body temperature verified that unlike the pristine ACP solution, the phototreated solutions induced significant toxicity to the laboratory rats. In addition, liquid chromatography-mass spectrometry analysis was served to clarify the toxicity assessment results and propose a suitable photoproduct generation pathway.
5	Metal-organic framework MIL101 (Cr)-NH ₂ functionalized magnetic graphene oxide for ultrasonic-assisted magnetic solid phase extraction of neonicotinoid insecticides from fruit and water samples	A. M. Ghiasi, A., et. al. Talanta 217, , 121120 https://www.ncbi.nlm.nih.gov/pubmed/32498893	In this work, a magnetic nanocomposite composed of graphene oxide (GO), silica-coated cobalt ferrite (CoFe ₂ O ₄ @SiO ₂) nanoparticles and amino-functionalized metal-organic framework (MIL 101 (Cr)-NH ₂) was fabricated and employed for ultrasonic-assisted magnetic solid phase extraction (UA-MSPE) of neonicotinoid insecticides. Various techniques such as Fourier transform infrared (FT-IR) spectrometry, vibrating sample magnetometry (VSM), energy-dispersive X-ray spectroscopy (EDS) and field emission scanning electron microscope (FE-SEM) measurements were executed to investigate features and morphology of the adsorbent. The magnetic graphene oxide functionalized MIL-101 (Cr)-NH ₂ (MGO/MIL) combines the advantages of magnetic GO and MIL 101(Cr)-NH ₂ such as excellent thermal and chemical stability, high surface area, accessible coordinative unsaturated sites, sufficient stability in aqueous solutions and rapid and easy separation from the solution. Some of the important extraction factors such as type and volume of desorption solvent, desorption time, salt concentration, adsorbent amount, pH and extraction time were investigated in detail to achieve high MSPE recovery. In optimal condition, the limits of detection (LODs) for Acetamiprid and Imidacloprid were achieved 0.022 and 0.019 ng mL ⁻¹), respectively. Good determination coefficients (R ²) more than 0.9990) with satisfactory linearity in the range of 0.064-3500 ng mL ⁻¹) were found for this method. The relative standard deviations for intra- and inter-day analyses were in the range of 3.93-4.56% and 7.80-8.50%, respectively. The method was successfully used for analyzing of neonicotinoid insecticides in water and fruit samples and acceptable recoveries from 82.13% to 102.27% were obtained. The results indicated that the nanocomposite is feasible for the adsorption of trace amounts of the target analytes from the fruit and water samples.
5	Micellar electrokinetic chromatography as efficient alternative for the multiresidue determination of seven neonicotinoids and 6-chloronicotinic acid in environmental samples	Carbonell-Rozas L, Lara FJ, Del Olmo Iruela M, Garcia-Campaña AM. Micellar electrokinetic chromatography as efficient alternative for the multiresidue determination of seven neonicotinoids and 6-chloronicotinic acid in environmental samples. Anal Bioanal Chem. 2020 Sep;412(24):6231-6240. doi: 10.1007/s00216-019-02233-y. Epub 2019 Dec 11. Erratum in: Anal Bioanal Chem. 2021 Oct 11;; PMID: 31822954.	A simple, sensitive, and efficient method has been developed for the determination of the seven neonicotinoid insecticides commercially available (imidacloprid, thiacloprid, clothianidin, thiamethoxam, acetamiprid, nitenpyram, and dinotefuran) and the main metabolite 6-chloronicotinic acid. Micellar electrokinetic chromatography (MEKC) mode was applied, using 48.5 cm of total length capillary (50 μ m i.d.) with an extended light-path capillary (150 μ m). The running electrolyte consisted of 25 mM sodium tetraborate buffer (pH 9.2) containing 120 mM of sodium dodecyl sulfate and 15% of methanol (v/v). A voltage of 27 kV and a temperature of 25 °C were applied. Samples dissolved in deionized water were hydrodynamically injected at 50 mbar for 12 s, achieving the analysis in less than 12 min. Diode array detection (DAD) was performed at 220, 254, and 270 nm, depending on the analyte. Two different methodologies as sample treatments were developed; for water samples, solid-phase extraction was checked using different cartridges (C18, Oasis® HLB, Oasis® HLB Prime, and Strata-X), being the best option Oasis® HLB for preconcentration and cleanup. In the case of soil samples, a simple solid-liquid extraction was applied using a mixture of 1:3 (v/v) acetonitrile/dichloromethane. Satisfactory linearity, trueness, and precision were achieved, with detection limits in the range of 0.1-0.4 μ g L ⁻¹ for river water and 1.0-2.9 μ g kg ⁻¹ for soil samples. Recoveries in the range of 80-107% for all of the assayed neonicotinoids in water samples of different origin and 73-92% for soil samples were achieved.
Toxicology	Mitigation of acetamiprid - induced renotoxicity by natural antioxidants via the regulation of ICAM, NF- κ B and TLR 4 pathways	A. F. Alhusaini, L. M., et. al. Pharmacol Rep 71, 6, 1088-1094 https://www.ncbi.nlm.nih.gov/pubmed/31629938	BACKGROUND: Acetamiprid (ACMP) is a member of the neonicotinoid group of insecticides. It is extensively used worldwide. The misuse of ACMP creates danger hazards to human and animal. METHODS: ACMP induced renal damage evidenced by an increase in kidney injury biomarkers. So the goal of this work is to clarify the reno protective effect of Quercetin (Qrctn) and/or Nano- glutathione (N-Gluta) solely or in combination to counterbalance the danger effect of ACMP. All treatments with the previous agents were coadministered orally with ACMP for one month. RESULTS: ACMP ingestion caused a significant rise in serum creatinin, urea, and uric acid, TNF alpha along with renal cystatin C, lipid peroxidation and nitric oxide with the concomitant decline in the levels of reduced glutathione and IL-10 levels. Protein expression of ICAM was upregulated as well as mRNA expression of NF-kappaB while mRNA expression of Nrf2 was down-regulated. Immune histochemistry of TLR 4 revealed strong immune reaction. The administration of Qrctn or N-Gluta either individually or together modulated all the preceding aforementioned parameters. CONCLUSION: Fascinatingly Qrctn and N-Gluta combination was the most powerful regimen to frustrate ACMP reno-toxicity and may be deliberate as a hopeful applicant for renal therapy.
5	Mixtures of chelating agents to enhance photo-Fenton process at natural pH: Influence of wastewater matrix on micropollutant removal and bacterial inactivation	López-Vinent N, Cruz-Alcalde A, Giménez J, Esplugas S. Mixtures of chelating agents to enhance photo-Fenton process at natural pH: Influence of wastewater matrix on micropollutant removal and bacterial inactivation. Sci Total Environ. 2021 Sep 10;786:147416. doi: 10.1016/j.scitotenv.2021.147416. Epub 2021 Apr 29. PMID: 33964782.	Three organic fertilizers (EDTA (Ethylenedinitrilotetraacetic acid), EDDS (Ethylenediamine-N, N'-disuccinic acid) and DTPA (Diethylene triamine pentaacetic acid)) were tested as Fe-complexes in photo-Fenton process at natural pH for micropollutants (MPs) abatement and simultaneous E.coli inactivation. Less stable Fe-complexes show high iron precipitation, stopping MPs degradation. On the contrary, stable Fe-complexes imply low kinetic rates for MPs removal. To solve these inconveniences, three mixtures of organic fertilizers were also tested, trying to improve the kinetic rates of micropollutants oxidation and overcome iron precipitation. Three different pollutants (propranolol (PROP), acetamiprid (ACMP) and sulfamethoxazole (SMX)) were used as the target compounds. As the iron release is, in part, linked to the hardness of water, two water matrices from two different secondary wastewaters (Membrane Bioreactor (MBR) and Conventional Activated Sludge (CAS)) were tested. The best performance in micropollutant degradation and E.coli inactivation was achieved with the combination of EDDS + EDTA, accomplishing a good equilibrium between iron precipitation and rate of MPs removal. For instance, total removal of propranolol was achieved at 45 min in MBR, while it was only 85.7% in CAS, being an improvement of the process comparing with that obtained using single organic fertilizers. At the end of the treatment, 2.1 log-inactivation for E.coli was reached in CAS. The differences observed between both wastewaters were related to CAS' higher DOC, turbidity, and hardness. Finally, from the physicochemical characterization conducted, including Biochemical Oxygen Demand at 5 days and phytotoxicity, it is possible to highlight the suitability of these treated effluents for its reuse in irrigation, as long as in CAS matrix the final values of E. coli are within the legal limit.
15	Mobility and sorption assessment of selected pesticides in alluvial aquifer	N. V. K. Zivancev, S. R., et. al. Environ Sci Pollut Res Int 26, 28, 28725-28736 https://www.ncbi.nlm.nih.gov/pubmed/31376123	The objective of the paper was to use transport model of selected pesticides (carbendazim, acetamiprid and imidacloprid) in determination of linear sorption coefficients in alluvial aquifer. For constructing transport model, results of a field experiment at the location of Kovin-Dubovac drainage system in Serbia were used in order to set hydraulic parameters (hydraulic conductivity, aquifer layer thickness of the observed area, effective porosity etc.). The field experiment consisted of a tracer test during which concentrations of non-reactive tracer (Cl ⁻) and selected pesticides (carbendazim, acetamiprid and imidacloprid) were monitored. For better characterization of hydraulic parameters, a pumping test was conducted at the observed well and results were used in designing transport model. Simulation model was constructed with Lizza groundwater flow software and W.O.D.A. (Well Outline and Design Aid) solver. Obtained linear sorption coefficients in the sand and gravel water-bearing layer were 0.14 mL g ⁻¹ for carbendazim and 0.11 mL g ⁻¹) for acetamiprid and imidacloprid. Results from this study are a unique insight into mobility of observed pesticides in the alluvial groundwater in natural conditions and can be used in contamination assessment for drinking water wells.

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9	Modeling Remobilization of Neonicotinoid Residues from Tree Foliage in Streams-A Relevant Exposure Pathway in Risk Assessment?	D. B. Englert, N., et. al. Environ Sci Technol 51, 3, 1785-1794 https://www.ncbi.nlm.nih.gov/pubmed/28001052	Systemic neonicotinoid insecticides are increasingly used as a crop protection measure to suppress insect pests on trees. However, senescent foliage falling from treated trees represents a rarely studied pathway through which neonicotinoids may enter nontarget environments, e.g., surface waters. To estimate risk posed by this pathway, neonicotinoid residues were analyzed in foliage from black alder trees treated with one of three neonicotinoid insecticides (imidacloprid, thiacloprid, or acetamiprid) at five concentrations, each ranging from 0.0375-9.6 g active ingredient/cm trunk diameter at breast height (n = 3). Foliar residues measured at the time of leaf fall were used as input parameters for a model predicting imidacloprid water concentrations over a 100-m-long stream stretch as a consequence of remobilization from introduced foliage (input: 600 g foliage/m ²) containing 80 mug imidacloprid/g). The water concentration (up to approximately 250 ng/L) predicted by the model exceeded the recently proposed Maximum Permissible Concentration of 8.3 ng/L for approximately 6.5 days. Moreover, dietary uptake was identified as an additional exposure route for aquatic organisms. The alternative pathway (i.e., introduction via leaf fall) and exposure route (i.e., dietary uptake) associated with the systemic nature of neonicotinoids should be accounted for during their registration process in order to safeguard ecosystem integrity.
9	Modelling of the operation of raceway pond reactors for micropollutant removal by solar photo-Fenton as a function of photon absorption	Modelling of the operation of raceway pond reactors for micropollutant removal by solar photo-Fenton as a function of photon absorption G. Rivas, I. Carra, J. L. García Sánchez, J. L. Casas López, S. Malato and J. A. Sá nchez Pérez Applied Catalysis B: Environmental 2015 Vol. 178 Pages 210-217 DOI: https://doi.org/10.1016/j.apcatb.2014.09.015	Raceway ponds reactors (RPRs) are extensive non-concentrating photoreactors which allow large volumes of water to be treated. They consist of channels where water is set in motion by a paddlewheel system. In this work the effect of solar irradiance on RPR operation to remove micropollutants by solar photo-Fenton was studied. A RPR was used at pilot plant scale (up to 360 L) and the pesticides acetamiprid (ACTM) and thiaibendazole (TBZ) were used as a model pollutant mixture (100 µg/L each) in simulated effluent. Averaged UV irradiances ranged from 10 to 30 W/m ² and three values of iron concentration (1, 5.5 and 10 mg/L) were used. Different liquid depths were also used to evaluate the relationship between the rate of photon absorption and pollutant removal. A model was proposed to predict degradation rate and treatment capacity as a function of the volumetric rate of photon absorption (VRPA). Under low irradiance conditions (10 W/m ²) the treatment capacity was not sensitive above 10 cm liquid depth, so a low iron concentration should be used (5 mg Fe/L). For high irradiance values (30 W/m ²), greater liquid depth (20 cm) and iron concentration (10 mg Fe/L) should be used to take full advantage of photon availability. Treatment capacity values of 133 mg/h m ² can be reached under these conditions.
10	Modification of the existing maximum residue levels for acetamiprid in various crops	Modification of the existing maximum residue levels for acetamiprid in various crops EFSA, G. Bellisai, G. Bernasconi, A. Brancato, L. Carrasco Cabrera, L. Ferreira, et al. EFSA Journal 2021 Vol. 19 Issue 9 Pages e06830 DOI: https://doi.org/10.2903/j.efsa.2021.6830	In accordance with Article 6 of Regulation (EC) No 396/2005, the applicants Nisso Chemical Europe GmbH and Sipcam Italia S.p.A. submitted requests to the competent national authority in the Netherlands and in Italy, respectively, to modify the existing maximum residue levels (MRLs) for the active substance acetamiprid in various crops. The data submitted in support of these requests were found to be sufficient to derive MRL proposals for plums, aubergines, peppers, cucumbers, courgettes, other cucurbits with edible peel, poppy seeds, mustard seeds, pomegranates and honey. Adequate analytical methods for enforcement are available to control the residues of acetamiprid in the commodities under consideration at the validated limit of quantification (LOQ) of 0.01 mg/kg. Based on the risk assessment results, EFSA concluded that the short - term and long - term intake of residues resulting from the use of acetamiprid according to the reported agricultural practices is unlikely to present a risk to consumer health.
8,9	Molecular Effects of Neonicotinoids in Honey Bees (<i>Apis mellifera</i>)	V. M. Christen, F., et. al. Environ Sci Technol 50, 7, 4071-81 https://www.ncbi.nlm.nih.gov/pubmed/26990785	Neonicotinoids are implicated in the decline of bee populations. As agonists of nicotinic acetylcholine receptors, they disturb acetylcholine receptor signaling leading to neurotoxicity. Several behavioral studies showed the link between neonicotinoid exposure and adverse effects on foraging activity and reproduction. However, molecular effects underlying these effects are poorly understood. Here we elucidated molecular effects at environmental realistic levels of three neonicotinoids and nicotine, and compared laboratory studies to field exposures with acetamiprid. We assessed transcriptional alterations of eight selected genes in caged honey bees exposed to different concentrations of the neonicotinoids acetamiprid, clothianidin, imidacloprid, and thiamethoxam, as well as nicotine. We determined transcripts of several targets, including nicotinic acetylcholine receptor alpha 1 and alpha 2 subunit, the multifunctional gene vitellogenin, immune system genes apidaecin and defensin-1, stress-related gene catalase and two genes linked to memory formation, pka and creb. Vitellogenin showed a strong increase upon neonicotinoid exposures in the laboratory and field, while creb and pka transcripts were down-regulated. The induction of vitellogenin suggests adverse effects on foraging activity, whereas creb and pka down-regulation may be implicated in decreased long-term memory formation. Transcriptional alterations occurred at environmental concentrations and provide an explanation for the molecular basis of observed adverse effects of neonicotinoids to bees.
5	Monitoring of Neonicotinoid Pesticides in Water-Soil Systems Along the Agro-Landscapes of the Cauvery Delta Region, South India	M. M. Menon, R., et. al. Bull Environ Contam Toxicol 106, 6, 1065-1070 https://www.ncbi.nlm.nih.gov/pubmed/33877372	The prophylactic use of neonicotinoids in paddy fields has raised concern due to its toxicity to ecological systems and human health. The present study evaluated the concentrations of neonicotinoids such as clothianidin, imidacloprid, thiamethoxam, acetamiprid, and thiacloprid in the water-soil systems of the paddy fields, and their potential discharge into the groundwater along the Cauvery delta region, South India. Though neonicotinoids are extensively sprayed in the paddy fields, the concentration of residues analyzed by QuEChERS, combined with LC-MS/MS found no detectable residues at concentrations above LOD. The LOD and the LOQ values for water and soil were 0.001 ppm and 0.0025 ppm and 0.025 ppm and 0.05 ppm respectively. The results of the study found that neonicotinoids are less persistent in the water-soil systems of the delta region as they are readily exposed to photolysis and undergo rapid microbial degradation. Further, the hydrogeological characteristics of the highly saturated delta soil facilitate ready leaching followed by vertical migration and infiltration into the soil aquifers.
5	Monitoring of the 17 EU Watch List contaminants of emerging concern in the Ave and the Sousa Rivers	J. C. G. R. Sousa, A. R., et. al. Sci Total Environ 649, 1083-1095 https://www.ncbi.nlm.nih.gov/pubmed/33038880	The occurrence of micropollutants in the environment is a matter of high concern. Some regulations have been published in the last years and a Watch List of contaminants of emerging concern (CECs) for European Union monitoring of surface water was launched in the Decision 2015/495, including three estrogens (estrone, E1; 17-beta-estradiol, E2; and 17-alpha-ethinylestradiol, EE2), four pharmaceuticals (diclofenac and the macrolide antibiotics azithromycin, clarithromycin and erythromycin), an anti-oxidant (2,6-di-tert-butyl-4-methylphenol, BHT), an UV filter (2-ethylhexyl 4-methoxycinnamate, EHMC), some pesticides (methiocarb and the neonicotinoids imidacloprid, thiacloprid, thiamethoxam, clothianidin and acetamiprid) and two herbicides (oxadiazon and triallate). This study provides the first spatial and seasonal monitoring campaign in the Ave and the Sousa Rivers for the full set of the 17 Watch List CECs (not reported yet for any country), in order to assess their occurrence, distribution, frequency and risk assessment. It also highlights the need of extend the study to other regions and environmental matrices to investigate the occurrence and possible sources of contamination of CECs, aiming to give insights for decision makers to define mitigation strategies for a more sustainable water policy.
4	Monitoring resistance of <i>Phenacoccus solenopsis</i> Tinsley (Homoptera: Pseudococcidae) to new chemical insecticides in Punjab, Pakistan	Monitoring resistance of <i>Phenacoccus solenopsis</i> Tinsley (Homoptera: Pseudococcidae) to new chemical insecticides in Punjab, Pakistan B. Saddiq, S. A. Shad, M. Aslam, M. Ijaz and N. Abbas Crop Protection 2015 Vol. 74 Pages 24-29 DOI: https://doi.org/10.1016/j.cpro.2015.03.026	Mealybug, <i>Phenacoccus solenopsis</i> Tinsley is a devastating pest of cotton and many other crops and ornamental plants. <i>P. solenopsis</i> has ability to develop resistance to most chemical classes of insecticides. The aim of present study was to monitor the resistance to new chemical insecticides in different field populations of <i>P. solenopsis</i> . Six populations of <i>P. solenopsis</i> , collected from Multan, Khanewal, Muzaffar Garh, Mailsi, Bahawalpur, and Sahiwal, were tested for resistance to selected new chemical insecticides by the leaf dip method. The resistance ratios were in the range of 4.0-30.9-fold for nitenpyram, 12.6-105.0-fold for acetamiprid, 3.4-79.0-fold for emamectin benzoate, 0.4-2.3 fold for indoxacarb, 12.1-28.9 for pyriproxyfen, 13.0-37.4 for cyromazine, 7.2-35.0 for methoxyfenozide, and 5.5-17.0-fold for lufenuron compared to the laboratory susceptible strain. Regular insecticide resistance monitoring and integrated management plans including the judicious use of insecticides with correct application rates and methods and rotation of insecticides with different modes of action are required to delay insecticide resistance development in <i>P. solenopsis</i> .

Phase 1 Conformity category	Title	Citation	Abstract
9	Multi-Drug Resistance Transporters and a Mechanism-Based Strategy for Assessing Risks of Pesticide Combinations to Honey Bees	A. J. M. Guseman, K. , et. al. PLoS One 11, 2, e0148242 https://www.ncbi.nlm.nih.gov/pubmed/26840460	Annual losses of honey bee colonies remain high and pesticide exposure is one possible cause. Dangerous combinations of pesticides, plant-produced compounds and antibiotics added to hives may cause or contribute to losses, but it is very difficult to test the many combinations of those compounds that bees encounter. We propose a mechanism-based strategy for simplifying the assessment of combinations of compounds, focusing here on compounds that interact with xenobiotic handling ABC transporters. We evaluate the use of ivermectin as a model substrate for these transporters. Compounds that increase sensitivity of bees to ivermectin may be inhibiting key transporters. We show that several compounds commonly encountered by honey bees (fumagillin, Pristine, quercetin) significantly increased honey bee mortality due to ivermectin and significantly reduced the LC50 of ivermectin suggesting that they may interfere with transporter function. These inhibitors also significantly increased honey bees sensitivity to the neonicotinoid insecticide acetamiprid. This mechanism-based strategy may dramatically reduce the number of tests needed to assess the possibility of adverse combinations among pesticides. We also demonstrate an in vivo transporter assay that provides physical evidence of transporter inhibition by tracking the dynamics of a fluorescent substrate of these transporters (Rhodamine B) in bee tissues. Significantly more Rhodamine B remains in the head and hemolymph of bees pretreated with higher concentrations of the transporter inhibitor verapamil. Mechanism-based strategies for simplifying the assessment of adverse chemical interactions such as described here could improve our ability to identify those combinations that pose significantly greater risk to bees and perhaps improve the risk assessment protocols for honey bees and similar sensitive species.
5	Multiresidue Analysis of Five Neonicotinoid Insecticides and Their Primary Metabolite in Cucumbers and Soil Using High-Performance Liquid Chromatography with Diode-Array Detection	Abdel-Ghany MF, Hussein LA, El Azab NF. Multiresidue Analysis of Five Neonicotinoid Insecticides and Their Primary Metabolite in Cucumbers and Soil Using High-Performance Liquid Chromatography with Diode-Array Detection. J AOAC Int. 2017 Jan 1;100(1):176-188. doi: 10.5740/jaoacint.16-0162. Epub 2016 Oct 19. PMID: 27765084.	A sensitive, selective, and validated HPLC-diode-array detection method was developed for the simultaneous determination of five neonicotinoid insecticides-acetamiprid, imidacloprid, nitenpyram, flonicamid, and thiacloprid-and their primary metabolite, 6-chloronicotinic acid, in cucumbers and soil based on the quick, easy, cheap, effective, rugged, and safe (QuEChERS) technique as a pretreatment procedure. In the QuEChERS procedure, cucumber samples were extracted with acetonitrile and cleaned using C18, whereas soil samples were extracted with an acetonitrile-dichloromethane mixture (1 + 2). The HPLC conditions were optimized by separating neonicotinoids using an acetonitrile-water mixture (25 + 75) and a Synergi Hydro RP C18 column. Matrix-matched calibration standards were prepared in cucumber and soil to eliminate any matrix interference. RSDs were ≤9% in all recovery tests. LODs and LOQs for the five neonicotinoids were in the ranges of 0.006-0.122 and 0.018-0.366 μg/g, respectively. This method was successfully applied to determine residues, the rate of disappearance of the five neonicotinoids from cucumber and soil, and the half-lives of the neonicotinoids.
4	Nanochitin whisker enhances insecticidal activity of chemical pesticide for pest insect control and toxicity	Z. W. Li, H., et. al. J Nanobiotechnology 19, 1, 49 https://www.ncbi.nlm.nih.gov/pubmed/33593391	BACKGROUND: Nanomaterials in plant protection promise many benefits over conventional pesticide products. Nano-enabled pesticides may alter the functionality or risk profile of active ingredients. Cationic nanochitin whiskers (NC) possess strong biological activity against wheat aphids. However, toxicity and synergistic effects of NC with chemical pesticides against pest insects has not been systematically reported. This study investigated the insecticidal enhancement by NC with Omethoate (40% EC), imidacloprid (10% WP), and Acetamiprid (40% WG) for pest control using wheat aphid as piercing-sucking mouthparts insect. Fluorescein isothiocyanate labelled NC was used to monitor the uptake and transportation pathway of NC inside the target insects. Toxicity of NC was tested with Sprague-Dawley (SD) rat. Our findings provide a theoretical basis for future application of NC in plant protection against pest insects. RESULTS: NCs synthesized by acidic hydrolysis were rod-like nanoparticles in a range of 50-150 nm in length and 30-50 nm in width, which examined by electron microscopy and dynamic light scattering methods. The charge density and zeta potential were about 63 mmol/kg and + 36.4 mV, respectively. By absorption and/or contact action of 30-50 mg/L of NC suspension, the corrected mortality of wheat aphids reached up to 80% or above after 12 h treatment, NC could be distributed through digestive system and relocated from mouth to other tissues inside the insect body. When associated with dilutions of conventional pesticides, the corrected mortality were significantly increased up to 95% or above. The dosage of the chemical pesticide and nanochitin in the mixtures (1:1 by volume) were all reduced to half. The acute oral toxicity Lethal Dose 50% (LD50) to SD rat is greater than 5000 mg/kg BW (body weight) in male and female, acute dermal toxicity LD50 is greater than 2000 mg/kg BW of NC. CONCLUSIONS: NC has a strong promotive effect on insecticidal effectiveness of chemical insecticides. It was easily absorbed by plant, transported and distributed from mouth to other tissues of the insects while sucking plant fluid. Low acute oral and dermal toxicity to SD rat indicated that it is safe to apply in agriculture and food industry. NCs has a great potential for water-based nanopesticide formulation to reduce chemical pesticide use for future agro-environmental sustainability.
Epidemiology	Nationwide Biomonitoring of Neonicotinoid Insecticides in Breast Milk and Health Risk Assessment to Nursing Infants in the Chinese Population	D. L. Chen, Z., et. al. J Agric Food Chem 68, 47, 13906-13915 https://www.ncbi.nlm.nih.gov/pubmed/33146527	Presently, the potential health risks of neonicotinoid insecticides (neonics) are now receiving much attention, but no data regarding the exposure of infants to neonics via human breast milk intake have been reported. In this study, a nationwide survey was conducted during the period of 2017-2019, wherein 97 pooled breast milk samples were collected from 3570 lactating women of 23 provinces in China. Nationally, acetamiprid-N-desmethyl was the most predominant compound, accounting for 61.2% of the total amount of neonics, followed by imidacloprid (15.6%). The concentration of the sum of acetamiprid and its metabolite acetamiprid-N-desmethyl in breast milk was positively correlated with corresponding dietary exposure, while no statistically significant association between the other neonic levels in breast milk and dietary exposure was found. The cumulative daily intakes of neonics (9.40-249 ng kg(-1) of body weight day(-1)) were estimated for breastfed infants, indicating a minuscule risk to Chinese infants from neonic exposure via breastfeeding.
Epidemiology	A nationwide study of occurrence and exposure assessment of neonicotinoid insecticides and their metabolites in drinking water of China	A nationwide study of occurrence and exposure assessment of neonicotinoid insecticides and their metabolites in drinking water of China G. Mahai, Y. Wan, W. Xia, A. Wang, L. Shi, X. Qian, et al. Water Research 2021 Vol. 189 Pages 116630 DOI: https://doi.org/10.1016/j.watres.2020.116630	Neonicotinoid insecticides (NNIs) are the most extensively used insecticides worldwide, threatening ecosystem and human health. However, nationwide studies of NNIs and their metabolites in drinking water are limited. In order to characterize the contamination status of NNIs in drinking water throughout China, we collected 884 drinking water samples including 789 tap water and 95 groundwater samples from 32 provinces (covering seven regions of mainland China: south, central, east, north, northeast, northwest, and southwest) and Hong Kong. Ten NNIs and six of their main metabolites were determined in the water samples. The relative potency factor method was used to assess the cumulative concentrations of NNIs and their metabolites (imidacloprid-equivalent total NNIs, IMIeq) based on the chronic reference doses (cRfDs) of the NNIs or the toxic effects of the metabolites. The IMIeq varied among the studied regions, with a median concentration of 24.5 ng/L and a maximum concentration of 8,622 ng/L. The predominant NNIs in drinking water were acetamiprid (ACE) and imidacloprid (IMI). Compared with tap water derived from groundwater, much higher concentrations of IMIeq and NNIs were found in tap water derived from surface water. Different concentrations and patterns of NNIs in drinking water were observed in different regions, provinces, and capital cities, mainly due to regional and provincial differences in crop types and volumes of pesticide usage. The concentrations of NNIs in the drinking water of provincial capitals and small/medium cities were higher than the concentrations in rural areas. The estimated daily intake (EDI) of IMIeq was at least two orders of magnitude lower than the cRfD of IMI, while the NNIs in 16 drinking water samples exceeded the acceptable value (100 ng/L) recommended by the European Union. This study provided a nationwide profile of the occurrence of NNIs and their metabolites in the drinking water of China and the associated potential cumulative human health risks, taking into account of the toxicity differences between NNIs and their metabolites.

Phase 1 Conformity category	Title	Citation	Abstract
Epidemiology	A nationwide survey of urinary concentrations of neonicotinoid insecticides in China	T. S. Zhang, S., et. al. Environ Int 132, , 105114 https://www.ncbi.nlm.nih.gov/pubmed/31465954	Neonicotinoid insecticides (NEOs) are emerging pesticides of concern due to their potential toxicity to non-target species (e.g., bees, fish and birds). China is an important producer and user of NEOs in the world. Studies on human exposure to NEOs in China are very limited. In this study, urinary levels of six NEOs, namely acetamiprid (ACE), clothianidin (CLO), dinotefuran (DIN), imidacloprid (IMI), thiacloprid (THD), and thiamethoxam (THM) were determined in 324 individuals from 13 cities in China. Across all sampling locations, total NEO concentrations (SigmaNEOs; sum of six NEOs) were dominated by CLO (median: 0.24ng/mL), IMI (0.21ng/mL), THM (0.15ng/mL) and DIN (0.14ng/mL) collectively accounting for 98% of the concentrations. Urinary concentrations of each NEO varied depending on the sampling location with the median values ranged from 0.057 to 1.2ng/mL for CLO, from 0.036 to 0.83ng/mL for DIN, from 0.069 to 3.2ng/mL for IMI, and from 0.062 to 0.45ng/mL for THM. Sex-related differences in IMI, ACE and SigmaNEOs concentrations were observed with males presenting significantly higher urinary levels than did females. All six NEOs were significantly positively correlated ($r=0.135$ to 0.661 , $p<0.05$) with each other, suggesting that the exposure sources of NEOs are common or related. On the basis of urinary IMI levels, we calculated the median daily intake (DI; mean and range) of IMI to be 1.6 (4.1, <0.02-55) mug/day, or 0.034 (0.11, <0.0003-2.1) mug/kg bw/day. To our knowledge, this is the first study to document the ubiquitous occurrence of and human exposure to NEOs in China.
9	Natural attributes of Chilean honeys modified by the presence of neonicotinoids residues	Natural attributes of Chilean honeys modified by the presence of neonicotinoids residues E. Mejias, C. Gómez, T. Garrido, P. Godoy, M. Gómez and G. Montenegro Agroforestry Systems 2019 Vol. 93 Issue 6 Pages 2257-2266 DOI: 10.1007/s10457-019-00345-z	Honeys in Chile are produced from native and endemic plant species that, due to phenolic compounds, present beneficial biological attributes. However, certain undesirable pollutants can exist in honeys from beehives located near agricultural crops or commercial industries. Neonicotinoids are a widely used pesticide group in farming, despite acute, negative effects to bee health. Indeed, neonicotinoids are associated with colony collapse disorder, one of the main causes for increased death rates in bee populations. Declining bee health in Chile may consequently be related to neonicotinoids exposure. To assess this threat, honey samples collected from different regions in Chile were analyzed to quantify phenolic contents, antioxidant activity, and the presence of four neonicotinoids (i.e., thiamethoxam, thiacloprid, acetamiprid, and imidacloprid). Pesticide-free honey samples were also fortified with three concentrations of the four neonicotinoids to evaluate changes in the chemical properties of honey. Total phenol contents decreased and antioxidant activity increased in relation to the assessed fortification concentrations. Since the agricultural use of neonicotinoids has been related to those negatives damages for bee health, in Chile, beehives should be strategically located to prevent the contamination of honeys with neonicotinoid pesticides.
9	Neonicotinoid insecticide hydrolysis and photolysis: Rates and residual toxicity	S. A. F. Today, A. M., et. al. Environ Toxicol Chem 37, 11, 2797-2809 https://www.ncbi.nlm.nih.gov/pubmed/30156316	Neonicotinoid insecticides are the most widely used class of insecticides worldwide. Concern has grown over their widespread environmental presence and potential unintended adverse effects. The present study examined hydrolysis and photolysis reaction rates of neonicotinoids and assessed any residual toxicity of reaction products. Hydrolysis rates were tested between pH 4 and 10 and found to be base-catalyzed. Experiments revealed a nonelementary rate law for hydrolysis, with the hydroxide concentration raised to a power of 0.55 ± 0.09 , which has implications for accurate prediction of environmental half-lives. Divalent metal ions ($\text{Cu}(2+)$, $\text{Ni}(2+)$, $\text{Zn}(2+)$) and minerals (kaolinite, goethite, TiO_2) had no effect on hydrolysis rates. The hydrolysis rate in a natural water, however, was slower than that predicted by buffered experiments. Nitenpyram, imidacloprid, thiamethoxam, and clothianidin reacted via direct photolysis in both ultrapure and natural waters, with average quantum yields of 0.024 ± 0.001 , 0.0105 ± 0.0002 , 0.0140 ± 0.0002 , and 0.0101 ± 0.0001 , respectively. Acetamiprid primarily underwent indirect photolysis by reaction with OH ($1.7 \pm [0.2] \times 10(9) \text{ M}^{-1} \text{ s}^{-1}$). For all compounds, the urea derivative was the most commonly detected product in both hydrolysis and photolysis experiments. Using mosquito (<i>Culex pipiens</i>) larvae, no residual toxicity of reaction products was observed. Results indicate long environmental half-lives for the tested neonicotinoids, which may help to explain their ubiquitous presence in environmental matrices. Environ Toxicol Chem 2018;37:2797-2809. (c) 2018 The Authors. Environmental Toxicology and Chemistry published by Wiley Periodicals, Inc. on behalf of SETAC.
Toxicology	Neonicotinoid Insecticides Alter the Gene Expression Profile of Neuron-Enriched Cultures from Neonatal Rat Cerebellum	J. N. Kimura-Kuroda, Y., et. al. Int J Environ Res Public Health 13, 10, https://www.ncbi.nlm.nih.gov/pubmed/27782041	Neonicotinoids are considered safe because of their low affinities to mammalian nicotinic acetylcholine receptors (nAChRs) relative to insect nAChRs. However, because of importance of nAChRs in mammalian brain development, there remains a need to establish the safety of chronic neonicotinoid exposures with regards to children's health. Here we examined the effects of longterm (14 days) and low dose (1 μM) exposure of neuron-enriched cultures from neonatal rat cerebellum to nicotine and two neonicotinoids: acetamiprid and imidacloprid. Immunocytochemistry revealed no differences in the number or morphology of immature neurons or glial cells in any group versus untreated control cultures. However, a slight disturbance in Purkinje cell dendritic arborization was observed in the exposed cultures. Next we performed transcriptome analysis on total RNAs using microarrays, and identified significant differential expression ($p < 0.05$, $q < 0.05$, ≥ 1.5 fold) between control cultures versus nicotine-, acetamiprid-, or imidacloprid-exposed cultures in 34, 48, and 67 genes, respectively. Common to all exposed groups were nine genes essential for neurodevelopment, suggesting that chronic neonicotinoid exposure alters the transcriptome of the developing mammalian brain in a similar way to nicotine exposure. Our results highlight the need for further careful investigations into the effects of neonicotinoids in the developing mammalian brain.
Toxicology	Neonicotinoid insecticides exposure cause amino acid metabolism disorders, lipid accumulation and oxidative stress in ICR mice	S. M. Yan, Z., et. al. Chemosphere 246, , 125661 https://www.ncbi.nlm.nih.gov/pubmed/31891846	Neonicotinoids are increasingly being used for pest control, and their potential health risks are now receiving attention. In this study, the toxic effects of three neonicotinoids (dinotefuran, nitenpyram and acetamiprid) were evaluated in ICR mice. After 30 days of exposure to neonicotinoids (1/200 LD50), oxidative stress levels, biochemical parameters, free fatty acids contents, and (1)H NMR-based hepatic metabolomics were tested. All treatment groups showed signs of amino acid metabolism disorders especially elevated branched chain amino acids and phenylalanine. Furthermore, animals exposed to neonicotinoids had elevated lipid levels, which induced oxidative stress. Overall, we found that oxidative stress is a common toxic effect of exposure to neonicotinoids. In addition, lipid accumulation induced by amino acid metabolism disorder may be the cause of oxidative stress. Our results further our understanding of the toxicological effects of neonicotinoids on mammals.
Ecotoxicology	Neonicotinoid insecticides hinder the pupation and metamorphosis into adults in a crabronid wasp	Heneberg P, Bogusch P, Astapenkova A, Řezáč M. Neonicotinoid insecticides hinder the pupation and metamorphosis into adults in a crabronid wasp. Sci Rep. 2020 Apr 27;10(1):7077.	Neonicotinoid insecticides are associated with a decline in the diversity and distribution of bees and wasps (Hymenoptera: Aculeata). The effects of neonicotinoids on the metamorphosis of aculeates have never been addressed in detail; however, recent evidence suggests that neonicotinoids induce wing abnormalities. We hypothesized that the metamorphosis success of bees and wasps differs in response to contact exposure to field-realistic concentrations of neonicotinoid insecticides or in response to combined exposure to neonicotinoid insecticides and benzimidazole fungicides. We treated prepupae of the model crabronid wasp <i>Pemphredon fabricii</i> with field-realistic concentrations of four neonicotinoids, acetamiprid, imidacloprid, thiacloprid and thiamethoxam, and/or with the benzimidazole fungicide thiabendazole. Treatment with acetamiprid or imidacloprid decreased the pupation rates to only 39% and 32%, respectively. Treatment with thiacloprid or thiamethoxam did not affect the pupation rate when applied alone, but the subsequent treatment of thiacloprid- or thiamethoxam-treated prepupae with thiabendazole led to significant decreases in pupation rates. A high concentration of acetamiprid, which severely affected the pupation rates, had moderate effects on metamorphosis into adults, resulting in 53% metamorphosis success (as opposed to 95% metamorphosis success in the water-treated group). However, imidacloprid or thiamethoxam treatment resulted in only 5%-10% metamorphosis success into adults. Overall survival decreased in response to treatment with any of the neonicotinoids or benzimidazoles or their combinations, with extremely low survival (<2%) following combined treatment with imidacloprid and thiabendazole or thiamethoxam and thiabendazole. In conclusion, neonicotinoids alter insect metamorphosis success, which can be further potentiated by their combination with other agrochemicals, such as benzimidazoles.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Neonicotinoid insecticides in surface water from the central Yangtze River, China	G. W. Mahai, Y., et. al. Chemosphere 229, , 452-460 https://www.ncbi.nlm.nih.gov/pubmed/31085348	Neonicotinoid insecticides (NNIs) are extensively used insecticides worldwide, yet the data on NNIs residues in the Yangtze River, China is scarce. Occurrence and distribution of six NNIs and a metabolite (desmethyl-acetamiprid) in surface water were investigated in the central Yangtze River, China at 20 sites from March to July and September 2015. Acetamiprid (ACE), imidacloprid (IMI) and thiamethoxam (THM) were the most frequently detected NNIs and IMI had a highest median concentration of 4.37ng/L, followed by ACE (2.50ng/L), THM (1.10ng/L), nitenpyram (NTP; 0.34ng/L), clothianidin (CLO; 0.10ng/L), and thiacloprid (THCP; 0.02ng/L). Significantly higher concentrations and detection frequencies of NNIs were observed in the summer than in the spring, which may be explained by the heavier precipitation in summer. Spatial variation with higher levels among the lower sites than the upper sites may be related with the agriculture land use. NNI contamination presented a low risk to aquatic life according to the risk quotient method, while IMI had potential risk to aquatic life according to the threshold of IMI (8.3ng/L) in freshwater recommended in Netherland. Using the relative potency factors method for chronic cumulative risk assessment for NNIs, potential exposure to NNIs through water ingestion are three orders of magnitude lower than the recommended relative chronic reference dose. Ongoing environmental monitoring of NNIs is needed due to the increase use of NNIs in China.
8,9	Neonicotinoid insecticides in the drinking water system - Fate, transportation, and, their contributions to the overall dietary risks	Lu C, Lu Z, Lin S, Dai W, Zhang Q. Neonicotinoid insecticides in the drinking water system - Fate, transportation, and their contributions to the overall dietary risks. Environ Pollut. 2020 Mar;258:113722.	Neonicotinoids (Neonics) have become the most widely used insecticides around the world in recent years. Due to the hydrophilic character, neonics are emerging contaminants in drinking water. In this study, we aimed to characterize and quantify the fate and transport of neonics in the drinking water treatment system and their contributions to the overall dietary risks. Seven neonics in 97 surface and drinking water samples in the city of Hangzhou, China were analyzed. The relative potency factor method was adopted in order to calculate the total neonics concentrations. We then used the Monte Carlo simulation to calculate the chronic daily intake (CDI) of total neonics from water consumption. All 16 surface water samples collected from two rivers contained at least two neonics, and more than 93% of those contained 3 or more neonics. Imidacloprid was detected in all 16 surface water samples, followed by clothianidin and acetamiprid with average concentrations of 11.9, 7.6, 17.6 ng L ⁻¹ , respectively. The drinking water treatment plants removed approximately 50% of neonics from surface water. However, 68 out of 71 tap water samples that we collected from the household faucets contained at least one neonic, with the highest average concentrations of 5.8 ng L ⁻¹ for acetamiprid. The maximum of CDIs of total neonics from water consumption for adult and children were 10.2 and 12.4 ng kg ⁻¹ d ⁻¹ , respectively, which are significantly lower than the acceptable daily intake (ADI). The results presented here shown drinking water consumption only represented an insignificant portion of dietary risks of total neonics, mainly due to the modern drinking water treatment technologies that are capable of removing significant amount of neonics from drinking water. However, the ubiquity of neonics in the drinking water sources to kitchen faucets, should be a concern for public health.
Ecotoxicology	Neonicotinoid insecticides inhibit cholinergic neurotransmission in a molluscan (<i>Lymnaea stagnalis</i>) nervous system	A. F. Vehovszky, A., et. al. Aquat Toxicol 167, , 172-9 https://www.ncbi.nlm.nih.gov/pubmed/26340121	Neonicotinoids are highly potent and selective systemic insecticides, but their widespread use also has a growing impact on non-target animals and contaminates the environment, including surface waters. We tested the neonicotinoid insecticides commercially available in Hungary (acetamiprid, Mospilan; imidacloprid, Kohinor; thiamethoxam, Actara; clothianidin, Apacs; thiacloprid, Calypso) on cholinergic synapses that exist between the VD4 and RPeD1 neurons in the central nervous system of the pond snail <i>Lymnaea stagnalis</i> . In the concentration range used (0.01-1 mg/ml), neither chemical acted as an acetylcholine (ACh) agonist; instead, both displayed antagonist activity, inhibiting the cholinergic excitatory components of the VD4-RPeD1 connection. Thiacloprid (0.01 mg/ml) blocked almost 90% of excitatory postsynaptic potentials (EPSPs), while the less effective thiamethoxam (0.1 mg/ml) reduced the synaptic responses by about 15%. The ACh-evoked membrane responses of the RPeD1 neuron were similarly inhibited by the neonicotinoids, confirming that the same ACh receptor (AChR) target was involved. We conclude that neonicotinoids act on nicotinic acetylcholine receptors (nAChRs) in the snail CNS. This has been established previously in the insect CNS; however, our data indicate differences in the background mechanism or the nAChR binding site in the snail. Here, we provide the first results concerning neonicotinoid-related toxic effects on the neuronal connections in the molluscan nervous system. Aquatic animals, including molluscs, are at direct risk while facing contaminated surface waters, and snails may provide a suitable model for further studies of the behavioral/neuronal consequences of intoxication by neonicotinoids.
8,9	Neonicotinoid insecticides triggers mitochondrial bioenergetic dysfunction via manipulating ROS-calcium influx pathway in the liver	S. C. Li, Y., et. al. Ecotoxicol Environ Saf 224, , 112690 https://www.ncbi.nlm.nih.gov/pubmed/34425541	Extensive use of neonicotinoids insecticides (NNIs) rapidly garnered widespread attention in the toxicology, since they have been found in human samples, including urine, blood, breast milk and hair. However, the precise mechanism is not completely clear regarding the NNIs-induced hepatotoxicity. In this study, we exposed male mice to three neonicotinoids (dinotefuran (DIN), nitenpyram (NIT) and acetamiprid (ACET) for 30 days. Our results showed that NNIs remarkably induced morphological damage in the liver. Simultaneously, we found that three neonicotinoids could activate the store operated Ca(2+) entry (SOCE) in the liver. Further results confirmed that reactive oxide species (ROS) scavenger n-acetylcysteine (NAC) attenuated DIN-induced calcium ion (Ca(2+)) overload and S-phase arrest via restoring protein expression of SOCE and S phase related genes in L02 hepatocytes. Moreover, we found that NAC obviously combated mitochondrial dysfunction caused by DIN via restoring mitochondrial membrane potential. Meanwhile, DIN treatment significantly increased pyruvate content, impaired the activities of tricarboxylic acid (TCA) cycle rate-limiting enzymes and inhibited adenosine triphosphate (ATP) generation, but these effects were reversed by Serca specific activator CDN1163. Collectively, perturbation of redox states can be recognized as the center of S-phase arrest and Ca(2+) overload after NNIs exposure. In this regard, Ca(2+) homeostasis dysregulation is a causative event of mitochondrial bioenergetic dysfunction in the liver. These data provides a new perspective for understanding NNI-induced hepatotoxicity mechanisms.
8,9	Neonicotinoid pesticides poorly interact with human drug transporters	M. B. Le Vee, A., et. al. J Biochem Mol Toxicol 33, 10, e22379 https://www.ncbi.nlm.nih.gov/pubmed/31364238	The interactions of six neonicotinoid pesticides and one neonicotinoid metabolite with drug transporters have been characterized in vitro. Acetamiprid, clothianidin, imidacloprid, nitenpyram, thiacloprid and its metabolite thiacloprid amide, and thiamethoxam, each used at 100 microM, did not impair activity of the efflux pumps P-glycoprotein, multidrug resistance-associated proteins, and breast cancer resistance protein. They also did not inhibit that of the uptake transporters OATP1B1, OATP1B3, OAT4, and MATE1, whereas that of OATP2B1, OAT1, and MATE2-K was affected by only one of the seven neonicotinoids. Activity of OCT1 was moderately stimulated (up to 1.5-fold) by several neonicotinoids. By contrast, that of OAT3 and OCT2 was inhibited by most (OAT3), if not all (OCT2), neonicotinoids, with IC50 values in the 20 to 60 microM range for thiacloprid, likely not relevant to environmental exposure. Thiacloprid was moreover not transported by OAT3 and OCT2. Overall, these data suggest that neonicotinoid pesticides rather poorly interact with drug transporter activities.

Phase 1 Conformity category	Title	Citation	Abstract
9	Neonicotinoid trapping by the FA1 site of human serum albumin	L. d. M. Leboffe, A., et. al. IUBMB Life 72, 4, 716-723 https://www.ncbi.nlm.nih.gov/pubmed/31614076	Neonicotinoids are a widely used class of insecticides that target the acetylcholine recognition site of the nicotinic acetylcholine receptors in the central nervous system of insects. Although neonicotinoids display a high specificity for insects, their use has been recently debated since several studies led to the hypothesis that they may have adverse ecological effects and potential risks to mammals and even humans. Due to their hydrophobic nature, neonicotinoids need specific carriers to allow their distribution in body fluids. Human serum albumin (HSA), the most abundant plasma protein, is a key carrier of endogenous and exogenous compounds. The in silico docking and ligand binding properties of acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam to HSA are here reported. Neonicotinoids bind to multiple fatty acid (FA) binding sites, preferentially to the FA1 pocket, with high affinity. Values of the dissociation equilibrium constant for neonicotinoid binding FA1 of HSA (i.e., (calc) K_n) derived from in silico docking simulations (ranging between 3.9×10^{-5} and 6.3×10^{-4} M) agree with those determined experimentally from competitive inhibition of heme-Fe(III) binding (i.e., (exp) K_n ; ranging between 2.1×10^{-5} and 6.9×10^{-5} M). Accounting for the HSA concentration in vivo ($\sim 7.5 \times 10^{-4}$ M), values of K_n here determined suggest that the formation of the HSA:neonicotinoid complexes may occur in vivo. Therefore, HSA appears to be an important determinant for neonicotinoid transport and distribution to tissues and organs, particularly to the liver where they are metabolized.
Toxicology	The neonicotinoids acetamiprid and imidacloprid impair neurogenesis and alter the microglial profile in the hippocampal dentate gyrus of mouse neonates	A. Y. Nakayama, M., et. al. J Appl Toxicol 39, 6, 877-887 https://www.ncbi.nlm.nih.gov/pubmed/30693975	Acetamiprid (ACE) and imidacloprid (IMI) are widely used neonicotinoid pesticides. They bind selectively to insect nicotinic acetylcholine receptors (nAChRs) and are considered non-hazardous to mammals. Few studies have assessed the activation of vertebrate nAChRs and the neurodevelopmental toxicity following in utero or neonatal exposure to neonicotinoids; therefore, we evaluated the effects of ACE or IMI exposure on neurogenesis and microglial profiles in the developing hippocampal dentate gyrus (DG) of mouse neonates. Mice were exposed to ACE, IMI (both 5 mg/kg/day) or nicotine (0.5 mg/kg/day) from postnatal day (P)12 to P26 by oral gavage. On P27, brains were removed, and neurogenesis and microglial activation in the hippocampal DG were examined via immunohistochemistry. A reduction in neurogenesis in the hippocampal DG of neonates following ACE, IMI and nicotine treatment was found. Additionally, neonicotinoid-exposed newborns showed an increase in the number of amoeboid-type and activated M1-type microglia. These results suggest that exposure to ACE and IMI impairs neurogenesis and alters microglial profiles in the developing hippocampal DG following oral dosing in an early postnatal period. A better understanding of the potential effects of these pesticides on human infant health is an important goal of our research.
Ecotoxicology	Neonicotinoids act like endocrine disrupting chemicals in newly-emerged bees and winter bees	D. W. Baines, E., et. al. Sci Rep 7, 1, 10979 https://www.ncbi.nlm.nih.gov/pubmed/28887455	Accumulating evidence suggests that neonicotinoids may have long-term adverse effects on bee health, yet our understanding of how this could occur is incomplete. Pesticides can act as endocrine disrupting chemicals (EDCs) in animals providing characteristic multiphasic dose-response curves and non-lethal endpoints in toxicity studies. However, it is not known if neonicotinoids act as EDCs in bees. To address this issue, we performed oral acute and chronic toxicity studies including concentrations recorded in nectar and pollen, applying acetamiprid, clothianidin, imidacloprid, and thiamethoxam to bumble bees, honey bees and leafcutter bees, the three most common bee species managed for pollination. In acute toxicity studies, late-onset symptoms, such as ataxia, were recorded as non-lethal endpoints for all three bee species. Clothianidin and thiamethoxam produced biphasic dose-response curves for all three bee species. Clothianidin and thiamethoxam were extremely toxic to winter worker honey bees prior to brood production in spring, making this the most sensitive bee stage identified to date. Chronic exposure to field-realistic levels of neonicotinoids reduced bee survival and caused significant late-onset symptoms for all three bee species. Given these findings, neonicotinoid risk should be reevaluated to address the EDC-like behavior and the sensitivity of winter worker honey bees.
5	Neonicotinoids Detection by new LC-MS/MS Method in Romanian Surface Waters	Iancu, V., et. al. Neonicotinoids Detection by new LC-MS/MS Method in Romanian Surface Waters. Revista de Chimie (Bucharest), vol 68, no 8, pp. 1716-1722	Increasing and widespread use of neonicotinoid insecticides in all world, together with their highly toxicity to invertebrates and environmental persistence mean that surface waters need to be monitored for these compounds. In the 2015, neonicotinoid insecticides have been incorporated in the watch list of substances for a European Union monitoring program (495/2015/ EU). A new method using automated solid phase extraction (SPE) with polymeric cartridges (OASIS HLB) followed by LC-MS/MS provided good separation of the most common neonicotinoids compounds. The method was developed for the determination of four neonicotinoid insecticides (nitenpyram, thiamethoxam, clothianidin, acetamiprid) in surface water with low limit of quantification (0.3-0.9 ng/L, nano grams per liter). Recoveries in surface water samples fortified at 200 ng/L for each compound ranged from 71.4 to 109.9 %; relative standard deviation ranged from 4 to 9%. The method was applied to water samples from four streams in Romania, Danube River and its tributaries (Arges River, Jiu River, and Olt River). The surface water samples were found to be contaminated clothianidin (1.08-6.4 ng/L) and by thiamethoxam (1.1-3.8ng/L). The highest concentrations were recorded in Danube River in Oltenita point (6.4ng/L) and in Gura-Vail point (5.5ng/L). The concentration of acetamiprid and nitenpyram were situated below limit of quantification in all samples.
8,9	Neonicotinoids in raw, finished, and tap water from Wuhan, Central China: Assessment of human exposure potential	Y. W. Wan, Y., et. al. Sci Total Environ 675, 513-519 https://www.ncbi.nlm.nih.gov/pubmed/31030157	Neonicotinoid insecticides (NNIs) are emerging insecticides compared to organophosphates and pyrethroids. Their occurrence in the environment is not well documented in China. In this study, raw water samples (n=20), finished water samples (n=20), and tap water samples (n=165) originating from the Han River and the Yangtze River in Wuhan, Central China, were collected during 2018 for the determination of the NNI residues. NNIs were found in all raw water samples with a median sum concentration of 27.7ng/L (range: 13.4-186ng/L). Higher concentrations of NNIs were found in July than in May, and higher NNIs were found in the Han River than in the Yangtze River. Most NNIs were not effectively removed during water treatment, except for acetamiprid and thiacloprid which decreased by 40.1% and 20.0%, respectively. At least three NNIs were detected in all tap water samples with the highest sum concentration of NNIs observed in July (median: 96.2ng/L, range: 16.7-138ng/L) among the studied months (median: 15.4, range: 2.59-138ng/L). The estimated daily intake of NNIs via tap water ingestion in July was 8.66ng/kg body weight/day for infants, about 4 times higher than that for adults. The concentrations observed in tap water are elevated in China relative to previous studies that were conducted in the USA and in Canada. This is the first study reporting residue levels of NNIs in China.
5	Neonicotinoids transference from the field to the hive by honey bees: Towards a pesticide residues biomonitor	S. J. Niell, F., et. al. Sci Total Environ 581-582, 25-31 https://www.ncbi.nlm.nih.gov/pubmed/28073057	The beehive as a quantitative monitor of pesticide residues applied over a soybean crop was studied through a semi field experiment of controlled exposure of honey bees to pesticides in macro tunnels. The distribution within exposed beehives of pesticides commonly used in soybean plantation, was assessed. Residue levels of insecticides in soybean leaves, honey bees, wax, honey and pollen were analyzed. The transference from pesticides present in the environment into the beehive was evidenced. The obtained results allow relating pesticide concentrations present in the environment with traces found in foraging bees. Therefore, pesticide transference ratios could be calculated for each detected compound (acetamiprid, imidacloprid and thiamethoxam) which showed a linear inverse trend with their 1-octanol/water partition coefficient (Kow). The least transferred pesticide to the hive (acetamiprid) has the highest vapor pressure (Vp). This study gives new insights on the usefulness of monitoring the environment through beehives aiming to evaluate if agroecosystems remain sustainable. It also contributes to generate valuable information for model building aiming to predict environmental quality through beehive's analysis.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Neonicotinoids, fipronil, chlorpyrifos, carbendazim, chlorotriazines, chlorophenoxy herbicides, bentazon, and selected pesticide transformation products in surface water and drinking water from northern Vietnam	Y. T. Wan, T. M., et. al. Sci Total Environ 750, , 141507 https://www.ncbi.nlm.nih.gov/pubmed/32841807	Studies on the occurrence of emerging pesticides in surface and drinking water in Vietnam are limited. In this study, lake water (n = 7), river water (n = 1), tap water (n = 46), and bottled water (n = 3) collected from Hanoi and other four provinces in northern Vietnam were analyzed for selected pesticides (including insecticides such as neonicotinoids, fipronil, and chlorpyrifos; fungicide carbendazim; herbicides such as atrazine, terbuthylazine, simazine, 2,4-dichlorophenoxyacetic acid, 2-methyl-4-chlorophenoxyacetic acid, and bentazon) and some of their degradates by liquid chromatography-tandem mass spectrometry. Carbendazim (median: 86.7 ng/L) and triazines (49.3 ng/L) were the major pesticides found in lake water samples, followed by neonicotinoids and their degradation products (15.1 ng/L), chlorpyrifos and its degradate (13.4 ng/L), fipronil and its degradates (3.76 ng/L), chlorophenoxy acid herbicides (2.10 ng/L), and bentazon (0.62 ng/L). Triazines (164 ng/L) were the major pesticides in river water. Higher concentrations (median: 39.3 ng/L; range: 1.20-127) of selected pesticides were found in tap water from Hanoi than those from four other provinces studied (5.49 ng/L; 4.73-66.8 ng/L). Bottled water samples collected from Hanoi contained lower concentrations of pesticide residues (median: 3.54 ng/L, range: 2.18-8.09) than those of tap water samples. The calculated risks from pesticide exposure through ingestion of tap water by the general populations were low. However, fipronil concentrations in lake water exceeded the benchmark value recommended for freshwater in the United States or the Netherlands. Degradation of acetamiprid into desmethyl-acetamiprid was found in lake water.
Toxicology	Neurodevelopmental toxicity in the mouse neocortex following prenatal exposure to acetamiprid	N. N. Kagawa, T., et. al. J Appl Toxicol 38, 12, 1521-1528 https://www.ncbi.nlm.nih.gov/pubmed/30047162	Acetamiprid (ACE) belongs to a widely used class of pesticides known as neonicotinoids. ACE binds selectively to insect nicotinic acetylcholine receptors and was previously considered relatively safe in mammalian species; however, recent studies have demonstrated ACE-mediated toxicity related to vertebrate nicotinic acetylcholine receptor activation. The potential for neurotoxicity following exposure to ACE in utero is unknown. Therefore, we evaluated the effects of repeated prenatal ACE exposure (5 mg/kg, oral doses administered to pregnant dams) on neurogenesis, neuronal distribution and microglial activation in the dorsal telencephalon on embryonic day (E)14 and in the neocortex on postnatal day 14. Immunohistochemical and morphological analyses on E14 revealed hypoplasia of the cortical plate and decreased neurogenesis in mice exposed to ACE from E6 to E13, whereas newborn ACE-exposed mice showed an abnormal neuronal distribution in the neocortex. Additionally, ACE-exposed mice showed increased numbers of Iba1-immunoreactive and amoeboid-type microglia as well as an increased M1/M2 microglial ratio. These findings suggest that prenatal ACE exposure induces neurodevelopmental toxicity and increases microglial activation in the developing brain.
13	Neuroprotective effects of curcumin against acetamiprid-induced neurotoxicity and oxidative stress in the developing male rat cerebellum: biochemical, histological, and behavioral changes	I. B. A. Dhoub, A. , et. al. Environ Sci Pollut Res Int 24, 35, 27515-27524 https://www.ncbi.nlm.nih.gov/pubmed/28980111	Curcumin is a molecule found in turmeric root that has anti-inflammatory, antioxidant, and anti-tumor properties and has been widely used as both an herbal drug and a food additive to treat or prevent neurodegenerative diseases. This study aimed to investigate the effect of curcumin on neurobehavioral and neuropathological alterations induced by acetamiprid on male rats. Three groups of ten male Wistar rats each were used for the study: the first was a control group (CTR) that did not consume acetamiprid (ACE); the second was an experimental group (ACE) that consumed 40 mg/kg body weight/day of acetamiprid; and the third group (CUR) received curcumin (100 mg/kg) and acetamiprid (40 mg/kg) in combination. Neurobehavioral evaluations including inclined plane performance and forepaw grip time were studied. Treatment with CUR significantly prevented ACE-treated rats from impairments in the performance of neurobehavioral tests, indicating the presence of deficits on sensorimotor and neuromuscular responses. In addition, Curcumin administration protects rats against acetamiprid-induced cerebellum toxicity such as increase in AChE and BChE activities, decrease on cells viability, oxidative stress, and an increase of intracellular calcium. Taken together, these results demonstrate for the first time that ACE treatment substantially impairs the survival of primary neuronal cells through the induction of necrosis concomitantly with the generation of an oxidative stress. Additionally, curcumin reduced histopathological changes caused by ACE.
5	A novel approach based on capillary liquid chromatography for the simultaneous determination of neonicotinoid residues in cereal samples	Carbonell-Rozas, L., et al. (2021). "A novel approach based on capillary liquid chromatography for the simultaneous determination of neonicotinoid residues in cereal samples." Microchemical Journal 161: 105756.	A simple and effective method using solid-liquid extraction followed by capillary liquid chromatography with diode array detection (CLC-DAD) has been established for the extraction and determination of seven neonicotinoid insecticides commercially available (imidacloprid, thiacloprid, clothianidin, thiamethoxam, acetamiprid, nitenpyram and dinotefuran) in cereal samples. The separation was achieved in less than 19 min using a Zorbax XDB-C18 column (150 mm × 0.5 mm i.d, 5 µm) at a 25 ° C, with a mobile phase consisting of ultrapure water and acetonitrile at a flow rate of 10 µL/min. Detection wavelengths of 254 or 270 nm were used, depending on the analyte. Variables affecting the extraction efficiency were optimized, such as type and volume of extraction solvent, and extraction and centrifugation time. Under the optimal conditions, the proposed method was characterized according to SANTE/12682/2019 guideline, in terms of linearity (R2 ≥ 0.9901), repeatability (RSD ≤ 7.6%), reproducibility (RSD ≤ 10%) and trueness (recoveries ≥ 80%). The limits of detection and quantification were in the ranges of 3–5 and 9–18 µg/kg, respectively, being adequate for the determination of these compounds in cereal samples at levels below its maximum residue limits (MRLs) established by the European legislation. The advantages of a miniaturized technique such as CLC in terms of high mass sensitivity and reduced solvent consumption, combined with the simplicity of the solid-liquid extraction procedure, make this method a useful alternative for the monitoring of these residues at trace level in cereal samples.
5	Novel use of PVPP in a modified QuEChERS extraction method for UPLC-MS/MS analysis of neonicotinoid insecticides in tea matrices	Hou, R., et al. (2015). "Novel use of PVPP in a modified QuEChERS extraction method for UPLC-MS/MS analysis of neonicotinoid insecticides in tea matrices." Analytical Methods 7(13): 5521-5529.	A rapid UPLC-ESI (+)-MS/MS method was developed and validated for simultaneous determination of eight neonicotinoid insecticides (dinotefuran, nitenpyram, thiamethoxam, clothianidin, imidacloprid, acetamiprid, thiacloprid and imidaclothiz) in tea samples based on a refined QuEChERS extraction method. In order to eliminate the matrix effect and obtain satisfactory recoveries, an inexpensive and excellent absorbent material, polyvinylpyrrolidone (PVPP), was used to eliminate polyphenols from tea matrices. Further, combinations of PVPP and the commonly used sorbents PSA and GCB were investigated in this study. The optimized 'quick, easy, cheap, effective, rugged and safe' protocol is briefly described as follows. Tea samples were soaked in water and extracted with acetonitrile. Sample extracts were treated with 400 mg PVPP to remove polyphenols from tea matrices, and then cleaned up with a combination of PSA (25 mg), GCB (100 mg) and C18 (50 mg). Finally, the dried extract was dissolved in acetonitrile/water (15 : 85, v/v) and analyzed by UPLC-MS/MS. The recovery ratios from tea for eight neonicotinoid insecticides ranged from 60–109% at 0.01–0.5 mg kg ⁻¹ spiked levels. Relative standard deviations were <15.4% for all of the recovery tests. The limit of quantification was below 0.01 mg kg ⁻¹ . The developed method was simple, effective, and sensitive. This method should prove to be highly useful for monitoring neonicotinoid insecticides in commercial tea products.
9	An Observational Study of Honey Bee Colony Winter Losses and Their Association with Varroa destructor, Neonicotinoids and Other Risk Factors	van der Zee R, Gray A, Pisa L, de Rijk T. An Observational Study of Honey Bee Colony Winter Losses and Their Association with Varroa destructor, Neonicotinoids and Other Risk Factors. PLoS One. 2015 Jul 8;10(7):e0131611	This article presents results of an analysis of honey bee losses over the winter of 2011-2012 in the Netherlands, from a sample of 86 colonies, located at 43 apiaries. The apiaries were selected using spatially stratified random sampling. Colony winter loss data were collected and related to various measures of colony strength recorded in summer, as well as data from laboratory analysis of sample material taken from two selected colonies in each of the 43 apiaries. The logistic regression model which best explained the risk of winter loss included, in order of statistical importance, the variables (1) Varroa destructor mite infestation rate in October 2011, (2) presence of the cyano-substituted neonicotinoids acetamiprid or thiacloprid in the first 2 weeks of August 2011 in at least one of the honey bee matrices honey, bees or bee bread (pollen), (3) presence of Brassica napus (oilseed rape) or Sinapis arvensis (wild mustard) pollen in bee bread in early August 2011, and (4) a measure of the unexplained winter losses for the postal code area where the colonies were located, obtained from a different dataset. We consider in the discussion that reduced opportunities for foraging in July and August because of bad weather may have added substantially to the adverse effects of acetamiprid and thiacloprid. A novel feature of this work is its use of postal code random effects from two other independent datasets collected in the annual national monitoring by questionnaires of winter losses of honey bees in the Netherlands. These were used to plan the sample selection and also in the model fitting of the data in this study. It should however be noted that the results of the present pilot study are based on limited data, which may consequently reveal strong factors but fail to demonstrate possible interaction effects.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Occurrence and distribution of neonicotinoid insecticides in surface water and sediment of the Guangzhou section of the Pearl River, South China	X. Z. Yi, C., et. al. Environ Pollut 251, , 892-900 https://www.ncbi.nlm.nih.gov/pubmed/31234255	Little information is available about the occurrence of neonicotinoid insecticides in surface water and sediment of the metropolitan regions around the rivers in China. Here we investigate the residual level of neonicotinoids in the Guangzhou section of the Pearl River. At least one or two neonicotinoids was detected in each surface water and sediment, and the total amount of neonicotinoids (summation operator5neonics) in surface water ranged from 92.6 to 321ng/L with a geometric mean (GM) of 174ng/L. Imidacloprid, thiamethoxam and acetamiprid were three frequently detected neonicotinoids (100%) from surface water. As for the sediment, total concentration was varied between 0.40 and 2.59ng/g dw with a GM of 1.12ng/g dw, and acetamiprid and thiacloprid were the common sediment neonicotinoids. Western and Front river-route of the Guangzhou section of the Pearl River suffered a higher neonicotinoids contamination than the Rear river-route, resulting from more effluents of WWTPs receiving, and intensive commercial and human activities. Level of residual neonicotinoids in surface water was significantly correlated with the water quality ($p<0.01$), especially items of pH, DO and ORP, and nitrogen and phosphorus contaminants. Compared with reports about residual neonicotinoids in water and sediment previously, the metropolitan regions of the Guangzhou could be confronted with a moderate contamination and showed serious ecological threats (even heavier than the Pearl Rivers). Our results will provide valuable data for understanding of neonicotinoids contamination in the Pearl River Delta and be helpful for further assessing environmental risk of neonicotinoids.
9	Occurrence and distribution of neonicotinoids and characteristic metabolites in paired urine and indoor dust from young adults: Implications for human exposure	H. S. Zhang, K. , et. al. Environ Res 199, , 111175 https://www.ncbi.nlm.nih.gov/pubmed/33964309	Neonicotinoid insecticides (NEOs) are widely used for pest control worldwide. The profile of NEOs in paired urine and indoor dust has not yet been reported in China. In this study, 40 paired samples (i.e., 160 urine and 40 indoor dust) were collected from university students and dormitories from Guangzhou City of China to measure the concentrations of six NEOs and their three metabolites. Target analytes were frequently detected in paired urine (81%-98%) and indoor dust (75%-95%) samples, with median concentrations ranging from 0.02 [specific gravity (SG) adjusted: 0.02] to 2.08 (SG-adjusted: 2.38) ng/mL in urine and from 0.05 to 2.74 ng/g in indoor dust. 5-Hydroxy-imidacloprid was predominant in urine, while N-desmethyl acetamiprid was predominant in indoor dust samples, accounting for 56% and 37%, respectively. 1-Methyl-3-(tetrahydro-3-furylmethyl) urea, a dinotefuran degradate, was measured for the first time in indoor dust, with the median level of 1.02 ng/g. Significant gender-related differences ($p < 0.05$) in the urinary concentrations of most NEOs were found. We calculated the estimated daily intake (EDI) of target compounds from urine and indoor measurements. The EDIs of target analytes varied among all urine and indoor dust samples, with median values ranging from 0.51 (SG-adjusted: 0.56) to 51.6 (SG-adjusted: 52.8) ng/kg bw/day and from 0.04 to 2.10 pg/kg bw/day, respectively. Moreover, the median EDIsurine of most target analytes in females were significantly higher than ($p < 0.05$) those in males. The median EDIsdust of target compounds in dust from female dormitories were slightly higher than that in dust from male dormitories. These findings indicated that females were more exposed to NEO than males. Thus, the potential health risks of exposure to NEOs and their metabolites in female adults should be addressed in future studies. To our knowledge, this study is the first to report the profiles of NEOs and their metabolites in paired urine and indoor dust samples from young adults in China.
9	Occurrence and ecological risk of pharmaceuticals and personal care products (PPCPs) and pesticides in typical surface watersheds, China	M. H. Xu, H., et. al. Ecotoxicol Environ Saf 175, , 289-298 https://www.ncbi.nlm.nih.gov/pubmed/30898333	To evaluate the occurrence and ecological risk of organic contaminants in aquatic environment in China, a method for simultaneously detecting 130 pharmaceuticals and personal care products (PPCPs) and 35 pesticides has been established using solid phase extraction-ultra performance liquid chromatography-tandem mass spectrometry (SPE-UPLC-MS/MS) method. In the present survey, a total of 122 target compounds (103 PPCPs and 19 pesticides) were detected in seven major watersheds in China, with average concentrations ranged from 0.02ng/L (sulfamerazine) to 332.75ng/L (bisphenol A), revealing that PPCPs and pesticides were widely distributed in surface water of China. Antibiotics and organophosphorus were the most ubiquitously PPCPs and pesticides, respectively; quinolones were the predominant antibiotics, most of which were detected in more than 96% sampling sites, with average concentrations ranged from 2.14 to 309.67ng/L; six pesticides including isoprocab, fenobucarb, acetamiprid, imidacloprid, acetochlor and bentazone were detected in more than 80% sampling sites, with average concentrations ranged from 5.62 to 225.93ng/L; more than half of the non-antibiotic pharmaceuticals were hormones; and diethyltoluamide (DEET) was predominant personal care products; The risk assessment showed that each watershed was at potential medium ecological risk based on their mean concentration ($RQ_{Total} > 1$), and pesticides were the main compounds arising risks.
2	Occurrence and removal of organic micropollutants: An overview of the watch list of EU Decision 2015/495	M. O. M. Barbosa, N. F. F., et. al. Water Res 94, , 257-279 https://www.ncbi.nlm.nih.gov/pubmed/26967909	Although there are no legal discharge limits for micropollutants into the environment, some regulations have been published in the last few years. Recently, a watch list of substances for European Union-wide monitoring was reported in the Decision 2015/495/EU of 20 March 2015. Besides the substances previously recommended to be included by the Directive 39/2013/EU, namely two pharmaceuticals (diclofenac and the synthetic hormone 17- α -ethinylestradiol (EE2)) and a natural hormone (17- β -estradiol (E2)), the first watch list of 10 substances/groups of substances also refers three macrolide antibiotics (azithromycin, clarithromycin and erythromycin), other natural hormone (estrone (E1)), some pesticides (methiocarb, oxadiazon, imidacloprid, thiacloprid, thiamethoxam, clothianidin, acetamiprid and triallate), a UV filter (2-ethylhexyl-4-methoxycinnamate) and an antioxidant (2,6-di-tert-butyl-4-methylphenol) commonly used as food additive. Since little is known about the removal of most of the substances included in the Decision 2015/495/EU, particularly regarding realistic concentrations in aqueous environmental samples, this review aims to: (i) overview the European policy in the water field; (ii) briefly describe the most commonly used conventional and advanced treatment processes to remove micropollutants; (iii) summarize the relevant data published in the last decade, regarding occurrence and removal in aqueous matrices of the 10 substances/groups of substances that were recently included in the first watch list for European Union monitoring (Decision 2015/495/EU); and (iv) highlight the lack of reports concerning some substances of the watch list, the study of un-spiked aquatic matrices and the assessment of transformation by-products.
8,9	Occurrence and risk of neonicotinoid insecticides in surface water in a rapidly developing region: Application of polar organic chemical integrative samplers	J. W. Xiong, Z., et. al. Sci Total Environ 648, , 1305-1312 https://www.ncbi.nlm.nih.gov/pubmed/30340276	Extensive use of neonicotinoid insecticides (NNIs) worldwide calls for further knowledge on their environmental occurrence and risk. The present study highlighted the need for more research on long-term exposure of NNIs in aquatic environment, which is important but remains elusive. Time weighted average concentrations of five commonly used NNIs in urban waterways of Guangzhou, China were measured using newly developed polar organic chemical integrative samplers (POCIS). Acetamiprid (from 18.8+/-1.9 to 157+/-31ng/L; mean+/-standard deviation), clothianidin (from 14.8+/-3.7 to 47.6+/-10.0ng/L) and imidacloprid (from 32.9+/-11.6 to 249+/-19ng/L) were detectable in all samples. Thiamethoxam was found at 71.4% of the 21 sampling sites (from not detected to 52.4+/-9.4ng/L), while thiacloprid was not detected at any site. Vegetable planting and sewage effluent were the main sources of NNIs in surface water in Guangzhou. Probabilistic environmental exposure distributions were subsequently constructed using the measured concentrations and the exceedances of predicted environmental concentrations of NNI to ecological thresholds were assessed. In Guangzhou, 63.5%, 16.2%, 87.8% and 17.2% of acetamiprid, clothianidin, imidacloprid and thiamethoxam, respectively, exceeded an interim chronic threshold of 35ng/L for NNIs. Further risk assessment and control measures for the use of NNIs are advocated for protecting the integrity of aquatic ecosystems.
5	Occurrence of Acetamiprid Residues in Water Reservoirs in the Cotton Basin of Northern Benin	B. A. Zoumenou, M. P., et. al. Bull Environ Contam Toxicol 102, 1, 44389 https://www.ncbi.nlm.nih.gov/pubmed/30374586	An ultra performance liquid chromatography (UPLC) coupled to UV detection method was developed to determine acetamiprid residues in water reservoirs of northern Benin, close to cotton fields. The quantification limit of this method was 0.2 microg L(-1) acetamiprid in water, its precision ranged between 8% and 22%, and its trueness between 99% and 117% (for concentrations ranging from 0.2 to 5.0 microg L(-1)). Acetamiprid residues were determined in water samples collected in four reservoirs from northern Benin during the phytosanitary treatment period of cotton. The minimum and maximum concentrations of acetamiprid residues in water were 0.2 and 7.7 microg L(-1), respectively. These levels do not represent any risk for human consumption of this water, but indicate a regular use of acetamiprid, possibly together with other pesticides which could be more harmful for both humans and aquatic species.

Phase 1 Conformity category	Title	Citation	Abstract
9	Occurrence of neonicotinoid insecticides and their metabolites in tooth samples collected from south China: Associations with periodontitis	Zhang N, Wang B, Zhang Z, Chen X, Huang Y, Liu Q, Zhang H. Occurrence of neonicotinoid insecticides and their metabolites in tooth samples collected from south China: Associations with periodontitis. Chemosphere. 2021 Feb;264(Pt 1):128498.	Neonicotinoid insecticides (NEOs) are widely used in agricultural production processes in China and worldwide. NEOs have been an increasing concern because of their potential toxicity to nontarget organisms. However, studies that focused on human exposure to NEOs in China are limited. In this study, levels of six parent NEOs (p-NEOs), namely imidacloprid (IMI), acetamiprid (ACE), clothianidin (CLO), dinotefuran (DIN), thiamethoxam (THIX), and thiacloprid (THI), and three metabolites (m-NEOs), such as 5-hydroxy-imidacloprid (5-OH-IMI), 1-methyl-3-(tetrahydro-3-furyl methyl) urea (UF), and N-desmethyl-acetamiprid (N-dm-ACE) were measured in 127 tooth samples collected from South China. P-NEOs and m-NEOs are frequently detected (76%-93%) in tooth samples, with median levels of 0.03-1.20 ng/g. UF is the most abundant NEOs in tooth samples (36%). Females have higher NEO levels than males, and gender-related differences in NEO levels are found. Associations among most p-NEOs are also found ($p < 0.05$), indicating the source of human exposure to p-NEOs is related. However, no significant relationships ($p > 0.05$) between levels of m-NEOs and their corresponding p-NEOs are found, suggesting that exogenous m-NEOs contribute to exposure. We have also examined the associations between human NEOs exposure and periodontitis, and associations between NEO exposure and periodontitis are observed (OR = 2.63-7.33; 95% CI = 1.01-21.1, p -trend < 0.05). Our results suggest that NEO levels are associated with increased odds of prevalent periodontitis. This study is the first to report about p-NEOs and m-NEOs in tooth samples collected from South China.
8,9	Occurrence of Neonicotinoid Residues in Danube River and Tributaries	Vasile-Ion Iancu, Jane Petre, et. al. Occurrence of Neonicotinoid Residues in Danube River and Tributaries. Revista de Chimie (Rev. Chim.), Year 2019, Volume 70, Issue 1, 313-318.	Occurrence and fate of 6 neonicotinoid insecticides belonging to different chemical classes were investigated in the aqueous phase of surface water at 16 sampling locations along the Romanian side of the Danube River and its three main tributaries (Jiu, Olt, Arges). This is the first report on the neonicotinoid occurrence in the Danube River and three tributaries. It was observed a contamination of Danube River and its tributaries, higher in planting period than pre-or post- planting period, with the next compounds (detection frequency and the concentration range): thiamethoxam (68.7%, 0.9-3.8ng/L), clothianidin (64.6%, 0.84-9.6ng/L), nitenpyram (52.08%, 0.39-11.1ng/L), imidacloprid (31.2%, 0.5-8.2ng/L), acetamiprid (16.6%, 0.84-12.7ng/L). The four main neonicotinoids (clothianidin, thiamethoxam, imidacloprid, nitenpyram) follow the classic pattern in which concentrations and frequency increase during the planting period and that is correlated with seed crop treatment. Total neonicotinoid levels present in investigated Rivers, reaching up to 31.6 ng/L, may affect aquatic invertebrates that are most susceptible to these insecticides. For clothianidin and nitenpyram were obtained positive correlations between the percentage of the area planted with cereals and concentrations of this compound ($r = 0.574$, $r = 0.665$) which indicate their use in agricultural area. For imidacloprid were obtained positive correlations between percent of permanent cultivated crop in urban land and concentrations of this compound ($r = 0.264$, $r = 0.877$).
8,9	Occurrence of neonicotinoids and sulfoxaflor in major aquifer groups in Iowa	D. A. H. Thompson, C. E., et. al. Chemosphere 281, , 130856 https://www.ncbi.nlm.nih.gov/pubmed/34029958	A statewide assessment of neonicotinoids in groundwater was conducted among a sample of public water supply wells in Iowa from October 2017 to August 2018. Samples from all the state's major aquifer groups were initially collected from 118 wells in 69 counties. Subsets of 55 untreated samples and 45 paired pre- and post-treatment samples were then collected in summer 2018, post-planting season for primarily corn and soybeans, to assess seasonal differences and the efficacy of treatment. Samples prepared using solid phase extraction were analyzed using LC/MS/MS for six neonicotinoids: acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, thiamethoxam, and a sulfoximine (i.e., sulfoxaflor). Clothianidin was the most frequently detected (34%, max: 13.4 ng/L), followed by thiamethoxam (14.4%, max: 20.6 ng/L), imidacloprid (13%, max: 2.3 ng/L), and dinotefuran (0.1%, max: 1.4 ng/L). Alluvial aquifers (unadjusted odds ratio (UOR) = 14.1; 95% CI (5.4-36.9), $p < 0.0001$), wells with confining layers < 15 m (UOR = 13.5, 95% CI (4.8-38.4), $p < 0.0001$), and less than 19.4 m in depth (UOR = 20.0; 95% CI (6.5-58.0), $p < 0.0001$) had the greatest risk for contamination. In vulnerable aquifers, neonicotinoids were detected in 62% of winter and 46% of summer samples, with winter samples over 3 times (UOR = 3.2; 95% CI (1.2-8.8), $p = 0.02$) more likely to have at least two neonicotinoids detected. In 55 public water supply systems, the median concentrations of clothianidin ($p = 0.6$), imidacloprid ($p = 0.7$), and thiamethoxam ($p = 0.7$) were unchanged following treatment. These results suggest that neonicotinoid contamination may be present year-round in treated drinking water from vulnerable groundwater sources and represent a source of human exposure.
8,9	Occurrence of pesticides in Dutch drinking water sources	R. M. A. K. Sjerps, P. J. F., et. al. Chemosphere 235, , 510-518 https://www.ncbi.nlm.nih.gov/pubmed/31280041	We determined pesticide occurrence in groundwater and surface water sources used for drinking water production in The Netherlands, using both routine monitoring data from Dutch drinking water companies and by studying the presence of newly authorized pesticides in drinking water sources. An analytical LC-MS/MS method was developed for 24 recently authorized pesticides, selected based on their mobility and persistence, and applied in a Dutch/Belgian ground- and surface water monitoring campaign. 15 of these pesticides were detected, including seven in concentrations above the water quality standard from the Water Framework Directive. Two neonicotinoids were detected in highest concentrations: acetamiprid (1.1μg/L) and thiamethoxam (0.4μg/L). The routine monitoring data was collected over 2010-2014 in The Netherlands, covering 408 pesticides and 52 metabolites. 63 pesticides and 6 metabolites were prioritized according to their presence in groundwater, surface water and drinking water. The vast majority of the pesticides in routine monitoring has not been detected or only in low concentrations. Overall, the study shows that pesticides are of major concern in drinking water sources across the Netherlands. In two third of the abstraction areas pesticides and/or metabolites have been detected. In one third of the abstraction areas pesticide and/or metabolites concentration exceeded water quality standards according to the Water Framework Directive. The results emphasize that monitoring should focus on priority pesticides, since the vast majority of the pesticides has a low priority. The occurrence of recently authorized pesticides in drinking water sources demonstrates the importance to keep routine monitoring methods up to date.
9	Occurrence of pesticides in fruits and vegetables from organic and conventional agriculture by QuEChERS extraction liquid chromatography tandem mass spectrometry	Montiel-León, J. M., et al. (2019). "Occurrence of pesticides in fruits and vegetables from organic and conventional agriculture by QuEChERS extraction liquid chromatography tandem mass spectrometry." Food Control 104: 74-82.	Human exposure to pesticides commands the implementation of food safety control, but few studies have provided a comparative assessment of conventional and organic products. This study set out to examine 22 pesticides in four distinct commodities (lettuce, apples, grapes, and tomatoes) from conventional and organic agriculture available to consumers. A multiresidue procedure based on QuEChERS extraction and ultra-high-performance liquid chromatography tandem mass spectrometry (UHPLC-MS/MS) was first validated for its robustness. Suitable determination coefficients ($R^2 > 0.99$) and recoveries generally between 70 and 110% were obtained. Intraday and interday variations were $< 20\%$ and low matrix effects were noted with sample-to-sample variation. Method limits of detection (LOD) in the overall range of $0.05\text{--}2\text{ }\mu\text{g kg}^{-1}$ were obtained. The validated method was applied to 133 fruit and vegetable samples purchased in Canada, including conventional and organic culture samples. Overall, 47% of the 133 samples had levels above the LOD for at least one pesticide. Neonicotinoid insecticides were detected in all four product types. Imidacloprid ($0.08\text{--}29\text{ }\mu\text{g kg}^{-1}$), acetamiprid ($0.11\text{--}108\text{ }\mu\text{g kg}^{-1}$), and clothianidin ($0.13\text{--}141\text{ }\mu\text{g kg}^{-1}$) were the most recurrent. Atrazine was reported in approximately a third of the lettuce samples ($0.25\text{--}7.5\text{ }\mu\text{g kg}^{-1}$). For varieties with samples available from both organic and conventional agriculture, the proportion of insecticide levels $> \text{LOD}$ was significantly higher ($p < 0.05$) for samples from conventional agriculture (9.7%) than from organic agriculture (2.0%). Measured levels were compliant to Canadian Maximum Residue Limits (MRLs), but a thorough human health risk assessment has yet to be conducted for many of these pesticides.

Phase 1 Conformity category	Title	Citation	Abstract
9	Occurrence of pesticides residues in French beans, tomatoes, and kale in Kenya, and their human health risk indicators	Marete GM, Shikuku VO, Lalah JO, Mputhia J, Wekesa VW. Occurrence of pesticides residues in French beans, tomatoes, and kale in Kenya, and their human health risk indicators. Environ Monit Assess. 2020 Oct 10;192(11):692.	Residue levels of seven commonly used pesticides were determined in random samples of tomatoes, French beans, and kale collected from horticultural farms in Buuri, Imenti North, and Imenti South sub-counties in Meru, Kenya, just before delivery to the consumers. QuEChERS method for extraction followed by LC-MS/MS was used to determine the concentrations. The concentrations ($\mu\text{g kg}^{-1}$ wet weight) in French beans, kale, and tomatoes ranged from below detection limit (BDL): BDL-48.65 (carbendazim), BDL-290.76 (imidacloprid), BDL-2.81 (acetamiprid), BDL-25.76 (azoxystrobin), BDL-105.18 (metalaxyl), BDL-0.15 (diazinon), and BDL-0.17 (chlorpyrifos). The maximum residue levels determined in the horticultural produce from the three regions were $290 \mu\text{g kg}^{-1}$ for imidacloprid in tomatoes from Buuri and $25.76 \mu\text{g kg}^{-1}$ for azoxystrobin in French beans from Imenti South. The pesticide residue levels generally were extremely low and met the MRLs set by EU and other countries, except for carbendazim and metalaxyl in French beans, and posed no concern to human health. The estimated daily intakes (EDI) (mg kg^{-1} BW/day) for the population of Meru County were very low ranging from 1.685×10^{-8} (acetamiprid) to 2.381×10^{-5} (imidacloprid) in tomatoes, 2.849×10^{-9} (metalaxyl) to 3.633×10^{-7} (azoxystrobin) in French beans, and 1.392×10^{-8} (diazinon) in kale, respectively. The health risk indices were subsequently extremely low for the detectable pesticide residues, ranging from 6.74×10^{-7} (acetamiprid) to 3.97×10^{-4} (imidacloprid) in tomatoes, 3.56×10^{-8} (metalaxyl) to 5.52×10^{-5} (chlorpyrifos) in French beans, and 6.96×10^{-5} (diazinon) in kale, respectively, indicating no health risk in the population, but their presence in these vegetables cannot be ignored as long-term exposure can still cause health risks.
8,9	Occurrence, source and ecotoxicological risk assessment of pesticides in surface water of Wujin District (northwest of Taihu Lake), China	Y. W. Zhou, J., et. al. Environ Pollut 265, Pt A, 114953 https://www.ncbi.nlm.nih.gov/pubmed/32806427	This study investigated the occurrence and distribution of pesticides in surface water (lakes, major rivers and tributaries) and potential discharge sources (fish ponds, livestock and poultry farms, and sewage treatment plants) in Wujin District (northwest of Taihu Lake), Jiangsu province, China. An analytical liquid chromatography-tandem mass spectrometry method was developed for 38 pesticides, which was applied in the monitoring of 240 surface water samples and 76 potential discharge source samples. Eleven insecticides and five fungicides with temporal and spatial variation were detected in surface water. The total pesticide concentrations in surface water in different seasons were as follows: March > August > June > November. The two most polluting and widespread pesticides were carbendazim (maximum concentration 508 ng L^{-1}), detection rate 100%) and imidacloprid (maximum concentration 438 ng L^{-1} , detection rate 88%). Gehu Lake (S46) and Sanshangang River (S12) were seriously polluted water bodies. Seven insecticides and four fungicides were detected in the potential discharge sources; and their composition changed significantly with the seasons. The concentrations of detected organophosphorus pesticides and neonicotinoids (e.g. acetamiprid in March and dichlorvos in November) in a few non-agricultural planting sources were far greater than those detected in surface water, and hence a few fish ponds, livestock and poultry farms, and sewage treatment plants might be the potential discharge sources of pesticides in the surrounding surface water. The estimated input flux of the studied pesticides from upstream rivers to Taihu Lake was 141.95 kg a^{-1}). Furthermore, more attention should be paid to the medium or high aquatic ecotoxicological risk presented by the levels of organophosphorus pesticides, carbamates, and benzimidazoles.
9	Occurrence, spatiotemporal distribution, and risk assessment of current-use pesticides in surface water: A case study near Taihu Lake, China	T. Z. Wang, M., et. al. Sci Total Environ 782, , 146826 https://www.ncbi.nlm.nih.gov/pubmed/33839661	This study involved the monitoring and risk assessment of current-use pesticides in surface water from the northwestern section of the Taihu Lake Basin (China) in 2019. In particular, 114 current-use pesticides were measured in samples collected during four campaigns spread across the wet, dry, and normal seasons. Pesticide concentrations were measured by means of a novel analytical method involving online solid-phase extraction coupled to LC-MS/MS. In total, 1 plant growth regulator, 34 herbicides, 23 insecticides, and 25 fungicides were detected. Detection frequencies greater than 90% were recorded for 26 pesticides; furthermore, acetamiprid, azoxystrobin, bentazone, carbendazim, isoprothiolane, metolachlor, paclobutrazol, and triadimenol were present in every sample. The measured pesticide concentrations varied widely, from below the detection limit to $10,600 \text{ ng/L}$ (tricyclazole). The highest median concentrations for the fungicide, herbicide, and insecticide families were observed for carbendazim (135 ng/L), metolachlor (40 ng/L), and imidacloprid (31 ng/L), respectively. Twenty-two pesticides were quantitatively reported in Chinese surface water for the first time. The number and concentration of detected pesticides were significantly higher in June and September (wet season) compared to March and December (dry season). Agricultural areas of the study area were more contaminated than the residential and industrial sections. Imidacloprid was the only pesticide that exhibited high risk to sensitive ecological species ($\text{RQ}_{\text{median}} > 1$) in all four seasons. Isoproturon, isoprothiolane, and pretilachlor were identified as high risk in March ($\text{RQ}_{\text{median}} = 4.5$), September (1.3), and June (1.1), respectively; moreover, another eight pesticides posed a high ecological risk at specific sites. Seven pesticides recorded moderate risks (i.e., $\text{RQ}_{\text{median}} = 0.1\text{--}1.0$). Of the 18 pesticides with cases of high risk, a novel risk index, which accounted for frequency of PNEC exceedance, ranged from 6.7 (imidacloprid) to 7.1×10^{-5} (propiconazole). The integrated consideration of ecological risk and frequency of risk inform priorities for regional pesticide management and control.
1	Occurrences of the Typical Agricultural Non-ionic Surfactants Tristyrylphenol Ethoxylates in Cherries (<i>Cerasus pseudocerasus</i>), Peaches (<i>Amygdalus persica</i>), and Kiwifruit (<i>Actinidia chinensis</i>) and the Implications of Human Exposure in China	J. L. Zhou, C., et. al. J Agric Food Chem 67, 10, 2999-3005 https://www.ncbi.nlm.nih.gov/pubmed/30789723	Tristyrylphenol ethoxylates (TSP nEOs) are widely used as non-ionic surfactants in pesticide formulations in China. However, limited information is available regarding the occurrences of TSP nEOs in fruits. In this study, 361 fruit samples were collected from the main growing areas in China from 2016 to 2017 and analyzed for TSP nEO contamination using gel permeation chromatography-high-performance liquid chromatography-tandem mass spectrometry. TSP nEOs were detected in all samples, with a total concentration range of $0.5\text{--}14786.0 \text{ mug/kg}$ (median of 85.0 mug/kg). The total concentrations were significantly but weakly correlated with the residues of acetamiprid ($r = 0.119$; $p < 0.05$) and carbendazim ($r = -0.170$; $p < 0.01$), suggesting that the TSP nEO residues are probably associated with the use of these pesticides during fruit growth. A risk assessment showed that there were little or no risks to human health. However, the risks to health associated with exposure to TSP nEOs should not be ignored because of their ubiquitousness in fruit samples.
5	Optimization of photochemical decomposition acetamiprid pesticide from aqueous solutions and effluent toxicity assessment by <i>Pseudomonas aeruginosa</i> BCRC using response surface methodology	Toolabi A, Malakootian M, Ghaneian MT, Esrafilii A, Ehrampoush MH, Tabatabaei M, AskarShahi M. Optimization of photochemical decomposition acetamiprid pesticide from aqueous solutions and effluent toxicity assessment by <i>Pseudomonas aeruginosa</i> BCRC using response surface methodology. AMB Express. 2017 Dec;7(1):159.	Contamination of water resources by acetamiprid pesticide is considered one of the main environmental problems. The aim of this study was the optimization of acetamiprid removal from aqueous solutions by $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{SiO}_2$ nanocomposite using the response surface methodology (RSM) with toxicity assessment by <i>Pseudomonas aeruginosa</i> BCRC. To obtain the optimum condition for acetamiprid degradation using RSM and central composite design (CCD). The magnetic $\text{TiO}_2/\text{Fe}_3\text{O}_4/\text{SiO}_2$ nanocomposite was synthesized using co-precipitation and sol-gel methods. The surface morphology of the nanocomposite and magnetic properties of the as-synthesized Fe_3O_4 nanoparticles were characterised by scanning electron microscope and vibrating sample magnetometer, respectively. In this study, toxicity assessment tests have been carried out by determining the activity of dehydrogenase enzyme reducing Resazurin (RR) and colony forming unit (CFU) methods. According to CCD, quadratic optimal model with $R^2 = 0.99$ was used. By analysis of variance, the most effective values of each factor were determined in each experiment. According to the results, the most optimal conditions for removal efficiency of acetamiprid ($\text{pH} = 7.5$, contact time = 65 min, and dose of nanoparticle 550 mg/L) was obtained at 76.55%. Effect concentration (EC_{50}) for RR and CFU test were 1.950 and 2.050 mg/L , respectively. Based on the results obtained from the model, predicted response values showed high congruence with actual response values. And, the model was suitable for the experiment's design conditions.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Oral acute toxicity and impact of neonicotinoids on <i>Apis mellifera</i> L. and <i>Scaptotrigona postica</i> Latreille (Hymenoptera: Apidae)	C. R. O. M. Jacob, J. B. , et. al. Ecotoxicology 28, 7, 744-753 https://www.ncbi.nlm.nih.gov/pubmed/31254187	Wild and managed bees are essential for crop pollination and food production. However, the widespread use of insecticides such as neonicotinoids may affect the survival, development, behavior, and maintenance of bee colonies. Therefore, in this study we evaluated the impacts of three neonicotinoid insecticides on the survival and walking abilities of the Africanized honeybee <i>A. mellifera</i> and stingless bee <i>S. postica</i> . <i>A. mellifera</i> was more susceptible than <i>S. postica</i> to all neonicotinoids tested. The median lethal concentrations LC50 values estimated for acetamiprid, imidacloprid, and thiacloprid were 189.62, 22.78, and 142.31 ng microL(-1) of diet for <i>A. mellifera</i> , and 475.94, 89.11, and 218.21 ng microL(-1) of diet for <i>S. postica</i> , respectively. All tested neonicotinoids affected the speed, distance traveled, duration and frequency of resting, and continuous mobility of both bee species. The results showed that in spite of the different susceptibility to compounds with cyano and nitro radicals, the behavioral variables showed different levels of commitment according to the molecule insecticide and bee species. These results contribute not only to the understanding of the effects of neonicotinoid insecticides on <i>A. mellifera</i> and <i>S. postica</i> , but also to help in the development of protocols that aim to reduce the impact of these insecticides in Neotropical environments.
5	Organic solvent-free immunoassay for quantitative detection of neonicotinoid acetamiprid residues in agricultural products	Watanabe, E., et al. (2018). "Organic solvent-free immunoassay for quantitative detection of neonicotinoid acetamiprid residues in agricultural products." Analytical Methods 10(26): 3162-3169.	A completely organic-solvent free analytical method for a neonicotinoid insecticide acetamiprid with water-based extraction and highly sensitive direct competitive enzyme-linked immunosorbent assay (ELISA) has been proposed. The analytical sensitivity (I50 value) and the limit of detection of the proposed ELISA were, respectively, 0.16 ng mL – 1 and 0.015 ng mL – 1. The ELISA showed no cross-reactivity to other structurally related neonicotinoid analogues excluding thiacloprid (43.8%). After crop samples were extracted with water, the aqueous sample extracts were adequately diluted with water before determination. No marked matrix interference was observed except for Chinese chive. However, problematic interference was found in the sample dissolved by homogenization with aqueous phosphoric acid. The average recoveries of acetamiprid were 89–118% with relative standard deviation of less than 10%. Acetamiprid-incurred fruiting vegetable samples were analyzed using the proposed method and a Japanese official method based on chromatographic techniques. Results obtained using the respective methods were statistically comparable.
5	An orthogonal experimental design and QuEChERS based UFLC-MS/MS for multi-pesticides and human exposure risk assessment in Honeysuckle	Fang, L., et al. (2021). "An orthogonal experimental design and QuEChERS based UFLC-MS/MS for multi-pesticides and human exposure risk assessment in Honeysuckle." Industrial Crops and Products 164: 113384.	Honeysuckle with outstanding medicinal and edible functions has attracted increasing world-wide attention. However, the inevitable use and residue of pesticides has caused serious threaten to its quality and safety, as well as human health. In this study, a modified QuEChERS based UFLC-MS/MS approach was developed for simultaneous determination of 23 pesticides in 64 real honeysuckle samples collected from different places of China. An orthogonal experimental design was introduced for optimized the crucial parameters for highly-efficient extraction of diverse pesticides in acetonitrile containing 1 % (v/v) acetic acid, with MgSO4, PSA and GCB as the adsorbents. 18 pesticides (incidence rate of 78.26 %) were detected in these honeysuckle samples with highest incidence rate (100 %) for carbendazim, thiophanate-methyl, metalaxyl, and chlorpyrifos. The incidence rate of officially-banned pesticides was 93.75 % with contents from 0.0097 to 0.22836 mg/kg. Imidacloprid, carbendazim, thiophanate-methyl and acetamiprid presented high residue levels more than the maximum linear concentration point of 0.8 mg/kg (200 ng/mL). Considering the possible health risks related to pesticide residues, risk assessment of human exposure to pesticides via intake of honeysuckle was evaluated, indicating negligible short- and long-term risks to human health. This study provides a robust platform for multi-pesticides monitoring in honeysuckle to promote the proper use of pesticides and protect the consumers from potential health risks associated with pesticide residues in honeysuckle.
5	Part-per-trillion LC-MS/MS determination of neonicotinoids in small volumes of songbird plasma	C. E. Hao, M. L., et. al. Sci Total Environ 644, , 1080-1087 https://www.ncbi.nlm.nih.gov/pubmed/30743821	Neonicotinoids are the most widely used class of insecticides in the world, and there are increasing concerns about their effects on non-target organisms. Analytical methods to diagnose exposure to neonicotinoids in wildlife are still very limited, particularly for small animals such as songbirds. Blood can be used as a non-lethal sampling matrix, but the sample volume is limited by body size. Neonicotinoids have a low bioaccumulation potential and are rapidly metabolized, therefore, sensitive assays are critically needed to reliably detect their residues in blood samples. We developed an efficient LC-MS/MS method at a part-per-trillion (pg/ml) level to measure eight neonicotinoid related insecticides (acetamiprid, clothianidin, dinotefuran, flonicamid, imidacloprid, nitenpyram, thiacloprid and thiamethoxam) plus one metabolite (6-chloronicotinic acid) in small volumes (50µL) of avian plasma. The average recovery of target compounds ranged from 95.7 to 101.3%, and relative standard deviations were between 0.82 and 2.13%. We applied the method to screen blood samples from 36 seed-eating songbirds (white-crowned sparrows; <i>Zonotrichia leucophrys</i>) at capture, and detected imidacloprid in 78% (28 of 36), thiamethoxam in 22% (8 of 36), thiacloprid in 11% (4 of 36), and acetamiprid in 11% (4 of 36) of wild-caught sparrows. 6h after capture, birds were orally dosed with 0 (control), 1.2 or 3.9mg of imidacloprid/kg bw, test results using this method indicated that plasma imidacloprid was significantly elevated (low 26-times, high 316-times) in exposed groups. This is the first study to confirm neonicotinoid exposure in small free-living songbirds through non-lethal blood sampling, and to demonstrate that environmentally realistic doses significantly elevate circulating imidacloprid concentrations. This sensitive method could be applied to characterize exposure to neonicotinoids in free-living wildlife and in toxicological studies.
8,9	Partial Agonist Activity of Neonicotinoids on Rat Nicotinic Receptors: Consequences over Epinephrine Secretion and In Vivo Blood Pressure	J. T. Park, A., et. al. Int J Mol Sci 22, 10, https://www.ncbi.nlm.nih.gov/pubmed/34065933	Neonicotinoid insecticides are nicotine-derived molecules which exert acute neurotoxic effects over the insect central nervous system by activating nicotinic acetylcholine receptors (nAChRs). However, these receptors are also present in the mammalian central and peripheral nervous system, where the effects of neonicotinoids are faintly known. In mammals, cholinergic synapses are crucial for the control of vascular tone, blood pressure and skeletal muscle contraction. We therefore hypothesized that neonicotinoids could affect cholinergic networks in mammals and sought to highlight functional consequences of acute intoxication in rats with sub-lethal concentrations of the highly used acetamiprid (ACE) and clothianidin (CLO). In this view, we characterized their electrophysiological effects on rat alpha3beta4 nAChRs, knowing that it is predominantly expressed in ganglia of the vegetative nervous system and the adrenal medulla, which initiates catecholamine secretion. Both molecules exhibited a weak agonist effect on alpha3beta4 receptors. Accordingly, their influence on epinephrine secretion from rat adrenal glands was also weak at 100 µM, but it was stronger at 500 µM. Challenging ACE or CLO together with nicotine (NIC) ended up with paradoxical effects on secretion. In addition, we measured the rat arterial blood pressure (ABP) in vivo by arterial catheterization. As expected, NIC induced a significant increase in ABP. ACE and CLO did not affect the ABP in the same conditions. However, simultaneous exposure of rats to both NIC and ACE/CLO promoted an increase of ABP and induced a biphasic response. Modeling the interaction of ACE or CLO on alpha3beta4 nAChR is consistent with a binding site located in the agonist pocket of the receptor. We present a transversal experimental approach of mammal intoxication with neonicotinoids at different scales, including in vitro, ex vivo, in vivo and in silico. It paves the way of the acute and chronic toxicity for this class of insecticides on mammalian organisms.

Phase 1 Conformity category	Title	Citation	Abstract
5	Performance of different advanced oxidation processes for tertiary wastewater treatment to remove the pesticide acetamiprid	Carra, I., Sánchez Pérez, J.A., Malato, S., Autin, O., Jefferson, B. and Jarvis, P. (2016), Performance of different advanced oxidation processes for tertiary wastewater treatment to remove the pesticide acetamiprid. J. Chem. Technol. Biotechnol., 91: 72-81	BACKGROUND This work studied the performance of different advanced oxidation processes (AOPs) as tertiary treatment for removal of the pesticide acetamiprid from water. Specifically, UV, UV/TiO₂, UV/H₂O₂/Fe, and two systems with persulfate (PS), UV/PS and UV/PS/Fe, were evaluated. RESULTS The study was carried out in deionised water, synthetic water from a secondary effluent and real effluent from a conventional activated sludge effluent (CAS effluent). In addition, the effect of humic acids, lignin-derivative and lauryl sulphate was investigated as organic matter that affects AOP efficiency. CONCLUSIONS Photo-Fenton at natural pH proved to be the most efficient process in all matrices. The persulfate systems have also shown that they have great potential for micropollutant removal. It was found that humic acids reduced degradation efficiency for UV/H₂O₂/Fe and UV/PS/Fe due to competition with radicals. Humic acids had a negative impact on UV photolysis at high concentration due to the absorptivity of UV light. Lignin had a negative effect on AOPs that used iron, forming Fe(II)-complexes with high absorptivity which act as a light filter. For lauryl sulphate, its chemical structure did not favour the formation of iron complexes at natural pH, resulting in similar degradation rates for UV/H₂O₂/Fe, UV/H₂O₂, UV/PS and UV/PS/Fe.
9	Pesticide residues in honey bees, pollen and beeswax: Assessing beehive exposure	P. C. Calatayud-Vernich, F., et. al. Environ Pollut 241, , 106-114 https://www.ncbi.nlm.nih.gov/pubmed/29803024	In order to study the distribution of pesticide residues in beekeeping matrices, samples of live in-hive worker honey bees (<i>Apis mellifera</i>), fresh stored pollen and beeswax were collected during 2016-2017 from 45 apiaries located in different landscape contexts in Spain. A total of 133 samples were screened for 63 pesticides or their degradation products to estimate the pesticide exposure to honey bee health through the calculation of the hazard quotient (HQ). The influence of the surrounding environment on the content of pesticides in pollen was assessed by comparing the concentrations of pesticide residues found in apiaries from intensive farming landscapes to those found in apiaries located in mountainous, grassland and urban contexts. Beeswax revealed high levels of miticides used in beekeeping such as coumaphos, chlorfenvinphos, fluvalinate and acrinathrin, which were detected in more than 75% of samples. Pollen was predominantly contaminated by miticides but also by insecticides used in agriculture such as chlorpyrifos and acetamiprid, which showed concentrations significantly higher in apiaries located in intensive farming contexts. Pesticides residues were less frequent and at lower concentrations in live honey bees. Beeswax showed the highest average hazard scores (HQ>5000) to honey bees. Pollen samples contained the largest number of pesticide residues and relevant hazard (HQ>50) to bees. Acrinathrin was the most important contributor to the hazard quotient scores in wax and pollen samples. The contributions of the pesticides dimethoate and chlorpyrifos to HQ were considered relevant in samples.
8,9	Pesticide risk assessment at the molecular level using honey bee cytochrome P450 enzymes: A complementary approach	Haas J, Nauen R. Pesticide risk assessment at the molecular level using honey bee cytochrome P450 enzymes: A complementary approach. Environ Int. 2021 Feb;147:106372.	Honey bee (<i>Apis mellifera</i>) first-tier pesticide risk assessment is largely based on standardized laboratory toxicity bioassays after both acute and chronic exposure. Recent research on honey bee cytochrome P450 monooxygenases (P450s) uncovered CYP9Q3 as the molecular determinant mediating neonicotinoid insecticide selectivity and explaining why certain neonicotinoids such as thiacloprid show > 1000-fold lower acute toxicity than others (e.g. imidacloprid). Here this knowledge is leveraged for mechanistic risk assessment at the molecular level using a fluorescence-based high-throughput in vitro assay, predicting the interaction of diverse pesticidal chemotypes, including azole fungicides, with recombinantly expressed honey bee CYP9Q enzymes, known to metabolize thiacloprid, acetamiprid and tau-fluvalinate. Some azole fungicides were shown to be synergistic in combination with certain insecticides, including neonicotinoids and pyrethroids, whereas others such as prothioconazole were not. We demonstrate that biochemical CYP9Q2/CYP9Q3 inhibition data of azoles revealed a striking correlation with their synergistic potential at the organismal level, and even allow to explain combined toxicity effects observed for tank mixtures under field conditions. Our novel toxicogenomics-based approach is designed to complement existing methods for pesticide risk assessment with unprecedented screening capacity, by utilizing honey bee P450 enzymes known to confer pesticide selectivity, in order to biochemically address issues of ecotoxicological concern.
2	Pesticides from the EU First and Second Watch Lists in the Water Environment	Pietrzak, D., Kania, J., Malina, G., Kmiecik, E. and Wątor, K. (2019), Pesticides from the EU First and Second Watch Lists in the Water Environment. Clean – Soil, Air, Water, 47: 1800376	The contamination of water with pesticides used in agriculture and urban areas is a priority issue that is currently of global concern. In 2015, the European Union (EU) published the first Watch List (1st WL), which showed the necessity for Union-wide monitoring of ten organic substances/groups of substances in the field of water policy. The list includes, among other items, eight pesticides: five neonicotinoids (acetamiprid, clothianidin, imidacloprid, thiacloprid, and thiamethoxam), and methiocarb, oxadiazon, and tri-allate. In 2018 the EU published the second Watch List, which repealed the 1st WL. In this list, among other changes, one pesticide (metaflumizone) was added, and two (oxadiazon and tri-allate) were removed. This review summarizes the current state of knowledge on the reported occurrence and concentrations of these pesticides in surface and groundwaters and in effluents from wastewater treatment plants derived from 73 studies in 21 countries worldwide. Imidacloprid, acetamiprid and thiamethoxam were the most frequently found pesticides due to their widespread use, while metaflumizone, methiocarb, oxadiazon, and tri-allate are less studied pesticides whose occurrence in water is also poorly reported. More investigation is needed to assess the occurrence and impact of these pesticides on the aquatic environment worldwide in the context of water supply and human security.
9	Pesticides from wastewater treatment plant effluents affect invertebrate communities	R. H. Munze, C., et. al. Sci Total Environ 599-600, , 387-399 https://www.ncbi.nlm.nih.gov/pubmed/28478367	We quantified pesticide contamination and its ecological impact up- and downstream of seven wastewater treatment plants (WWTPs) in rural and suburban areas of central Germany. During two sampling campaigns, time-weighted average pesticide concentrations (cTWA) were obtained using Chemcatcher(R) passive samplers; pesticide peak concentrations were quantified with event-driven samplers. At downstream sites, receiving waters were additionally grab sampled for five selected pharmaceuticals. Ecological effects on macroinvertebrate structure and ecosystem function were assessed using the biological indicator system SPEARpesticides (SPECies At Risk) and leaf litter breakdown rates, respectively. WWTP effluents substantially increased insecticide and fungicide concentrations in receiving waters; in many cases, treated wastewater was the exclusive source for the neonicotinoid insecticides acetamiprid and imidacloprid in the investigated streams. During the ten weeks of the investigation, five out of the seven WWTPs increased in-stream pesticide toxicity by a factor of three. As a consequence, at downstream sites, SPEAR values and leaf litter degradation rates were reduced by 40% and 53%, respectively. The reduced leaf litter breakdown was related to changes in the macroinvertebrate communities described by SPEARpesticides and not to altered microbial activity. Neonicotinoids showed the highest ecological relevance for the composition of invertebrate communities, occasionally exceeding the Regulatory Acceptable Concentrations (RACs). In general, considerable ecological effects of insecticides were observed above and below regulatory thresholds. Fungicides, herbicides and pharmaceuticals contributed only marginally to acute toxicity. We conclude that pesticide retention of WWTPs needs to be improved.

Phase 1 Conformity category	Title	Citation	Abstract
9	Pesticides in surface waters of tropical river basins draining areas with rice-vegetable rotations in Hainan, China: Occurrence, relation to environmental factors, and risk assessment	H. Z. Tan, H. , et. al. Environ Pollut 283, , 117100 https://www.ncbi.nlm.nih.gov/pubmed/33865099	Pesticides are heavily applied in rice-vegetable rotations in tropical China, yet publicly available information on the contamination and risk of currently used pesticides (CUPs) and legacy pesticides (LPs) in surface waters of river basins draining these areas is very limited. Therefore, in two tropical river basins (Nandu River and Wanquan River basins) dominated by rice-vegetable rotations in Hainan, China, pesticides were analyzed in 256 surface water samples in wet and dry seasons. Forty-one pesticides were detected, and total concentrations ranged from not detectable to 24.2 mug/L. Carbendazim and imidacloprid were the two most prevalent CUPs, detected in 59.8% and 17.7%, respectively, of surface water samples at concentrations above 0.1 mug/L. Chlorpyrifos was the main LP, detected in 9.0% of samples at a concentration above 0.05 mug/L. The fungicides difenoconazole and emamectin benzoate, the herbicide butachlor, and the insecticide acetamiprid occurred in >/=12.5% samples at concentrations above 0.1 mug/L. Surface waters typically (85.2%) contained 5 to 15 residues, with an average of nine. Seasonally, the concentrations of the 41 pesticides were in the order January > July > November > September. Spatially, the composition of the main CUPs (not LPs) was significantly different depending on position in the drainage, which also changed with seasons. Crop and pest types and wet and dry seasons were the key factors controlling the spatiotemporal distribution of CUPs and LPs in surface waters. On the basis of evaluations of the exposures to individual pesticides and the dominant combinations with >/=8 pesticides, multiple pesticides were likely a significant risk to aquatic organisms, although noncarcinogenic and carcinogenic risks to humans were low. This study provides valuable data to better understand pesticide occurrence and ecological risks in river basins draining areas with rice-vegetable rotation systems in tropical China.
9	Pesticides residues and metabolites in honeybees: A Greek overview exploring Varroa and Nosema potential synergies	K. M. Z. Kasiotis, E., et. al. Sci Total Environ 769, , 145213 https://www.ncbi.nlm.nih.gov/pubmed/33736246	The aim of this study was to investigate reported cases of honeybee mortality incidents and the potential association to pesticide exposure and to their metabolites. The same honeybee samples were also assessed for Varroa mites, and Nosema microsporidia provoked infections to provide an integrated picture of all observable stressors that may impact bees' survival. Thus, honeybee samples from different areas of Greece (2014-2018) were analyzed for the presence of pesticide residues and metabolites. In this context, an existing LC-ESI-QqQ-MS multiresidue method of analytes of different chemical classes such as neonicotinoids, organophosphates, triazoles, carbamates, was enriched with additional active substances, developed and validated. A complementary GC-El-QqQ-MS method was also exploited for the same scope covering pyrethroid compounds. Both methods monitored more than 150 active substances and metabolites and presented acceptable linearity over the ranges assayed. The calculated recoveries ranged from 65 to 120% for the three concentration levels, while the precision (RSD%) values ranged between 4 and 15%. Therefore, this approach proved sufficient to act as a monitoring tool for the determination of pesticide residues in cases of suspected honeybee poisoning incidents. From the analysis of 320 samples, the presence of 70 active substances and metabolites was confirmed with concentrations varying from 1.4 ng/g to 166 mug/g. Predominant detections were the acaricide coumaphos, several neonicotinoids exemplified by clothianidin, organophosphorous compounds dimethoate and chlorpyrifos, and some pyrethroids. Metabolites of imidacloprid, chlorpyrifos, coumaphos, acetamiprid, fenthion and amitraz were also identified. Concerning Nosema and Varroa they were identified in 27 and 22% of samples examined, respectively, verifying their prevalence and coexistence with pesticides and their metabolites in honeybees.
10	Pesticides: Behavior in Agricultural Soil and Plants	L. F. Bondareva, N. Molecules 26, 17, https://www.ncbi.nlm.nih.gov/pubmed/34500803	This review considers potential approaches to solve an important problem concerning the impact of applied pesticides of various classes on living organisms, mainly agricultural crops used as food. We used the method of multi-residual determination of several pesticides in agricultural food products with its practical application for estimating pesticides in real products and in model experiments. The distribution of the pesticide between the components of the soil-plant system was studied with a pesticide of the sulfonylureas class, i.e., rimsulfuron. Autoradiography showed that rimsulfuron inhibits the development of plants considered as weeds. Cereals are less susceptible to the effects of pesticides such as acetamiprid, flumetsulam and florasulam, while the development of legume shoots was inhibited with subsequent plant death.
8,9	Pharmacokinetics of Three Neonicotinoid Insecticides upon Contact Exposure in the Western Honey Bee, Apis mellifera	Zaworra, M., et al. (2019). "Pharmacokinetics of Three Neonicotinoid Insecticides upon Contact Exposure in the Western Honey Bee, Apis mellifera." Chemical Research in Toxicology 32(1): 35-37.	Neonicotinoid insecticides differ in their acute contact toxicity to honey bees. We investigated the uptake, metabolic fate, and excretion of imidacloprid and two much less toxic chemotypes, thiacloprid and acetamiprid, upon contact exposure in honey bees because ADME data for this mode of entry are lacking. Pharmacokinetic parameters were analyzed by tracking a 14C-label and by HPLC coupled to ESI-MS. Imidacloprid penetrates the honey bee cuticle much faster and more readily compared to thiacloprid and acetamiprid, thus revealing a pharmacokinetic component, i.e., faster penetration and higher steady-state internal body concentrations, contributing to its higher acute contact toxicity.
13	Phenomenological study and application of the combined influence of iron concentration and irradiance on the photo-Fenton process to remove micropollutants	I. G. S. Carra, J. L. , et. al. Sci Total Environ 478, , 123-32 https://www.ncbi.nlm.nih.gov/pubmed/24530592	The presence of low concentrations of persistent pollutants in waters (mug/L or ng/L), also called micropollutants, brings as a consequence the need to apply advanced oxidation treatments for their removal. The successful application of solar-driven photo-Fenton to treat highly polluted wastewaters (g/L and mg/L of pollutants) has prompted its application to lowly polluted effluents. However, a decrease in contaminant concentration may involve an alteration in the intrinsic process phenomenon, which until now has only been widely studied at the milligram-per-litre level or higher with this process. The aim of this research was to study the combined influence of the operating variable (iron concentration) and the environmental variable (irradiance) and application on the photo-Fenton process at pH2.8 when removing micropollutants. For this purpose, experimentation was carried out at laboratory and pilot plant scales with a biocide mixture of acetamiprid (ACTM), thiabendazole (TBZ) and imazalil (IMZ) (100 mug/L each) as the model pollutant. Results indicated that above 15 WUV/m(2) and a light path length of 5 cm (the most commonly used path for this type of application) iron concentration limited the process and there was irradiance excess under these conditions. On the other hand, and given the circumstances of irradiance excess, a higher light path length (10 cm) was assessed. Results showed that path lengths wider than 5 cm are recommended since more wastewater volume could be treated with a higher process rate per surface unit.
13	Photo-degradation dynamics of five neonicotinoids: Bamboo vinegar as a synergistic agent for improved functional duration	Liang R, Tang F, Wang J, Yue Y (2019) Photo-degradation dynamics of five neonicotinoids: Bamboo vinegar as a synergistic agent for improved functional duration. PLoS ONE 14(10): e0223708.	The effects of photo-degradation on the utilization of pesticides in agricultural production has been investigated. Various influencing factors were compared, with results showing that the initial pesticide concentration, light source, water quality and pH possessed different effects on neonicotinoids photo-degradation. The initial concentration and pH were found to be most critical effects. The photo-degradation rate decreased by a factor of 2-4 when the initial concentration increased from 5 mg L-1 to 20 mg L-1, particularly for acetamiprid and imidacloprid. The photo-degradation pathways and products of the five neonicotinoids were also investigated, with similar pathways found for each pesticide, except for acetamiprid. Degradation pathways mainly involved photo-oxidation processes, with products identified using liquid chromatography-quadrupole time-of-flight mass spectrometry (LC-Q-TOF-MS) found to be consistent with literature reported results. Bamboo vinegar exerted a photo-quenching effect on the neonicotinoids, with an improved efficiency at higher vinegar concentrations. The photo-quenching rates of thiamethoxam and dinotefuran were 381.58% and 310.62%, respectively, when a 30-fold dilution of vinegar was employed. The photo-degradation products in bamboo vinegar were identical to those observed in methanol, with acetic acid being the main factor influencing the observed quenching effects.

Phase 1 Conformity category	Title	Citation	Abstract
13	Photocatalytic degradation of neonicotinoid insecticides using sulfate-doped Ag ₃ PO ₄ with enhanced visible light activity	Lee, Y.-J., et al. (2020). "Photocatalytic degradation of neonicotinoid insecticides using sulfate-doped Ag ₃ PO ₄ with enhanced visible light activity." Chemical Engineering Journal 402: 126183.	Visible light-activated photocatalysts offer a promising approach to remove recalcitrant organic contaminants from water without adding chemicals, using free solar energy. In this study, sulfate-doped silver phosphate (SO ₄ -Ag ₃ PO ₄) was prepared using a simple precipitation method, and its visible light photocatalytic activity against seven neonicotinoid insecticides currently available on the market was evaluated. The characteristics of the photocatalysts were analyzed using diffuse reflectance-UV/visible spectrophotometer measurements and electrochemical impedance spectroscopy analysis. Photocatalytic degradation of all tested insecticides under visible light irradiation was significantly enhanced by SO ₄ doping, which decreased band gap energy and charge transfer resistance. The apparent first-order rate constant (k _{app}) with SO ₄ -Ag ₃ PO ₄ varied depending on the insecticides (0.003–0.432/min), and was at least 5.4-fold faster than that with pristine Ag ₃ PO ₄ , in the order of thiacloprid (TCP) > nitenpyram (NTP) > imidacloprid (ICP) > clothianidin (CTD) > acetamiprid (ATP) > thiamethoxam (TMX) > dinotefuran (DTF). Even after four reuse cycles, SO ₄ -Ag ₃ PO ₄ maintained over 75% of its initial photocatalytic efficiency. Reactive species trapping experiments indicated that photoinduced electron holes (h ⁺) were the most important oxidant for ICP degradation.
13	Photodegradation of Neonicotinoid Active Ingredients and Their Commercial Formulations in Water by Different Advanced Oxidation Processes	Banić, N.D., Šojić, D.V., Krstić, J.B. et al. Photodegradation of Neonicotinoid Active Ingredients and Their Commercial Formulations in Water by Different Advanced Oxidation Processes. Water Air Soil Pollut 225, 1954 (2014).	This contribution is concerned with the comparison of the efficiency of the removal of four pure neonicotinoid active ingredients (AIs) and their commercial formulations (CFs) from aqueous solutions by using different advanced oxidation processes at the pH 2.8. The AIs of thiamethoxam and imidacloprid, and their CFs (Actara and Confidor), having a nitroguanidine functional group, exhibited low persistence to photolysis. In contrast to them, thiacloprid and acetamiprid and their CFs (Calypso and Mospilan), containing a cyanoimine functional group, were stable during the UV irradiation period. As expected, the degradation rate of the studied neonicotinoids increased significantly in the combined action of UV radiation and H ₂ O ₂ . In the case of thiacloprid and acetamiprid and their CFs, the reaction of the OH radicals formed and molecules of these insecticides was the major destruction pathway. The increased photodegradation efficiency of the UV/7.2Fe/TiO ₂ /H ₂ O ₂ and vis/7.2Fe/TiO ₂ /H ₂ O ₂ processes was attributed to the surface photoreduction of Fe ³⁺ to Fe ²⁺ , which produces new OH radicals in the reaction with H ₂ O ₂ . In the presence of visible light, the efficiency may be partly due to the formation of the H ₂ O ₂ -TiO ₂ complexes. For the 7.2Fe/TiO ₂ /H ₂ O ₂ process in the presence of UV or visible radiation, no significant influence on the efficiency of photodegradation was observed in dependence of the structural differences of selected neonicotinoids. These results strongly suggest that highly reactive hydroxyl radicals, generated on the catalyst's surface in the reaction involving H ₂ O ₂ , are responsible for this oxidation. In order to investigate degree of mineralization for all insecticides, TOC measurements were also conducted. Also, it was observed that the removal of pure AIs and their CFs by dark adsorption was almost negligible.
13	Photodegradation of neonicotinoid insecticides in water by semiconductor oxides	J. G. Fenoll, I. , et. al. Environ Sci Pollut Res Int 22, 19, 15055-66 https://www.ncbi.nlm.nih.gov/pubmed/26002372	The photocatalytic degradation of three neonicotinoid insecticides (NIs), thiamethoxam (TH), imidacloprid (IM) and acetamiprid (AC), in pure water has been studied using zinc oxide (ZnO) and titanium dioxide (TiO ₂) as photocatalysts under natural sunlight and artificial light irradiation. Photocatalytic experiments showed that the addition of these chalcogenide oxides in tandem with the electron acceptor (Na ₂ S ₂ O ₈) strongly enhances the degradation rate of these compounds in comparison with those carried out with ZnO and TiO ₂ alone and photolytic tests. Comparison of catalysts showed that ZnO is the most efficient for the removal of such insecticides in optimal conditions and at constant volumetric rate of photon absorption. Thus, the complete disappearance of all the studied compounds was achieved after 10 and 30 min of artificial light irradiation, in the ZnO/Na ₂ S ₂ O ₈ and TiO ₂ /Na ₂ S ₂ O ₈ systems, respectively. The highest degradation rate was noticed for IM, while the lowest rate constant was obtained for AC under artificial light irradiation. In addition, solar irradiation was more efficient compared to artificial light for the removal of these insecticides from water. The main photocatalytic intermediates detected during the degradation of NIs were identified.
13	Phytoextraction of Pb, Cr, Ni, and Zn using the aquatic plant <i>Limnium laevigatum</i> and its potential use in the treatment of wastewater	Arán DS, Harguineguy CA, Fernandez-Cirelli A, Pignata ML. Phytoextraction of Pb, Cr, Ni, and Zn using the aquatic plant <i>Limnium laevigatum</i> and its potential use in the treatment of wastewater. Environ Sci Pollut Res Int. 2017 Aug;24(22):18295-18308.	In order to study the bioaccumulation of Pb, Cr, Ni, and Zn and the stress response, the floating aquatic plant <i>Limnium laevigatum</i> was exposed to increasing concentrations of a mixture of these metals for 28 days, and its potential use in the treatment of wastewater was evaluated. The metal concentrations of the treatment 1 (T1) were Pb 1 µg L ⁻¹ , Cr 4 µg L ⁻¹ , Ni 25 µg L ⁻¹ , and Zn 30 µg L ⁻¹ ; of treatment 2 (T2) were Pb 70 µg L ⁻¹ , Cr 70 µg L ⁻¹ , Ni 70 µg L ⁻¹ , and Zn 70 µg L ⁻¹ ; and of treatment 3 (T3) were Pb 1000 µg L ⁻¹ , Cr 1000 µg L ⁻¹ , Ni 500 µg L ⁻¹ , and Zn 100 µg L ⁻¹ , and there was also a control group (without added metal). The accumulation of Pb, Cr, Ni, and Zn in roots was higher than in leaves of <i>L. laevigatum</i> , and the bioconcentration factor revealed that the concentrations of Ni and Zn in the leaf and root exceeded by over a thousand times the concentrations of those in the culture medium (2000 in leaf and 6800 in root for Ni; 3300 in leaf and 11,500 in root for Zn). Thus, this species can be considered as a hyperaccumulator of these metals. In general, the changes observed in the morphological and physiological parameters and the formation of products of lipid peroxidation of membranes during the exposure to moderate concentrations (T2) of the mixture of metals did not cause harmful effects to the survival of the species within the first 14 days of exposure. Taking into account the accumulation capacity and tolerance to heavy metals, <i>L. laevigatum</i> is suitable for phytoremediation in aquatic environments contaminated with moderated concentrations of Cr, Ni, Pb, and Zn in the early stages of exposure.
9	A pilot nationwide baseline survey on the concentrations of Neonicotinoid insecticides in tap water from China: Implication for human exposure	Y. Z. He, B. , et. al. Environ Pollut 291, , 118117 https://www.ncbi.nlm.nih.gov/pubmed/34534832	Neonicotinoids (NEOs) have become the most widely used insecticides in the world. However, information on the NEO concentrations in tap water based on nationwide surveys is limited in China. In this study, the levels of six NEOs were measured in tap water samples collected from 38 cities in China. Across all sampling locations, the overall frequency of detection for at least one NEO was 100%, indicating that NEOs are ubiquitous in tap water from China. Imidacloprid was the most abundant NEO (median: 7.59 ng/L), followed by (in decreasing order) clothianidin (5.46 ng/L), dinotefuran (4.55 ng/L), thiamethoxam (4.50 ng/L), acetamiprid (2.72 ng/L), and thiacloprid (0.38 ng/L). Significantly positive correlations ($r = 0.655-0.902$, $p < 0.001$) among all pairs of NEOs were observed, which showed that the sources of NEOs in tap water were common or related. Across all sampling locations, regional differences in concentrations (SigmaNEOs; sum of six NEOs varied from 0.79 ng/L to 415 ng/L) were observed within China, showing an increasing trend from northern to southern China. Although the estimated daily intake of NEOs were much lower than the reference dose, the potential health risk of NEOs via tap water consumption should raise more public concern considering the high detection rates of NEOs in tap water.
9	Plant protection practices and pesticide exposure levels of Northern Benin cotton producers	Gouda, A. I., Imorou Toko, I., Salami, S. D., Richert, M., Scippo, M. L., Kestemont, P., & Schiffers, B. (2018). Pratiques phytosanitaires et niveau d'exposition aux pesticides des producteurs de coton du nord du Bénin. Cahiers Agricultures, 27(6), [65002].	In Benin, terrestrial ecosystems are polluted by a widespread presence of pesticide residues released by an intensive use of plant protection products in agriculture, mainly those sprayed on cotton crops. In order to assess the exposure of producers to pesticides and predict the potential impact on human health, field observation of local practices coupled with semi-structured surveys were conducted among 150 cotton growers in Gogounou, Kandi and Banikoara in Northern Benin, the main cotton production area of the country. Seventy-five percent of producers never received an education nor instructions of use, while only 5% have been trained in the safe use of pesticides on cotton crops. Among pesticides used by farmers, only 19% belong to the approved list of plant protection products in Benin. The most frequently used active substances are insecticides such as acetamiprid, lambda-cyhalothrin, chlorpyrifos-ethyl, emamectin benzoate, profenofos or cypermethrin. All are known to be more or less toxic and may have detrimental effects on health after exposure. Seventy-five percent of producers use higher amounts of insecticides than recommended on the labels and 80% do not wear personal protective equipment during mixing, loading and spraying. Empty pesticide containers are often left in cotton fields (73% of observations) or sometimes used for domestic purposes (25% of observations). Field observations were translated into reliable scenarios to estimate the exposure levels of producers, using the UK-POEM predictive model. Total exposures without personal protective equipment vary from 0.099 to 0.546 mg/kg body weight/day. Exposure values far exceed the Acceptable Operator Exposure Levels, indicating a potential risk.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Pollinator exposure to systemic insecticides and fungicides applied in the previous fall and pre-bloom period in apple orchards	S. J. Heller, N. K. , et. al. Environ Pollut 265, Pt A, 114589 https://www.ncbi.nlm.nih.gov/pubmed/32531650	Pollinators provide a crucial ecosystem service by pollinating commercially cultivated crops, but they are frequently exposed to various agricultural chemicals used for pest management. In this study, we assessed the potential exposure of pollinators to various systemic insecticides and a fungicide used in apple orchards. Residue levels were determined for the whole flower as well as pollen and nectar separately for pre-bloom applications of acetamiprid, imidacloprid, sulfoxaflor, thiacloprid, thiamethoxam, and myclobutanil. Very low pesticide residue levels (2-70 parts per billion, ppb) were found in the whole flower, pollen and nectar samples compared with pesticide concentrations of 60-200 parts per million (ppm) in applied foliarly only 5 days earlier. Insecticide residues from nectar and pollen samples were below the USA EPA classification of No Observable Effect Limit (NOEL) for acute toxicity to honey bees, suggesting that a single foraging visit to flowers may not cause toxicity to bees. However, cumulative acute exposure from multiple flower visits could potentially be harmful to bees, and needs to be studied further. We also examined apple flowers for residues of several systemic insecticides that were applied for brown marmorated stink bug control late in the fall of the previous season. None of the fall sprays that contained premixed insecticide active ingredients (viz., thiamethoxam + lambda-cyhalothrin, and imidacloprid + beta-cyfluthrin), including multiple applications of individual active ingredients (viz., dinotefuran, clothianidin, and sulfoxaflor), persisted until the following spring. Based on these findings, fall applications of insecticides used for controlling invasive pests such as the brown marmorated stink bug (<i>Halyomorpha halys</i>) and the spotted lanternfly (<i>Lycorma delicatula</i>) could be considered safe to pollinator species foraging in apple orchards during the spring bloom the following season.
1	Polyoxometalate-Based Nickel Clusters as Visible Light-Driven Water Oxidation Catalysts	Han, X.-B., et al. (2015). "Polyoxometalate-Based Nickel Clusters as Visible Light-Driven Water Oxidation Catalysts." Journal of the American Chemical Society 137(16): 5486-5493.	Three new polyoxometalate(POM)-based polynuclear nickel clusters, Na ₂₄ [Ni ₁₂ (OH) ₉ (CO ₃) ₃ (PO ₄)(SiW ₉ O ₃₄) ₃]-56H ₂ O (1), Na ₂₅ [Ni ₁₃ (H ₂ O) ₃ (OH) ₉ (PO ₄) ₄ (SiW ₉ O ₃₄) ₃]-50H ₂ O (2), and Na ₅₀ [Ni ₂₅ (H ₂ O) ₂₀ H ₁₈ (CO ₃) ₂ (PO ₄) ₆ (SiW ₉ O ₃₄) ₆]-85H ₂ O (3) were synthesized and structurally characterized. Compounds 1–3 contain {Ni ₁₂ }, {Ni ₁₃ } and {Ni ₂₅ } core, respectively, connected by the inorganic {OH}, {PO ₄ } and/or {CO ₃ } linkers and encapsulated by the lacunary A-α-{SiW ₉ O ₃₄ } POM units. Compound 3 represents the currently largest POM-based Ni clusters. All three compounds contain {Ni ₃ O ₃ } quasi-cubane or {Ni ₄ O ₄ } cubane units, which are similar to the natural oxygen-evolving center [Mn ₄ O ₅ Ca] in photosystem II (PSII). Visible light-driven water oxidation experiments with compounds 1–3 as the homogeneous catalysts indicate that all three compounds show good photocatalytic activities. The O ₂ evolution amount corresponds to a high TON of 128.2 for 1, 147.6 for 2, and 204.5 for 3, respectively. Multiple experiments including dynamic light-scattering, UV–vis absorption, catalysts aged experiments, tetra-n-heptylammonium nitrate (THPAN ₃) toluene extraction, and capillary electrophoretic measurements results confirm that compounds 1–3 are dominant active catalysts but not Ni ²⁺ ions(aq) or nickel oxide under the photocatalytic conditions. The above research results indicate a new and all-inorganic polynuclear Ni-based structural model as the visible light-driven water oxidation catalysts.
Toxicology	Postnatal development of rat pups after maternal low-dose exposure to the neonicotinoid insecticide acetamiprid during gestation	Price CJ, Marr MC, Myers CB, Jahnke GD. Postnatal development of rat pups after maternal exposure to diethanolamine. Birth Defects Res B Dev Reprod Toxicol. 2005 Jun;74(3):243-54.	Background: Diethanolamine (DEA), a widely used surfactant, was administered to pregnant mice at the oral LD10 resulting in failure of pups to grow and thrive through postnatal day (PND) 3 [National Toxicology Program, 1987; York et al., Teratology 37:503-504, 1988]. The toxicity profile for DEA differs among rodent species. This study investigated DEA-induced postnatal toxicity in a second species. Methods: Timed-mated Sprague-Dawley rats were dosed (0, 50, 125, 200, 250, or 300 mg DEA/kg/day, p.o.) on gestational days (GD) 6-19. Dams and pups were monitored for body weight, feed/water intake, clinical signs, litter size, and sex ratio. At necropsy (PND 21), maternal liver and kidney weights and number of uterine implantation sites were recorded. Results: The high-dose group was terminated early due to excessive toxicity. The estimated maternal LD10 was 218 mg/kg/day. Maternal effects included decreased body weight and relative feed intake (>or=200 mg/kg/day), transiently reduced relative water intake (125 and 250 mg/kg/day), and increased absolute kidney weight (>or=125 mg/kg/day). Postimplantation loss (PND 0) and pup mortality (PND 0-4) were increased (>or=200 and >or=125 mg/kg/day, respectively). Pup body weight was reduced (>or=200 mg/kg/day) as late as PND 21. Conclusions: This study demonstrates reduced postnatal growth and survival in a second species after gestational exposure to DEA, persistence of toxic effects through the end of lactation, possibly due to long elimination half-life, and maternal and developmental toxicity no-observed-adverse-effect level (NOAELs) (50 mg/kg/day) and lowest-observed-adverse-effect level (LOAELs) (125 mg/kg/day) for oral DEA exposure during embryo/fetal development in the rat.
8,9	Potential Environmental Health Risk Analysis of Neonicotinoids and a Synergist	L. X. Xu, X., et. al. Environ Sci Technol 55, 11, 7541-7550 https://www.ncbi.nlm.nih.gov/pubmed/33983014	The extensive use of neonicotinoid pesticides has led to their widespread presence in the environment, resulting in considerable safety risks to the ecosystem and human health. In this study, we investigated the biotransformation behavior of a cocktail of multiple neonicotinoids and piperonyl butoxide (PBO) synergist in vivo and their potential environmental health risk. It was found that neonicotinoids with a cyano group, such as acetamiprid and thiacloprid, tended to accumulate in liver and spleen tissues, while others with nitro groups (imidacloprid, thiamethoxam, clothianidin, dinotefuran, and nitenpyram) were mostly excreted in urine. In the presence of the synergist PBO, the metabolism of neonicotinoids in vivo changed, mainly through the nitro reduction pathway, while a low abundance of related metabolites was observed in the conventional hydroxylation and demethylation metabolic pathways, due to inhibition of CYP450 enzymes by the synergist. Furthermore, DNA methylation damage in vivo was exacerbated by the induction of hydroxylamine metabolites formed in the intermediate process of neonicotinoid metabolism with the synergistic effect of PBO, which resulted in a higher level of the O(6)-methyldeoxyguanosine (O(6)-medG) biomarker in the liver. Therefore, during the comprehensive evaluation of pesticide environmental risks, attention should be paid not only to the co-exposure mode under real environmental conditions but also to the potential risks of intermediate metabolism and related intermediate metabolites. This study provides a referential strategy and theoretical support for the health risk assessment of co-exposure of chemicals.
8,9,12	Potential Genotoxicity of Acetamiprid and Propineb Singly or in Combination in Cultured Human Peripheral Blood Lymphocytes by Using Mn Assay	Muranli, Fulya Dilek Gokalp, et al. "Potential genotoxicity of acetamiprid and propineb singly or in combination in cultured human peripheral blood lymphocytes by using MN assay." Fresenius Environmental Bulletin 24.11 (2015): 3947-3955.	Acetamiprid, a neonicotinoid insecticide, and Propineb, a dithiocarbamate fungicide, are used in agriculture singly or in combination with other pesticides. The aim of the study is to investigate the single and combined genotoxic effect two pesticides on cultured human lymphocytes by using the Micronucleus (MN) assay. The lymphocytes were treated with three different concentrations of pesticides singly and in combination (a mix), Acetamiprid (0.625, 1.25, 2.5 µg mL ⁻¹), Propineb (12.5, 25, 50 µg mL ⁻¹) and Acetamiprid+Propineb (0.625+12.5, 1.25+25, 2.5+50 µg mL ⁻¹), for 24 and 48 hours. MN frequency significantly increased at a 48-hour exposure period when the lymphocytes were exposed to the combined pesticides. The data demonstrated that these pesticides may have a synergistic effect and may have potential genotoxic activity in cultured human lymphocytes. Also, it was shown that when they are combined and exposed to lymphocytes these pesticides have a cyto-toxic effect.

Phase 1 Conformity category	Title	Citation	Abstract
5	Preconcentration of Trace Neonicotinoid Insecticide Residues Using Vortex-Assisted Dispersive Micro Solid-Phase Extraction with Montmorillonite as an Efficient Sorbent	Moyakao K, Santaladchaiyakit Y, Srijaranai S, Vichapong J. Preconcentration of Trace Neonicotinoid Insecticide Residues Using Vortex-Assisted Dispersive Micro Solid-Phase Extraction with Montmorillonite as an Efficient Sorbent. Molecules. 2018 Apr 11;23(4):883	In this work, we investigated montmorillonite for adsorption of neonicotinoid insecticides in vortex-assisted dispersive micro-solid phase extraction (VA-d- μ -SPE). High-performance liquid chromatography with photodiode array detection was used for quantification and determination of neonicotinoid insecticide residues, including thiamethoxam, clothianidin, imidacloprid, acetamiprid, and thiacloprid. In this method, the solid sorbent was dispersed into the aqueous sample solution and vortex agitation was performed to accelerate the extraction process. Finally, the solution was filtered from the solid sorbent with a membrane filter. The parameters affecting the extraction efficiency of the proposed method were optimized, such as amount of sorbent, sample volume, salt addition, type and volume of extraction solvent, and vortex time. The adsorbing results show that montmorillonite could be reused at least 4 times and be used as an effective adsorbent for rapid extraction/preconcentration of neonicotinoid insecticide residues. Under optimum conditions, linear dynamic ranges were achieved between 0.5 and 1000 ng mL ⁻¹ with a correlation of determination (R ²) greater than 0.99. Limit of detection (LOD) ranged from 0.005 to 0.065 ng mL ⁻¹ , while limit of quantification (LOQ) ranged from 0.008 to 0.263 ng mL ⁻¹ . The enrichment factor (EF) ranged from 8 to 176-fold. The results demonstrated that the proposed method not only provided a more simple and sensitive method, but also can be used as a powerful alternative method for the simultaneous determination of insecticide residues in natural surface water and fruit juice samples.
2,8,9	Predictors, sources, and health risk of exposure to neonicotinoids in Chinese school children: A biomonitoring-based study	H. Y. Wang, D., et. al. Environ Int 143, , 105918 https://www.ncbi.nlm.nih.gov/pubmed/32673906	BACKGROUND: Recent studies have suggested an extensive exposure to neonicotinoids in human, but the information on predictors, sources, and health risk remains limited in children. OBJECTIVE: To explore the predictors, sources, and health risk for exposure of Chinese school children to neonicotinoids by biomonitoring method. METHODS: In 2019, 309 school children aged 7-11 years were selected from a dynamic cohort of children established in Shanghai, East China. Eight neonicotinoids and four metabolites were determined in first morning urine. After detailed information on demographic and socioeconomic indices, intake of drinking water, food consumption, and anthropometric measurements was collected, the predictors and sources of exposure to neonicotinoids were explored by binary and ordinal logistic regression models. Health risk was assessed by the hazard quotient (HQ) and hazard index (HI) based on estimated daily exposure dose. RESULTS: Six neonicotinoids (thiamethoxam, clothianidin, imidacloprid, acetamiprid, nitenpyram, and dinotefuran) and three metabolites (N-desmethyl-thiamethoxam, N-desmethyl-clothianidin, and N-desmethyl-acetamiprid) were detected in 81.3% of urine samples. Children in nuclear family or girls had a higher detection frequency of thiamethoxam. N-desmethyl-acetamiprid was more likely to be detected in children who were older, physically active, or obese. Parents' occupation was heterogeneously associated with the detection of thiamethoxam and clothianidin. Thiamethoxam and clothianidin were more likely to be detected in children consuming more fresh vegetables in all or its specific items of cabbage, nori, and kelp. N-desmethyl-acetamiprid was more likely to be detected in children who drank more tap water. The maximum HQ and HI were 0.3522 and 0.5187, respectively, and 2.8% of children had a HI between 0.1 and 1. CONCLUSION: Predictors for the exposure of children to neonicotinoids included demographic and socioeconomic factors, physical exercise, and relative body weight. Tap water and fresh vegetables were potential sources. A low risk was posed on children's health by the neonicotinoids.
4	Preparation and characterization of an oil-in-water microemulsion of thiamethoxam and acetamiprid without organic solvent for unmanned aerial vehicle spraying	Song, R., et al. (2020). "Preparation and characterization of an oil-in-water microemulsion of thiamethoxam and acetamiprid without organic solvent for unmanned aerial vehicle spraying." Colloids and Surfaces A: Physicochemical and Engineering Aspects 607: 125485.	Spraying pesticides is an essential measure for crop protection in agricultural production process. However, the large organic solvents and surfactants usage of common pesticide formulations have caused concern about environmental pollution. In recent years, unmanned aerial vehicle (UAV) spraying has gained more and more attention because of its ability to reduce the usage of pesticide and replace traditional human-powered spraying equipment. Nevertheless, the potential pollution hazard, spray drift and loss of current pesticide formulations in actual aerial spraying also remain challenging to date. Based on the requirement of appropriate pesticide formulation for UAV spraying, a novel oil-in-water microemulsion of thiamethoxam and acetamiprid without any organic solvents was investigated in this study. Complex emulsifiers were proposed to increase the solubility of pesticides in water, which could avoid the addition of unnecessary organic solvents in microemulsions. The physicochemical properties and application performance of the microemulsions were determined using visual observation, Turbiscan technique, laser particle size, indoor spraying experiments, high-performance liquid chromatography with ultraviolet detection and transmission electron microscopy. The optimal microemulsion with the formulation of 10 % sodium dodecyl sulfate and 10 % fatty alcohol polyoxyethylene ether sulfate consisted of small particles with a mean diameter of 1.9 nm, and exhibited good stability, improved wettability, anti evaporation, and spraying performance with deposition coverage rate of 16.2 %. This study expanded the possibility of the preparation and development of environmentally friendly pesticide formulations applicable for UAV agricultural spraying.
5	Preparation and evaluation of hydrocalumite-iron oxide magnetic intercalated with dodecyl sulfate for removal of agrichemicals	J. L. B. Milagres, C. R., et. al. J Environ Manage 255, , 109845 https://www.ncbi.nlm.nih.gov/pubmed/31778866	The magnetic adsorbent prepared with hydrocalumite-iron oxide (HC/Fe) modified with dodecyl sulfate (DS) was examined for the removal of the agrichemicals atrazine (ATZ) and chlorpyrifos (CPF) from aqueous solution. The adsorbent HC-DS/Fe was characterized by infrared spectroscopy (IR), Raman spectroscopy, X-ray diffractometry (XRD) and atomic absorption spectrometry. The effects of adsorbent dosage, contact time, pH and initial concentration of ATZ and CPF were evaluated. HC-DS/Fe presented a maximum adsorption capacity for ATZ of 4.5 mg g ⁻¹ (30 min) and for CPF of 72.9 mg g ⁻¹ (210 min) at 25 degrees C. HC-DS/Fe can be readily removed from the aqueous solution by magnetization because of its magnetic properties. The free energy variation for HC-DS/Fe during the adsorption of the ATZ was -48.78 to -53.91 kJ mol ⁻¹ and for the CPF of -55.79 to -59.28 kJ mol ⁻¹ , suggesting the spontaneity of the adsorption process. The positive value of big up tri, openH suggests an endothermic process for the interaction of ATZ and CPF by HC-DS/Fe. This adsorbent showed satisfactory results when used in the treatment of a sample of river water, fortified with the agrichemicals chlorpyrifos, atrazine, thiamethoxam and acetamiprid.
9	Prevalence of neonicotinoids and sulfoxaflor in alluvial aquifers in a high corn and soybean producing region of the Midwestern United States	Thompson, D. A., et al. (2021). "Prevalence of neonicotinoids and sulfoxaflor in alluvial aquifers in a high corn and soybean producing region of the Midwestern United States." Science of The Total Environment 782: 146762.	Neonicotinoids have been previously detected in Iowa surface waters, but less is known regarding their occurrence in groundwater. To help fill this research gap, a groundwater study was conducted in eastern Iowa and southeastern Minnesota, a corn and soybean producing area with known heavy neonicotinoid use. Neonicotinoids were studied in alluvial aquifers, a hydrogeologic setting known to be vulnerable to surface-applied contaminants. Groundwater samples were analyzed from 40 wells for six neonicotinoid compounds (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, thiamethoxam), and sulfoxaflor. Samples were analyzed using liquid chromatography tandem mass spectrometry (LC/MS/MS) with both direct aqueous injection and solid phase extraction methods. Neonicotinoids were prevalent in the alluvial aquifers with 73% of the wells having at least one neonicotinoid detection. Clothianidin (68%, max: 391.7 ng/L) was the most commonly detected, followed by imidacloprid (43%, max: 6.7 ng/L) and thiamethoxam (3%, max: 0.2 ng/L). Acetamiprid, dinotefuran, sulfoxaflor, and thiacloprid were not detected during the study. The solid phase extraction method was more sensitive than direct aqueous injection, where only clothianidin detected in 23% of samples. SPE is the preferred method for detecting low concentrations of hydrophilic pesticides in water. This study documented that the combination of heavy chemical use overlying a hydrogeologic setting vulnerable to surface applied contaminants leads to transport of neonicotinoids into an important groundwater resource.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Prey contaminated with neonicotinoids induces feeding deterrent behavior of a common farmland spider	S. S. Korenko, P., et. al. Sci Rep 9, 1, 15895 https://www.ncbi.nlm.nih.gov/pubmed/31685882	Neonicotinoids are thought to have negligible repellent or anti-feeding effects. Based on our preliminary observations, we hypothesized that the contamination of spider prey with commonly used neonicotinoids has repellent or feeding deterrent effects on spiders. We tested this hypothesis by providing prey treated or not with field-realistic concentrations of neonicotinoids to the spiders and determining the number of (a) killed only and (b) killed and eaten prey. We exposed adult freshly molted and starved <i>Pardosa agrestis</i> , a common agrobiont lycosid species, to flies treated with neonicotinoids (acetamiprid, imidacloprid, thiacloprid and thiamethoxam) at field-realistic concentrations or with distilled water as a control. There were no effects of the exposure of the prey to neonicotinoids on the number of flies captured. However, the spiders consumed less of the prey treated with neonicotinoids compared to the ratio of control prey consumed, which resulted in increased overkilling (i.e., killing without feeding). In female <i>P. agrestis</i> , the overkilling increased from only 2.6% of control flies to 25-45% of neonicotinoid-treated flies. As the spiders avoided consuming the already captured neonicotinoid-treated prey, the sublethal effects of neonicotinoids extend beyond the simple attractivity/deterrence of the prey itself. The present study demonstrated that prey overkilling serves as a physiological response of spiders to the contact with the prey contaminated with agrochemicals. We speculate that primary contact with neonicotinoids during prey capture may play a role in this unexpected behavior.
5	Priority pesticides abatement by advanced water technologies: The case of acetamiprid removal by ozonation	A. S. Cruz-Alcalde, C., et. al. Sci Total Environ 599-600, 1454-1461 https://www.ncbi.nlm.nih.gov/pubmed/28531953	With the aim of exploring treatment alternatives for priority insecticide acetamiprid (ACMP) abatement, the removal of this compound from water by ozonation was studied for the first time, paying special attention to the kinetic, mechanistic and toxicological aspects of the process. The second order rate constants of reactions between ACMP and both molecular ozone (O ₃) and hydroxyl radicals (OH) were determined to be 0.25M ⁻¹ s ⁻¹ and 2.1.10(9)M ⁻¹ s ⁻¹ , respectively. On the basis of kinetic results, the degradation of ACMP during ozonation could be well-explained by the reactivity of this pesticide with OH. HPLC/MS analysis of the ozonated ACMP showed ACMP-N-desmethyl, 6-chloronicotinic acid, N'cyano-N-methyl acetamidide and N'-cyano acetamidine as the major transformation products (TPs), all of them formed through amine alpha carbon oxidation in combination with hydrolysis. Microtox bioassays revealed an increase in the toxicity of the medium during ACMP ozonation process, followed by a decrease to relatively low values. These changes could be attributed to the synergistic effects between TPs as well as to the presence of toxic intermediate aldehydes. Even though adopting strategies to further promote ozone decomposition to hydroxyl radicals appears to be essential, ozonation can be an effective treatment process for ACMP removal and associated toxicity abatement.
10	Progress in the Biodegradation of Chloronicotinyl Insecticide Acetamiprid	Yang, Q., et. al. (2018). "PROGRESS IN THE BIODEGRADATION OF CHLORONICOTINYL INSECTICIDE ACETAMIPRID." Fresenius Environmental Bulletin 27(5): 2735.	A member of the neonicotinoid class of systematic broad-spectrum insecticides, Acetamiprid (ACE) has been extensively used in agriculture, and because of its massive application, adverse effects on ecology and the environment have also been increasing. These effects include the contamination of water and soil and the disruption of biogeochemical cycles, and their impact has led to an increasing trend toward research involving available microbial methods for ACE degradation. This review summarizes progress in research on microbiological degradation of ACE, including organisms capable of degrading ACE, pathways for ACE biodegradation, ACE's behavior in soil, and the effect of environmental conditions on soil ACE degradation, as well as the prospects for ACE elimination. In addition, we review a broader spectrum of knowledge regarding the biodegradation of ACE, and we attempt to place this information into context with the most recent and sometimes surprising research results.
9	Protective effects of melatonin and vitamin E in acetamiprid-induced nephrotoxicity	M. E. Z. Erdemli, E., et. al. Environ Sci Pollut Res Int 27, 9, 9202-9213 https://www.ncbi.nlm.nih.gov/pubmed/31916150	Investigation of probable toxic effects of acetamiprid (ACMP) on kidney and comparative analysis of the probable protective effects of vitamin E and melatonin were conducted in the present study. The ethics committee approval was obtained from Inonu University Medical Faculty Ethics Committee. Fifty Balb-c mice were randomly assigned to control, corn oil, ethyl alcohol, ACMP, ACMP + melatonin, ACMP + vitamin E, and ACMP + melatonin + vitamin E groups. At the end of the experiments, rat kidney tissues were incised under anesthesia. Blood samples and kidney tissues were examined. After 21 days of ACMP administration, it was observed that malondialdehyde (MDA), total oxidant status (TOS), BUN, creatinine, IL-6, IL-1beta, and TNF-alpha levels, histopathological damage, and Caspase-3 immunoreactivity scores increased, and glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), and total antioxidant status (TAS) levels decreased, and histopathological damages were observed. Melatonin and vitamin E administration led to improvements in oxidative stress parameters, renal functions, inflammatory markers, and histopathological findings. ACMP administration led to nephrotoxicity in rat kidney tissues. Although melatonin and vitamin E administrations were effective on ACMP nephrotoxicity separately, co-administration of both was quite effective. Concomitant use of melatonin and vitamin E could be effective on prevention of toxicity.
5	QD-aptamer as a donor for a FRET-based chemosensor and evaluation of affinity between acetamiprid and its aptamer	Xiang, L. and J. Tang (2017). "QD-aptamer as a donor for a FRET-based chemosensor and evaluation of affinity between acetamiprid and its aptamer." RSC Advances 7(14): 8332-8337.	The sensitive and convenient detection of pesticides has become an important issue in food safety and environmental pollution. In this work, a unique aptamer biosensor for the detection of acetamiprid based on fluorescence resonance energy transfer (FRET) between complementary aptamer-modified CdTe quantum dots (QDs) and aptamer-modified Cy5.5 dye molecules was developed. Hybridization results in the transfer of excitation energy from the QDs to the dye. The Förster radius (R ₀) and the distance between the donor and acceptor pair (r) were 4.815 nm and 5.134 nm, respectively, based on an analysis of the ratio of donor- to acceptor-dependent FRET efficiency. The K _d was 0.58 μmol L ⁻¹ for the Cy5.5-aptamer with acetamiprid. In the presence of acetamiprid, the specific and strong interaction between the aptamer and target inhibited the conjugation of the donor and acceptor, thus leading to a decrease in energy transfer efficiency. A limit of detection (LOD) of 0.02 μM and a wide assay range from 0.01 μM to 10 μM for acetamiprid detection were achieved by fitting the dose-dependent energy transfer efficiency using a 4-parameter model. The proposed method was also successfully applied to measure acetamiprid in spiked water samples, demonstrating its reliability and repeatability.
5	Quantification of DEET and neonicotinoid pesticide biomarkers in human urine by online solid-phase extraction high-performance liquid chromatography-tandem mass spectrometry	S. E. S. Baker, A. B., et. al. Anal Bioanal Chem 411, 3, 669-678 https://www.ncbi.nlm.nih.gov/pubmed/30483854	Neonicotinoid insecticides are widely used replacements for organophosphate and carbamate insecticides, but the extent of human exposure is largely unknown. On the other hand, based on urinary concentrations of DEET metabolites, human exposure to N,N-diethyl-m-toluamide (DEET) appears to be widespread. We developed a fast online solid-phase extraction high-performance liquid chromatography-isotope dilution tandem mass spectrometry (HPLC-MS/MS) method to measure in 200 μL of human urine the concentrations of six neonicotinoid biomarkers (acetamiprid, N-desmethyl-acetamiprid, clothianidin, imidacloprid, 5-hydroxy-imidacloprid, thiacloprid), and two DEET biomarkers (3-diethyl-carbamoyl benzoic acid, 3-ethyl-carbamoyl benzoic acid). Limits of detection ranged from 0.01 to 0.1 μg/L, depending on the biomarker. Accuracy ranged from 91 to 116% and precision ranged from 3.7 to 10 %RSD. The presented method can be used to increase our understanding of exposure to neonicotinoid insecticides and DEET, and to evaluate the potential health effects from such exposures.
5	Quantification of five neonicotinoids in human urine by modified QuEChERS with isotope dilution mass spectrometry: a preliminary study for the development of certified reference material	Takamitsu Otake & Nobuyasu Hanari (2018) Quantification of five neonicotinoids in human urine by modified QuEChERS with isotope dilution mass spectrometry: a preliminary study for the development of certified reference material, International Journal of Environmental Analytical Chemistry, 98:12, 1106-1117, DOI: 10.1080/03067319.2018.1527911	A study for the quantification method of neonicotinoid pesticides (Neos) in human urine that aims to develop the certified reference material (CRM) in the future was carried out. A modified Quick, Easy, Cheap, Effective, Rugged and Safe (QuEChERS) method based on dispersive solid phase extraction (d-SPE) with isotope dilution mass spectrometry (IDMS) was evaluated for the quantification of five Neos (acetamiprid, dinotefuran, imidacloprid, thiacloprid and thiamethoxam) in human urine control by optimisation of the extraction solvent, and the type and amount of d-SPE material. Two types of human urine controls (sample A and B) containing 5 μg/kg and/or 25 μg/kg of Neos were prepared and employed for this study. The results of spike test using sample A (2 mL) obtained by modified QuEChERS method with acetone extraction (10 mL) and d-SPE using a strong cation exchanger (silica gel modified with benzenesulphonic acid phase, SCX) 500 mg were as follows: 97.8%–103.1% for 5 μg/kg and 97.2%–102.7% for 25 μg/kg (described as percentage by the quantification results of IDMS relative to the spiked amount of pesticides). These results were comparable to those by SPE cartridge method using SCX functionalised hydrophilic styrene divinylbenzene (PCX). The repeatabilities of the analyses, represented as relative standard deviations, were also comparable for spike level 5 μg/kg and 25 μg/kg of Neos: 0.1%–7.2% for modified QuEChERS with IDMS and 0.2%–5.6% for PCX cartridge method. The results of spike test using sample B for a spike level 5 μg/kg were 96.0%–100.6%. These results indicate that modified QuEChERS method with IDMS can be used for the development of certified reference material and has the potential to use for the quantification of Neos in real human urine.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Quantification of Neonicotinoid Pesticides in Six Cultivable Fish Species from the River Owena in Nigeria and a Template for Food Safety Assessment	Adegun, A. O., et al. (2020). "Quantification of Neonicotinoid Pesticides in Six Cultivable Fish Species from the River Owena in Nigeria and a Template for Food Safety Assessment." Water 12(9).	The Owena River Basin in Nigeria is an area of agricultural importance for the production of cocoa. To optimise crop yield, the cocoa trees require spraying with neonicotinoid insecticides (Imidacloprid, Thiacloprid Acetamiprid and Thiamethoxam). It is proposed that rainwater runoff from the treated area may pollute the Owena River and that these pesticides may thereby enter the human food chain via six species of fish (Clariasgariepinus, Clariasanguillar, Sarotherodongalilaeus, Parachannaobscura, Oreochromisniloticus and Gymnarchusniloticus) which are cultured in the river mostly for local consumption. This work aims to establish a working method to quantify the likely levels of the insecticides in the six species of fish, firstly by undertaking a laboratory-based study employing the QuEChERS method to extract the four neonicotinoids from fish purchased in marketplace in the UK, spiked with known quantities of the pesticide and using liquid chromatography coupled with tandem mass spectrometry (LC-MS-MS) as the detection method; secondly, by using these samples to optimise the detection method for very low levels of pesticides, then applying the optimised techniques to the analysis of three of each six species of fish taken from the Owena River. A significant benefit of this combined technique is that only small samples of fish are required. Success with this part of the study showed that very low concentrations of the insecticides could be detected in fish muscle. The third aim is to apply a simple quantitative risk assessment model using the data sets obtained, together with information about daily diet, human body weight and recommended safety limits of pesticides in food to illustrate how human health may be affected by the consumption of these fish. The multiple determinations of neonicotinoids in edible fishes in Nigeria are pioneer research and fill a gap in addressing the relationship between waterborne pesticides and food quality in the country. Fundamentally, this work is an exercise to demonstrate the applicability of the aforementioned instrumental method of analysis to fish muscle, which requires only a small sample size of fish; a large number of fish is not required for a proof of concept, in this case. Although not a monitoring programme for the whole Owena River Basin ecosystem per se, this work successfully demonstrates the technical feasibility of a system of chemical analysis and establishes the foundation for ecological surveys in the immediate future. Parameters involving exposures to xenobiotics in ecotoxicological modelling can now be expressed in terms of both mass and molar concentrations of a chemical in animal tissues if so desired.
8,9	Quantification of Pesticide Residues in Fresh Vegetables Available in Local Markets for Human Consumption and the Associated Health Risks	Nisha, U. S., et al. (2021). "Quantification of Pesticide Residues in Fresh Vegetables Available in Local Markets for Human Consumption and the Associated Health Risks." Agronomy 11(9).	Human health risks as a result of consuming pesticide residues in fresh vegetables have drawn serious attention to the scientific community, particularly in developing countries. This study analyzed country bean (Lablab purpureus L.) and eggplant (Solanum melongena L.) for widely used neonicotinoid, synthetic pyrethroid, and dithiocarbamate pesticide residues in order to ensure food safety. The analyzed vegetables contained residues of acetamiprid and cypermethrin in 17% of bean and 13% of eggplant samples, respectively; among them, 3% of bean and 1% of eggplant samples had residues of acetamiprid that were above the maximum residue limits set by the European Union (EU-MRLs). None of the samples for either of the analyzed vegetables contained the residue of thiram and lambda-cyhalothrin. In contrast, 83% of bean and 87% of eggplant samples had no detectable pesticides. Thus, the findings were surprising considering the repeated and overuse of pesticides in vegetables in the investigated areas. However, this outcome supports the general claim of pesticide adulteration in terms of the active ingredients, which is another drawback to ensuring food safety. The non-cancer health risk assessment based on the acute health risk to consumer (aHI) and chronic hazard quotient (HQ) indicates that contaminated vegetables might pose a potential threat to children's health and alarming for adults. This study reflects the overall scenario of pesticide residues in marketed vegetables of Barishal district of Bangladesh, which could help the consumers to bring awareness, and to take necessary actions by the pesticide suppliers and policymakers.
8,9	Quantum Yields for Direct Photolysis of Neonicotinoid Insecticides in Water: Implications for Exposure to Nontarget Aquatic Organisms	Lu, Z., et al. (2015). "Quantum Yields for Direct Photolysis of Neonicotinoid Insecticides in Water: Implications for Exposure to Nontarget Aquatic Organisms." Environmental Science & Technology Letters 2(7): 188-192.	Environmental fate processes of neonicotinoid insecticides are of significant interest, given the serious threats these chemicals can pose to nontarget organisms such as pollinators (e.g., bees). Direct photolysis was investigated using a laboratory photoreactor approximating full-spectrum sunlight to predict the aquatic fate of neonicotinoids. Quantum yields (ϕ) were 0.019 ± 0.001 , 0.013 ± 0.001 , 0.0092 ± 0.0005 , 0.0022 ± 0.0003 , and 0.0013 ± 0.0002 for thiamethoxam, clothianidin, imidacloprid, acetamiprid, and thiacloprid, respectively. On the basis of these values, estimated half-lives were 0.2–1.5 days for different seasons in surface waters at temperate latitudes for thiamethoxam, consistent with the 0.98 day half-life observed experimentally outdoors at Winnipeg, Manitoba, Canada (50° N), for thiamethoxam in summer. Light attenuation through shallow clear surface waters (e.g., by natural organic matter) indicated that photolysis of thiamethoxam at depths greater than 8 cm was negligible, which may help explain reports of its environmental persistence.
5	Rapid Detection of Acetamiprid in Foods using Surface-Enhanced Raman Spectroscopy (SERS)	Wijaya W, Pang S, Labuza TP, He L. Rapid detection of acetamiprid in foods using surface-enhanced Raman spectroscopy (SERS). J Food Sci. 2014 Apr;79(4):T743-7	Acetamiprid is a neonicotinoid pesticide that is commonly used in modern farming. Acetamiprid residue in food commodities can be a potential harm to human and has been implicated in the honey bee hive die off crisis. In this study, we developed rapid, simple, and sensitive methods to detect acetamiprid in apple juice and on apple surfaces using surface-enhanced Raman spectroscopy (SERS). No pretreatment of apple juice sample was performed. A simple surface swab method was used to recover acetamiprid from the apple surface. Samples were incubated with silver dendrites for several minutes and SERS spectra were taken directly from the silver surface. Detection of a set of 5 apple juice samples can be done within 10 min. The swab-SERS method took 15 min for a set of 5 samples. Resulting spectral data were analyzed using principal component analysis. The highest acetamiprid peak at 634 cm ⁻¹ was used to detect and quantify the amount of acetamiprid spiked in 1:1 water-methanol solvent, apple juice, and on apple surface. The SERS method was able to successfully detect acetamiprid at 0.5 μ g/mL (0.5 ppm) in solvent, 3 μ g/mL (3 ppm) in apple juice, and 0.125 μ g/cm ² on apple surfaces. The SERS methods provide simple, rapid, and sensitive ways to detect acetamiprid in beverages and on the surfaces of thick skinned fruits and vegetables.
5	Rapid Sample Preparation Followed by a 100% Water Mobile Phase HPLC Analysis for Quantifying Acetamiprid and its N-desmethyl Metabolite, IM-2-1, in Cow's Milk	Furasawa, N. Rapid Sample Preparation Followed by a 100% Water Mobile Phase HPLC Analysis for Quantifying Acetamiprid and its N-desmethyl Metabolite, IM-2-1, in Cow's Milk. LCGC Europe-02-01-2017, Volume 30, Issue 2	This article describes a space-saving, quick, and inexpensive sample preparation technique followed by a high performance liquid chromatography (HPLC) method with a 100% water mobile phase and photodiode array (PDA) detection for quantifying acetamiprid and its N-desmethyl metabolite, IM-2-1, in cow's milk. The analytes were extracted from the sample and deproteinized using a handheld ultrasonic homogenizer with 5% (w/v) trichloroacetic acid solution, purified using a centrifugal monolithic silica spin minicolumn, and quantified within 20 min per sample. The accuracy and precision are well within the international method acceptance criteria.
5	Reclamation of agro-wastewater polluted with pesticide residues using sunlight activated persulfate for agricultural reuse	Vela, N., et al. (2019). "Reclamation of agro-wastewater polluted with pesticide residues using sunlight activated persulfate for agricultural reuse." Science of The Total Environment 660: 923-930.	The removal of 17 pesticides (pymetrozine, flonicamid, imidacloprid, acetamiprid, cymoxanil, thiacloprid, spinosad, chlorantraniliprole, triadimenol, tebuconazole, fluopyram, difenoconazole, cyflufenamid, hexythiazox, spiromesifen, folpet and acrinathrin) found in agro-wastewater from washing of containers and phytosanitary treatments equipment, has been carried out using sodium persulfate (Na ₂ S ₂ O ₈) at pilot plant scale under natural sunlight. Persulfate is a strong oxidant, inexpensive and environmentally appropriate. However, this oxidant is slow in kinetics under ordinary conditions. Na ₂ S ₂ O ₈ can be activated by ultraviolet light, generating SO ₄ ⁻ radicals, which are also a very strong oxidizing species (E ₀ = 2.6 V). Previously, preliminary experiments were carried out at laboratory scale using a photoreactor to optimize the Na ₂ S ₂ O ₈ (300 mg L ⁻¹) concentration on the rate constants of the found pesticides. The residual levels of the studied pesticides in agro-wastewater (900 L) were in the range 0.02–1.17 mg L ⁻¹ for acrinathrin and fluopyram, respectively. After treatment, nearly complete degradation (>97%) of the parent molecules was achieved although 13% of initial DOC was measured. No significant differences (p < 0.05) were found when comparing grown broccoli using reclaimed and unreclaimed water.

Phase 1 Conformity category	Title	Citation	Abstract
9	A reconnaissance study of pharmaceuticals, pesticides, perfluoroalkyl substances and organophosphorus flame retardants in the aquatic environment, wild plants and vegetables of two Saudi Arabia urban areas: Environmental and human health risk assessment	Y. C. Pico, J., et. al. Sci Total Environ 776, 145843 https://www.ncbi.nlm.nih.gov/pubmed/33640550	In this study, the occurrence of 12 organophosphorus flame retardants (OPFRs), 64 pesticides, 21 perfluoroalkyl substances (PFASs) and 34 pharmaceuticals and personal care products (PPCPs) in surface water, sediments and vegetation collected from seven locations along the South Riyadh and six locations along the Al-Jubail industrial city (Saudi Arabia) were reported. The median of the concentrations of OPFRs, Pesticides, PFASs and PPCPs in water was 297, 231, 29.7 and 3794 ng L ⁻¹ (-1), respectively, in sediments 56.2, 40.4, 5.66 and 419 ng g ⁻¹ d.w., in crops for human consumption of 45.6, 42.0, 0.46 and 42.0 ng g ⁻¹ (-1), in farm crops of 13.4, 57.5, 3.2 and 637 ng g ⁻¹ (-1), and in natural vegetation of 51.7, 10.3, 1.88 and 1580 ng g ⁻¹ (-1). Predominant compounds in all matrices were tris-(1,3-dichloro-2-propyl)phosphate (TCIPP), acetamiprid, imidacloprid, caffeine, bisphenol A (BPA), diclofenac and ibuprofen. Tris(2-butoxyethyl) phosphate (TBEP), tris-(2-ethylhexyl)phosphate (TPhP), perfluorooctanoic acid (PFOA), perfluoroalkyl sulfonate (PFOS) and paracetamol were also in many samples but at low concentrations. The contaminants' levels showed similar values in both cities. However, pesticide levels were significantly higher in surface water (p < 0.05) and lower in natural vegetation (p < 0.05) of Riyadh than those of Al-Jubail. The risk assessment for the aquatic biota showed that abamectin, diazinon (pesticides), bisphenol A and caffeine (PPCPs) had the highest risk levels. The cumulative risk assessment showed that the contaminant mixture in all water samples is of concern. As far as the risk to human health is concerned, individual contaminants did not show a significant hazard for the population. However, OPFRs and pesticide requires a closed monitoring since % of admissible daily intakes (ADIs) or reference doses (RfD) are high. This is one of the most comprehensive study covering environmental and human risk assessment of emerging contaminants carried out in Saudi Arabia.
5	Recyclable nitrogen-containing chitin-derived carbon microsphere as sorbent for neonicotinoid residues adsorption and analysis	Cheng, Q., et al. (2021). "Recyclable nitrogen-containing chitin-derived carbon microsphere as sorbent for neonicotinoid residues adsorption and analysis." Carbohydrate Polymers 260: 117770.	Chitin-derived three-dimensional nanomaterials has tremendous potential in pesticide residue analysis as an attractive green substitute for toxic solvents. The work presented herein focuses on constructing the environmentally friendly nitrogen-containing chitin-derived carbon microspheres (N-CCMP) for the efficient adsorption of neonicotinoid pesticides (NPs) including acetamiprid, clothianidin, imidacloprid and thiamethoxam. The N-CCMP displayed hierarchical porous structure, uniform size distribution, and excellent specific surface area of 680.8 m ² g ⁻¹ . The N-CCMP with N-heterocyclic ring structure and surface oxygen functional groups exhibited good affinity to NPs, which was beneficial for the rapid adsorption. Then, the N-CCMP were utilized as sorbent in extraction of NP residues. Under the optimum conditions, the relative recoveries in water and juice sample were in the range of 85 %–116 % and 74 %–108 %, with relative standard deviations (RSDs) of 0.1 %–5.2 % and 0.7 %–5.2 %, respectively. The extraction performance of N-CCMP were still over 80 % after 5 times of reuse
5	Reducing the Ecotoxicity of Pesticide Polluted Waters by Electrochemical Methods	Neamtu, C., Tutunaru, B., Samide, A. & Popescu, A. (2019). Reducing the Ecotoxicity of Pesticide Polluted Waters by Electrochemical Methods. Revista de Chimie, 70(5), 1574-1578	Electrochlorination constitutes an electrochemical approach for the treatment of pesticide-containing wastewaters. This study evaluated the electrochemical and thermal stability of four pesticides and the efficiency of electrochlorination to remove and detoxify the simulated polluted water with: Acetamiprid, Emamectin, Imidacloprid and Propineb. This study reports the experimental results obtained by cyclic voltammetry and electrolysis at constant current density in association with UV-Vis spectrophotometry. In saline waters this pesticides are electrochemical active and anodic peaks are registered in the corresponding voltammograms. After thermal combustion, in a gaseous nitrogen atmosphere, a residue ranging from 15 to 45 % is observed at 500 ° C.
13	Reduction of methomyl and acetamiprid residues from tomatoes after various household washing solutions	M. Angela Rasolonjatovo, Mustafa Cemek, M. Fatih Cengiz, Deniz Ortaç, H. Büşra Konuk, Elif Karaman, A. Tuba Kocaman & Sadık Göneş (2017) Reduction of methomyl and acetamiprid residues from tomatoes after various household washing solutions, International Journal of Food Properties, 20:11, 2748-2759	The removal of pesticide residues is essential in order to control and reduce the harmful effects of pesticides commonly used in agriculture. The aim of this study was to investigate the effectiveness of 18 different household washing solutions for the reduction of methomyl and acetamiprid residues from tomatoes. These basic household solutions were used to prepare washing solution to remove pesticides. During this study, tomatoes were divided into two groups: in the first group, tomatoes were treated with the pesticides and the second group was washed with household solutions (distilled water, acetic acid, sodium chloride, ethanol, sodium bicarbonate, hydrogen peroxide, sodium hypochlorite, and liquid soap, lemon juice, mineral water, zam-zam water, whey, milk, and their combinations) after treating with pesticides. The pesticides residues in all samples were extracted by the QuEChERS technique, analyzed by LC-MS/MS. The results showed significant reduction in residues of all washed groups compared with the control (p < 0.01). Acetic acid, sodium chloride+sodium bicarbonate, zam-zam water, acetic acid+sodium chloride, sodium hypochlorite, milk, acetic acid+sodium chloride+sodium bicarbonate, liquid whey, liquid soap, lemon juice, ethanol, and sodium bicarbonate were found to remove more than 50% of both pesticide residues. The effectiveness of washing solutions was different for every type of pesticide. In the same way, blend of washing solutions has shown a synergetic effect on the removal of pesticides and was more effective compared to one solution. This research has raised the potential use of household solutions easily found at home that could be used to remove pesticide residues.
13	Reduction of pesticides residues on okra fruits by different processing treatments	Hanafi, A., Elsheshetawy, H.E. & Faied, S.F. Reduction of pesticides residues on okra fruits by different processing treatments. J. Verbr. Lebensm. 11, 337–343 (2016).	For the first time, the effect of washing, water boiling, chemical boiling, steaming and cooking treatments on the reduction of residues of indoxacarb, fenarimol, acetamiprid and chlorfenapyr in okra fruits was investigated. Residues were analyzed using quick, easy, cheap, effective, rugged, and safe (QuEChERS) method combined with liquid chromatography tandem-mass spectrometry (LC-MS/MS). Our results show that some treatments could significantly decrease pesticide residues. The reduction of residues by washing treatment was not correlated to water solubility: Chlorfenapyr (non-systemic pesticide) was decreased by 90 % and acetamiprid (systemic pesticide) was removed by 48 %. Therefore, we suggest that pesticide residues were washed off by removing the loosely attached pesticides on the okra fruit surface. The time of exposure in both boiling and steaming treatments has no significant effect on reduction of pesticides residues. Additionally, cooking after the washing and boiling treatments reduced the pesticides residues. In particular, acetamiprid was reduced after the cooking treatment to 90 %.
Ecotoxicology	Relative chronic sensitivity of neonicotinoid insecticides to Ceriodaphnia dubia and Daphnia magna	M. Z. Raby, X. , et. al. Ecotoxicol Environ Saf 163, , 238-244 https://www.ncbi.nlm.nih.gov/pubmed/30056337	Neonicotinoid insecticides are a group of plant protectants frequently detected in surface waters at low concentrations. Aquatic invertebrates therefore have the potential to be exposed chronically to low concentrations of neonicotinoids. The cladocerans Daphnia magna and Ceriodaphnia dubia are among the most commonly used invertebrate test species in aquatic toxicology. Both species are known to be acutely insensitive to neonicotinoids, and while chronic toxicity has been characterized for D. magna, little research has been conducted with C. dubia. In the present study we conducted 7-d static-renewal life cycle tests for 6 neonicotinoids (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, and thiamethoxam) with C. dubia, and a 21-d test with imidacloprid with D. magna. 7-d LC50s for C. dubia ranged from 8.42mgL ⁻¹ for imidacloprid to >100mgL ⁻¹ for clothianidin; 7-d reproduction EC50s were 2.98 for thiacloprid, to >67mgL ⁻¹ for dinotefuran. D. magna were less sensitive than C. dubia to imidacloprid, by 4-fold for lethality and 1.5-fold for reproduction; however, acute-to-chronic ratios (ACRs) were similar. ACRs, based on 48-h acute LC50s and 7- or 21-d chronic reproduction EC10s, ranged from 5.4 for acetamiprid to 53.0 for imidacloprid (mean 36.6, CV = 51%). Chronic toxicity values for both species were orders of magnitude greater than concentrations reported in the environment, and thus hazard to these cladocerans is negligible.
5	Removal of contaminants of emerging concern (CECs) and antibiotic resistant bacteria in urban wastewater using UVA/TiO2/H2O2 photocatalysis	Jiménez-Tototzintle, M., et al. (2018). "Removal of contaminants of emerging concern (CECs) and antibiotic resistant bacteria in urban wastewater using UVA/TiO2/H2O2 photocatalysis." Chemosphere 210: 449-457.	The dispersion of pollutants and proliferation of antibiotic resistant bacteria in the aquatic environment are an emerging health concern worldwide. In this sense, it is essential to develop new technologies to increase the quality of wastewater treatment, which is spread throughout the environment. The present study has demonstrated evidence of the existence of antibiotic and mercury-resistant bacteria in the aquatic environment. The application of heterogeneous photocatalysis with UVA/TiO2 P25 slurry (200 mg L ⁻¹), UVA/TiO2-immobilized, and UVA/TiO2-immobilized/H2O2 were evaluated for the simultaneous elimination of a mixture of contaminants of emerging concern (acetamiprid (ACP), imazalil (IMZ) and bisphenol A (BPA)) and inactivation of antibiotic and mercury-resistant bacteria (Pseudomonas aeruginosa and Bacillus subtilis). UVA/TiO2-immobilized/H2O2 increased the inactivation and elimination of the contaminants. After the combined treatment, the mixture of BPA, IMZ and ACP decreased 62%, 21% and <5%, respectively, after 300 min at 13.10 kJ L ⁻¹ of accumulated UV energy. The Pseudomonas aeruginosa strain was inactivated after 120 min using 5.24 kJ L ⁻¹ of accumulated UV energy, whereas the Bacillus subtilis strain was shown to be extremely resistant, with a capacity to develop mechanisms to avoid the oxidation process.

Phase 1 Conformity category	Title	Citation	Abstract
4	Repellent effects of insecticides on <i>Stephanitis pyrioides</i> Scott (Hemiptera: Tingidae) under laboratory conditions	Joseph, S. V. (2020). "Repellent effects of insecticides on <i>Stephanitis pyrioides</i> Scott (Hemiptera: Tingidae) under laboratory conditions." <i>Crop Protection</i> 127: 104985.	<i>Stephanitis pyrioides</i> Scott (Hemiptera: Tingidae) is an important insect pest of azalea plants (<i>Rhododendron</i> L. spp.) in the USA. The use of neonicotinoids in landscapes has been reduced because of consumer perceptions that they are not pollinator friendly. The reductions are due mostly to changes in the labels that restrict times these materials can be applied to ornamental plants based on plant phenology and bloom period. Pest management can be improved by using insecticides that repel <i>S. pyrioides</i> . A series of non-contact and contact laboratory assays were conducted with adult <i>S. pyrioides</i> to determine the repellency of insecticides. Insecticides with various modes of action were included in the assays. During the non-contact assay, significantly more <i>S. pyrioides</i> individuals were collected away from the insecticide source than closer to the source when cyfluthrin, bifenthrin, dinotefuran, clothianidin, cyaniliprole and novaluron were used. During the contact assay, the number of visits was significantly lower for thiamethoxam, lambda-cyhalothrin + bifenthrin + imidacloprid, permethrin, tebufenozide and spinosad treatments than for dinotefuran, azadirachtin, spirotetramat and <i>Chromobacterium subtsugae</i> strain PRAA4-1T. The adults spent significantly less time on leaves treated with cyfluthrin, permethrin and pyriproxyfen than the other treatments. In a mortality assay performed after 4 h of exposure, significantly more dead adults were found associated with acetamiprid, dinotefuran, thiamethoxam and flupyradifurone compared to chlorantraniliprole, cyantraniliprole, cyaniliprole, azadirachtin, afidopyropen and flonicamid. After 24 h of exposure, a significantly lower number of fecal spots was observed in the acetamiprid, dinotefuran, thiamethoxam, flupyradifurone, lambda-cyhalothrin, cyantraniliprole, cyaniliprole, pyrifluquinazon and afidopyropen treatments than chlorantraniliprole and azadirachtin.
Toxicology	Reproductive effects of subchronic exposure to acetamiprid in male rats	E. Y. G. K. Arican, D., et. al. <i>Sci Rep</i> 10, 1, 8985 https://www.ncbi.nlm.nih.gov/pubmed/32488017	Acetamiprid, a selective agonist of nicotinic acetylcholine receptors, is one of the most widely used neonicotinoids. There is limited data about toxicity of acetamiprid on male reproductive system. Therefore, the study aimed to investigate the reproductive toxic potential of acetamiprid in male rats orally treated with acetamiprid with low (12.5 mg/kg) medium (25 mg/kg) or high dose (35 mg/kg) for 90 days. According to our results, sperm concentration and plasma testosterone levels decreased in dose dependent manner. Gonadotropin-releasing hormone (GnRH), follicle-stimulating hormone (FSH), luteinizing hormone (LH) levels increased at low and medium dose groups and acetamiprid caused lipid peroxidation and glutathione (GSH) depletion in the testes. Histologic examinations revealed that acetamiprid induced apoptosis in medium and high dose groups and proliferation index dramatically decreased in high dose group. In conclusion, acetamiprid caused toxicity on male reproductive system in the high dose. The mechanism of the toxic effect may be associated with oxidative stress, hormonal disruptions and apoptosis.
9	Residues of neonicotinoids in soil, water and people's hair: A case study from three agricultural regions of the Philippines	J. M. M. Bonmatin, E. A. D., et. al. <i>Sci Total Environ</i> 757, , 143822 https://www.ncbi.nlm.nih.gov/pubmed/33246718	Synthetic pesticides such as neonicotinoids are commonly used to treat crops in tropical regions, where data on environmental and human contamination are patchy and make it difficult to assess to what extent pesticides may harm human health, especially in less developed countries. To assess the degree of environmental and human contamination with neonicotinoids we collected soil, water and people's hair in three agricultural regions of the Philippines and analysed them by ultra-high performance liquid chromatography coupled to tandem mass spectrometry (UHPLC-MS-MS). Five neonicotinoids, namely acetamiprid, clothianidin, imidacloprid, thiacloprid and thiamethoxam were targeted. Residues of neonicotinoids were found in 78% of 67 soil samples from the three provinces. Total neonicotinoid loads ranged on average between 0.017 and 0.89 µg/kg in soils of rice, banana and vegetable crops, and were 130 times higher (113.5 µg/kg) in soils of a citrus grove. Imidacloprid was the most prevalent compound at an average of 0.56 µg/kg in soil while thiacloprid was below the limit of detection. Half of the eight water samples from a rice field and nearby creek contained residues of imidacloprid (mean 1.29 ng/L) and one contained thiamethoxam (0.15 ng/L). Residues of neonicotinoids were found in 81% of 99 samples of people's hair from the surveyed regions (average total concentrations 0.14 to 1.18 ng/g, maximum 350 ng/g). Hair residue levels correlated well with the concentrations of thiamethoxam and total residues in soils from the same locality ($r = 0.98$). The presence of thiacloprid in 15% of the hair samples but not in soil samples suggests an additional route of exposure among people, which is most likely to be through ingestion of agricultural food and drinks available in the market.
9	Resistance and Vulnerability of Honeybee (<i>Apis mellifera</i>) Gut Bacteria to Commonly Used Pesticides	Cuesta-Maté A, Renelies-Hamilton J, Kryger P, Jensen AB, Sinotte VM, Poulsen M. Resistance and Vulnerability of Honeybee (<i>Apis mellifera</i>) Gut Bacteria to Commonly Used Pesticides. <i>Front Microbiol.</i> 2021 Sep 3;12:717990.	Agricultural and apicultural practices expose honeybees to a range of pesticides that have the potential to negatively affect their physiology, neurobiology, and behavior. Accumulating evidence suggests that these effects extend to the honeybee gut microbiome, which serves important functions for honeybee health. Here we test the potential effects of the pesticides thiacloprid, acetamiprid, and oxalic acid on the gut microbiota of honeybees, first in direct in vitro inhibition assays and secondly in an in vivo caged bee experiment to test if exposure leads to gut microbiota community changes. We found that thiacloprid did not inhibit the honeybee core gut bacteria in vitro, nor did it affect overall community composition or richness in vivo. Acetamiprid did also not inhibit bacterial growth in vitro, but it did affect community structure within bees. The eight bacterial genera tested showed variable levels of susceptibility to oxalic acid in vitro. In vivo, treatment with this pesticide reduced amplicon sequence variant (ASV) richness and affected gut microbiome composition, with most marked impact on the common crop bacteria <i>Lactobacillus kunkeei</i> and the genus <i>Bombella</i> . We conducted network analyses which captured known associations between bacterial members and illustrated the sensitivity of the microbiome to environmental stressors. Our findings point to risks of honeybee exposure to oxalic acid, which has been deemed safe for use in treatment against Varroa mites in honeybee colonies, and we advocate for more extensive assessment of the long-term effects that it may have on honeybee health.
4	Resistance of green lacewing, <i>Chrysoperla carnea</i> Stephens to nitenpyram: Cross-resistance patterns, mechanism, stability, and realized heritability	M. M. R. Mansoor, A. B., et. al. <i>Pestic Biochem Physiol</i> 135, , 59-63 https://www.ncbi.nlm.nih.gov/pubmed/28043332	The green lacewing, <i>Chrysoperla carnea</i> Stephens (Neuroptera: Chrysopidae) is a major generalist predator employed in integrated pest management (IPM) plans for pest control on many crops. Nitenpyram, a neonicotinoid insecticide has widely been used against the sucking pests of cotton in Pakistan. Therefore, a field green lacewing strain was exposed to nitenpyram for five generations to investigate resistance evolution, cross-resistance pattern, stability, realized heritability, and mechanisms of resistance. Before starting the selection with nitenpyram, a field collected strain showed 22.08-, 23.09-, 484.69- and 602.90-fold resistance to nitenpyram, buprofezin, spinosad and acetamiprid, respectively compared with the Susceptible strain. After continuous selection for five generations (G1-G5) with nitenpyram in the laboratory, the Field strain (Niten-SEL) developed a resistance ratio of 423.95 at G6. The Niten-SEL strain at G6 showed no cross-resistance to buprofezin and acetamiprid and negative cross-resistance to spinosad compared with the Field strain (G1). For resistance stability, the Niten-SEL strain was left unexposed to any insecticide for four generations (G6-G9) and bioassay results at G10 showed that resistance to nitenpyram, buprofezin and spinosad was stable, while resistance to acetamiprid was unstable. The realized heritability values were 0.97, 0.16, 0.03, and -0.16 to nitenpyram, buprofezin, acetamiprid and spinosad, respectively, after five generations of selection. Moreover, the enzyme inhibitors (PBO or DEF) significantly decreased the nitenpyram resistance in the resistant strain, suggesting that resistance was due to microsomal oxidases and esterases. These results are very helpful for integration of green lacewings in IPM programs.
9	Rinsing Tea before Brewing Decreases Pesticide Residues in Tea Infusion	Gao W, Yan M, Xiao Y, Lv Y, Peng C, Wan X, Hou R. Rinsing Tea before Brewing Decreases Pesticide Residues in Tea Infusion. <i>J Agric Food Chem.</i> 2019 May 15;67(19):5384-5393.	Rinsing dried tea leaves before brewing is a traditional way of preparing rolled oolong tea in China. This study analyzes how rinsing green, black, and oolong tea before brewing affects the levels of pesticide residues in the tea infusion. Eight representative insecticides of different polarities were tracked, namely, three neonicotinoids (acetamiprid, imidacloprid, and thiamethoxam), two organophosphates (dimethoate and malathion), and three pyrethroids (bifenthrin, β -cypermethrin, and fenvalerate). The results showed that the eight pesticides transferred into the rinse water at rates between 0.2 and 24% after 5, 10, 20, or 30 s. Rinsing tea before brewing reduced the pesticide risk levels by 5-59% in the tea infusion. Five functional components, such as epigallocatechin gallate and caffeine, were reduced by 0-11% in the tea infusion. The results can be used to develop an effective method of rinsing tea before brewing that reduces pesticide exposure risks.

Phase 1 Conformity category	Title	Citation	Abstract
5	Self-Assembled MoS2/ssDNA Nanostructures for the Capacitive Aptasensing of Acetamiprid Insecticide	Hamami, M., et. al. (2021). "Self-Assembled MoS2/ssDNA Nanostructures for the Capacitive Aptasensing of Acetamiprid Insecticide." Applied Sciences 11(4).	The aim of this work is to detect acetamiprid using electrochemical capacitance spectroscopy, which is widely used as a pesticide in agriculture and is harmful to humans. We have designed aptasensing platform based on the adsorption of a DNA aptamer on lipophilic acid-modified MoS2 nano-sheets. The biosensor takes advantage of the high affinity of single-stranded DNA sequences to MoS2 nano-sheets. The stability of DNA on MoS2 nano-sheets is assured by covalent attachment to lipophilic acid that forms self-assembled layer on MoS2 surface. The biosensor exhibits excellent capacitance performances owing to its large effective surface area making it interesting material for capacitive transduction system. The impedance-derived capacitance varies with the increasing concentrations of acetamiprid that can be attributed to the aptamer desorption from the MoS2 nanosheets facilitating ion diffusion into MoS2 interlayers. The developed device showed high analytical performances for acetamiprid detection on electrochemical impedance spectroscopy EIS- derived capacitance variation and high selectivity toward the target in presence of other pesticides. Real sample analysis of food stuff such as tomatoes is demonstrated which opens the way to their use for monitoring of food contaminants by tailoring the aptamer.
Ecotoxicology	Sensitivity of the early-life stages of freshwater mollusks to neonicotinoid and butenolide insecticides	R. S. d. S. Prosser, S. R., et. al. Environ Pollut 218, , 428-435 https://www.ncbi.nlm.nih.gov/pubmed/27450416	Neonicotinoid insecticides can be transported from agricultural fields, where they are used as foliar sprays or seed treatments, to surface waters by surface or sub-surface runoff. Few studies have investigated the toxicity of neonicotinoid or the related butenolide insecticides to freshwater mollusk species. The current study examined the effect of neonicotinoid and butenolide exposures to the early-life stages of the ramshorn snail, Planorbella pilsbryi, and the wavy-rayed lampmussel, Lampsilis fasciola. Juvenile P. pilsbryi were exposed to imidacloprid, clothianidin, or thiamethoxam for 7 or 28 d and mortality, growth, and biomass production were measured. The viability of larval (glochidia) L. fasciola was monitored during a 48 h exposure to six neonicotinoids (imidacloprid, thiamethoxam, clothianidin, acetamiprid, thiacloprid, or dinotefuran), or a butenolide (flupyradifurone). The 7-d LC50s of P. pilsbryi for imidacloprid, clothianidin, and thiamethoxam were ≥ 4000 $\mu\text{g/L}$ and the 28-d LC50s were ≥ 182 $\mu\text{g/L}$. Growth and biomass production were considerably more sensitive endpoints than mortality with EC50s ranging from 33.2 to 122.0 $\mu\text{g/L}$. The 48-h LC50s for the viability of glochidia were ≥ 456 $\mu\text{g/L}$ for all seven insecticides tested. Our data indicate that neonicotinoid and butenolide insecticides pose less of a hazard with respect to mortality of the two species of mollusk compared to the potential hazard to other non-target aquatic insects.
5	SERS-active metal-organic frameworks with embedded gold nanoparticles	X. H. Cao, S., et. al. Analyst 142, 14, 2640-2647 https://www.ncbi.nlm.nih.gov/pubmed/28612075	Surface-enhanced Raman scattering (SERS) has been widely used in the detection of targets and strongly depends on the interaction and the distance between the targets and nanoparticles. Herein, metal-organic frameworks (MOFs) were first easily synthesized on a large scale via a water bath method, especially UiO-66 and UiO-67. MOFs embedded with gold nanoparticles (AuNPs) for SERS enhancement were successfully fabricated via an impregnation strategy. The synthesized AuNPs/MOF-199, AuNPs/UiO-66, and AuNPs/UiO-67 composites, with LSPR properties and high adsorption capability of MOFs to preconcentrate the analytes close to the surface of the AuNPs, exhibited excellent SERS activity. The effects of the reducing concentrations of sodium citrate on the SERS activity, and the stability and reproducibility of the AuNP/MOFs have been discussed via the detection of acetamiprid. The SERS intensity enhanced by the composites was retained for more than 40 days under ambient conditions with the reducing concentrations of sodium citrate at 0.16%, 0.20%, and 0.16%. The limits of detection with the signal/noise ratio higher than 3 at the characteristic peak 632 cm^{-1} were 0.02 μM , 0.009 μM , and 0.02 μM for acetamiprid. Most interestingly, the AuNP/MOF-199 composites, whose morphology was long tube sheet, exhibited excellent SERS activity. These novel composites with high sensitivity, stability, and reproducibility provide a new route for the detection of pesticides via the SERS technology.
9	Serum concentrations of neonicotinoids, and their associations with lipid molecules of the general residents in Wuxi City, Eastern China	Chen, Q., et al. (2021). "Serum concentrations of neonicotinoids, and their associations with lipid molecules of the general residents in Wuxi City, Eastern China." Journal of Hazardous Materials 413: 125235.	Exposure to neonicotinoid insecticides (NNIs) was proven to be harmful to organisms, however, there is a dearth of information regarding their occurrence and adverse effects on the general residents. Here, $n = 120$ human serum samples were collected from the same area of Wuxi city, Eastern China, and these serum samples were further analyzed for nine NNIs and nine target lipid molecules by use of ultrahigh performance liquid chromatography-quadrupole orbitrap high-resolution mass spectrometer. We observed that four out of nine NNIs exhibited relatively high detection frequencies (DF), and these NNIs were imidacloprid (IMI; DF = 28.3%), clothianidin (CLO; 16.7%), thiacloprid (THI; 14.2%), and acetamiprid (ACE; 12.5%), respectively, with 95th concentrations ranging from 32.0 to 427 pg/mL . Median concentrations of imidacloprid-equivalent total neonicotinoids (IMeq) and Σ 7NNI were 46.6 pg/mL and 26 pg/mL , respectively. Five out of nine lipid molecules exhibited higher levels, that were docosahexaenoic acid [FA(22:6)], 18:0 phosphocholine [LysoPC(18:0)], 18:0 phosphoethanolamine [LysoPE(18:0)], D18:1-18:0 sphingomyelin [SM(d18:1/18:0)], and 18:1-18:1 diglycerol [DG(18:1/18:1)], respectively. More interestingly, we observed statistically significant correlations (student's t-test, one-way ANOVA, or Mann-Whitney test; $p < 0.05$) between NNI levels and population characteristics (i.e. age, smoking, and health status). Beyond that, we also observed statistically significant correlations between levels of selected NNIs (CLO, ACE, or THI) and lipid molecules [LysoPE(18:0), SM(d18:1/18:0), and DG(18:1/18:1)]. Collectively, for the first time, we provided the information on contamination levels of NNIs in serum samples of general residents in China and demonstrated the associations between concentrations of NNIs and levels of lipid molecular species.
9	Serum concentrations of pesticides including organophosphates, pyrethroids and neonicotinoids in a population with osteoarthritis in Saudi Arabia	A. J. B. Li, A. A., et. al. Sci Total Environ 737, , 139706 https://www.ncbi.nlm.nih.gov/pubmed/32512300	Human exposure to pesticides is widespread and has received much attention in recent years because of its link to adverse health outcomes. Measurement of urinary concentrations of pesticides and their metabolites is often used in the assessment of body burdens of these chemicals. However, pesticides and their metabolites can be present in blood circulatory system, although little is known on serum levels of pesticides. In this study, we aimed to examine the occurrence and profile of four organophosphate (OP), five pyrethroid (PYR) insecticides, two phenoxy acid (PA) herbicides, 14 neonicotinoid (neonic) insecticides and six dialkylphosphate metabolites in serum from 25 individuals diagnosed with osteoarthritis in Jeddah, Saudi Arabia. 2-Isopropyl-4-methyl-6-hydroxypyrimidine (IMPY), 3,5,6-trichloro-2-pyridinol (TCPY), 2,4-dichlorophenoxyacetic acid, 2,4,5-trichlorophenoxyacetic acid, 3-phenoxybenzoic acid, N-desmethyl acetamiprid, dimethylphosphate (DMP) and dimethylthiophosphate (DMTP) were detected in $\geq 80\%$ of the serum samples analyzed. Metabolites of OPs, DMTP (median concentration: 2.14 ng/mL), DMP (1.04 ng/mL) and TCPY (0.84 ng/mL), collectively accounted for 67-83% of the total serum pesticide concentrations. Serum concentrations of pesticides were similar to or lower than those reported in urine. Our preliminary evidence suggests that serum can be used as a matrix for the assessment of exposure to OPs, PYRs, PAs and neonics.
9	Short-term lab assessments and microcolonies are insufficient for the risk assessment of insecticides for bees	A. K. Van Oystaeyen, B. K., et. al. Chemosphere 273, , 128518 https://www.ncbi.nlm.nih.gov/pubmed/33092828	Risk assessment studies addressing effects of agrochemicals on bumblebees frequently use microcolonies. These are queenless colonies consisting of workers only in which typically one worker will lay unfertilized male-destined eggs. In the first tier of risk assessment for bees, short-term laboratory experiments (e.g. microcolonies) are used, the results of which will determine whether higher tier (semi-)field experiments are needed. To evaluate the suitability of microcolonies for risk assessment, a direct comparison between different assessment methods for the neonicotinoid pesticides acetamiprid and thiacloprid was made: microcolonies and queenright colonies under short-term laboratory conditions, queenright colonies under long-term laboratory conditions, and queenright colonies under field conditions. Here, we demonstrate that results from microcolonies contradict results from queenright colonies. While thiacloprid negatively impacted gyne production in queenright colonies, it had a positive effect on microcolony size. By contrast, thiacloprid had no significant effect on fitness parameters of queenright colonies under short-term laboratory conditions when mostly workers are produced. These results thus highlight both the need for long term assessments, allowing evaluation of gyne production, and the risk of reaching erroneous conclusions when using microcolonies. The negative effect of thiacloprid on colony fitness was confirmed under field conditions, where thiacloprid affected the production of reproductives, colony weight gain, worker weight, and foraging behaviour. For acetamiprid, a negative trend on colony fitness could only be shown in a field setup. Therefore, field-realistic setups, which allow colonies to forage freely, are most appropriate to assess sublethal effects of pesticides affecting behaviour and learning.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Similar Comparative Low and High Doses of Deltamethrin and Acetamiprid Differently Impair the Retrieval of the Proboscis Extension Reflex in the Forager Honey Bee (<i>Apis mellifera</i>)	S. H. B. Thany, et. al. <i>Insects</i> 6, 4, 805-14 https://www.ncbi.nlm.nih.gov/pubmed/26466901	In the present study, the effects of low (10 ng/bee) and high (100 ng/bee) doses of acetamiprid and deltamethrin insecticides on multi-trial learning and retrieval were evaluated in the honey bee <i>Apis mellifera</i> . After oral application, acetamiprid and deltamethrin at the concentrations used were not able to impair learning sessions. When the retention tests were performed 1 h, 6 h, and 24 h after learning, we found a significant difference between bees after learning sessions when drugs were applied 24 h before learning. Deltamethrin-treated bees were found to be more sensitive at 10 ng/bee and 100 ng/bee doses compared to acetamiprid-treated bees, only with amounts of 100 ng/bee and at 6 h and 24 h delays. When insecticides were applied during learning sessions, none of the tested insecticides was able to impair learning performance at 10 ng/bee or 100 ng/bee but retention performance was altered 24 h after learning sessions. Acetamiprid was the only one to impair retrieval at 10 ng/bee, whereas at 100 ng/bee an impairment of retrieval was found with both insecticides. The present results therefore suggest that acetamiprid and deltamethrin are able to impair retrieval performance in the honey bee <i>Apis mellifera</i> .
5	A simple and rapid chemiluminescence aptasensor for acetamiprid in contaminated samples: Sensitivity, selectivity and mechanism	Y. X. Qi, F. R., et. al. <i>Biosens Bioelectron</i> 83, , 243-9 https://www.ncbi.nlm.nih.gov/pubmed/27131997	Ultralow concentration and selective detection of pesticide residue is important to evaluate the environmental and biological pollution and the threat to human health which single component pesticide can bring. Herein, we report an amplified chemiluminescence (CL) sensing platform for ultrasensitive and selective acetamiprid (widely used pesticide) detection. It is based on aptamer's high binding affinity to target and the relevance between AuNPs' morphology and its catalytic effect to stimulate the generation of CL in the presence of H ₂ O ₂ and luminol. Moreover, AuNPs morphological slight change induced by aptamers' conformation during targets binding could lead to the significant change of catalytic properties. Therefore, the proposed sensing platform for pesticide residue exhibited a high sensitivity toward acetamiprid with a detection limit of 62pM, which was about 100-fold lower than that of other aptamer-based sensor for acetamiprid detection. Because of the intrinsic specificity of aptamer's recognition, this sensing platform has high selectivity. So, this sensing platform provides a label-free and cost-effective approach for sensitive and selective detection of single component pesticide residue. More importantly, this CL method was successfully used to determine acetamiprid in real contaminated samples.
5	Simultaneous determination of 98 pesticide residues in strawberries using UPLC-MS/MS and GC-MS/MS	Yue, C., et. al. <i>Simultaneous determination of 98 pesticide residues in strawberries using UPLC-MS/MS and GC-MS/MS</i> . <i>Microchemical Journal</i> , 156, 2020	Strawberries are a popular fruit but pesticide residues on strawberries can pose a risk to human health. We established a multi-residue gas chromatography-tandem mass spectrometry (GC-MS/MS) and high performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS) method for analysis of 98 pesticide residues on strawberries. A total of 26 pesticides were detected, and the detection percent ranged between 0.23% and 18.18%. The total sample detection percent was 39.32%. The pesticides with a relatively high detection percent were procymidone, pyrimethanil, acetamiprid, carbendazim, iprodione, tridemorph, chlormequat, fluazinam, prochloraz, and myclobutanil. The dietary risk assessment showed large differences in the acute and chronic exposure risk entropy values of various dietary pesticide exposures between different age groups and genders. They ranged from 0.1665% to 55.7224% and 0.0003% to 66.2687%, respectively. Both were less than 100% and within an acceptable safety range. There were different levels of pesticide residues on strawberries and most strawberries had residues of multiple pesticides. The levels of pesticide residues on strawberries were low, and there was no acute or chronic risk to humans via strawberry consumption.
5	Simultaneous determination of eight neonicotinoid insecticides, fipronil and its three transformation products in sediments by continuous solvent extraction coupled with liquid chromatography-tandem mass spectrometry	Z. C. Wang, J., et. al. <i>Ecotoxicol Environ Saf</i> 189, , 110002 https://www.ncbi.nlm.nih.gov/pubmed/31825794	Neonicotinoids (NEOs) and fipronil (FIP) are insecticides that are widely used in modern agriculture and have received considerable attention in recent years due to their adverse effects on non-target organisms in the environment. In the present study, a new method to simultaneously detect eight common NEO insecticides and FIP and its three transformation products (FIPs) in sediments was developed using high-performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS) based on a combined pretreatment of continuous solvent extraction (CSE) and solid phase extraction (SPE). Under optimized conditions, 5.0 g of freeze-dried sediment samples were initially extracted with methanol (20 mL)-methanol (15 mL)-water (20 mL) in sequence, and then the extract was cleaned with hydrophilic-lipophilic balance SPE cartridges, and HPLC-MS/MS analysis was conducted. The established method was validated to be sensitive, linear, accurate, and precise. The limits of detection (LOD) and limits of quantification (LOQ) of target compounds were 0.012-0.055 µg/kg d.w and 0.031-0.091 µg/kg d.w, respectively. Good linearity ($R(2) > 0.990$) was observed between 4.0×10^{-2} and 20.0 µg/kg d.w. The recovery rates of all target insecticides were between 75.5% and 98.5%, and the relative standard deviations (RSD) were all less than 15.0% at the low, medium, and high spiked levels. Finally, the optimized method was applied to analyze 12 target insecticides in the sediments obtained from Jiaozhou Bay of China and its main inflow rivers. Acetamiprid, thiamethoxam, fipronil sulfide, and fipronil sulfone were detected in the river sediment samples at the concentration from <LOQ to 0.197 µg/kg d.w. Thus, the two types of studied insecticides can enter the sedimentary environment. Overall, the proposed method can be used to investigate the contamination status of typical NEOs and FIP insecticides in sediments and provide base data to comprehensively understand their environmental behavior, safety, and fate.
5	Simultaneous determination of neonicotinoids and fipronil and its metabolites in environmental water from coastal bay using disk-based solid-phase extraction and high-performance liquid chromatography-tandem mass spectrometry	Li X, Chen J, He X, Wang Z, Wu D, Zheng X, Zheng L, Wang B. <i>Simultaneous determination of neonicotinoids and fipronil and its metabolites in environmental water from coastal bay using disk-based solid-phase extraction and high-performance liquid chromatography-tandem mass spectrometry</i> . <i>Chemosphere</i> . 2019 Nov;234:224-231.	In the previous decade, neonicotinoids (NEOs) and fipronil (FIP) have received increasing attention as environmental pollutants because the high toxicity of these insecticides to nontarget arthropods has been recognized. In this study, a new method was developed for the simultaneous determination of seven NEOs and FIP and its metabolites (FIPs) in seawater and river water samples using disk-based solid-phase extraction (SPE) and high-performance liquid chromatography-tandem mass spectrometry (HPLC-MS/MS). The optimization of disk-based SPE extraction and HPLC separation parameters of target analytes was investigated. Under optimal conditions, the low limit of quantitation (LOQ) of 11 target analytes in actual water samples ranged from 0.05 ng/L to 0.50 ng/L. Satisfactory absolute recoveries (58.9%-109.9%), precision (relative standard deviations, ≤13.3%), and linearity ($R(2) \geq 0.995$) were also achieved, thereby indicating that the developed method would be suitable to determine the target NEOs and FIPs in seawater and river water. Finally, the proposed method was applied to determine the amounts of these insecticides in authentic environmental water samples collected from Jiaozhou Bay, China, and its adjacent rivers. Nitenpyram, thiamethoxam, imidacloprid, clothianidin, and acetamiprid were detected, as well as FIPs in seawater and river water samples. This study is the first to report that NEOs and FIPs are detected in the coastal seawater. The total concentration of these insecticides ranged from ≤LOD to 11.19 ng/L, which indicates that these pesticides are eventually discharged into the marine environment. Therefore, it is necessary to investigate the temporal spatial distribution, migration and transformation, environmental fate, and bioavailability of these pesticides in further studies.
5	Simultaneous determination of nine neonicotinoids in human urine using isotope-dilution ultra-performance liquid chromatography tandem mass spectrometry	Zhang Q, Wang X, Li Z, Jin H, Lu Z, Yu C, Huang YF, Zhao M. <i>Simultaneous determination of nine neonicotinoids in human urine using isotope-dilution ultra-performance liquid chromatography-tandem mass spectrometry</i> . <i>Environ Pollut</i> . 2018 Sep;240:647-652.	Neonicotinoids (neonics), a class of systemic insecticides, have been frequently detected in pollen, vegetables, and fruits. Recently, an increasing concern has been aroused for human exposure to neonics. However, biological monitoring for quantifying body burden of neonics has rarely been reported. In this study, we developed an isotope-dilution ultra-high performance liquid chromatography coupled with tandem mass spectrometry (UPLC-MS/MS) method to simultaneously quantify nine neonics, including acetamiprid (ACE), thiamethoxam (THIAM), imidacloprid (IMIP), clothianidin (CLO), flonicamid (FLO), thiacloprid (THIAC), dinotefuran (DIN), nitenpyram (NIT), and imidaclothiz (IMIT) in urine. The limits of quantification were 0.1 µg/L for ACE, FLO, DIN, NIT and IMIT, and 0.2 µg/L for THIAM, IMIP, CLO, and THIAC. The overall recoveries were 80.8-103%, 81.5-91.7% and 83.0-92.3% for QA/QC samples fortifying at 1, 25, and 100 µg/L levels, respectively. UPLC/MS/MS method was used to analyze urine samples obtained from 10 children in Hangzhou, China. The detection frequencies were 80% for ACE and IMIP, 70% for THIAM and CLO, 20% for DIN and IMIT and 10% for THIAC. FLO and NIT were not detected in those urine samples. The data provided here will be helpful for conducting biological monitoring of neonics exposure in the future.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Single and joint toxicity assessment of four currently used pesticides to zebrafish (Danio rerio) using traditional and molecular endpoints	Wang Y, Wu S, Chen J, Zhang C, Xu Z, Li G, Cai L, Shen W, Wang Q. Single and joint toxicity assessment of four currently used pesticides to zebrafish (Danio rerio) using traditional and molecular endpoints. Chemosphere. 2018 Feb;192:14-23.	Pesticides usually present in mixtures in surface waters, although they are traditionally regulated on an individual basis in aquatic ecosystems. In this study, we aimed to investigate the lethal and transcriptional responses of individual and combined pesticides (iprodione, pyrimethanil, pyraclostrobin and acetamiprid) on zebrafish (Danio rerio). Semi-static toxicity test indicated that the greatest toxicity to the four life stages (embryonic, larval, juvenile and adult stages) of D. rerio was detected from pyraclostrobin, followed by iprodione and pyrimethanil. In contrast, the lowest toxicity to the organisms was found from acetamiprid. Most of the selected pesticides exerted greater toxicities to D. rerio of embryonic stage compared with other life stages. Synergistic responses were observed from all binary mixtures of iprodione in combination with pyrimethanil or acetamiprid and ternary mixtures of iprodione+pyraclostrobin in combination with pyrimethanil or acetamiprid. The expressions of 16 genes related to cell apoptosis pathway, oxidative stress response, innate immunity and endocrine disruption at the mRNA level showed that zebrafish embryos were affected by the individual or combined pesticides. The expressions of P53, Tnf, TR β , Tsh and Cyp19a exhibited greater changes upon exposure to combined pesticides compared with individual pesticides. Taken together, increased toxicity might be triggered by the simultaneous presence of several pesticides in the aquatic environment, which seriously damaged the non-target organisms.
13	Solar reclamation of agro-wastewater polluted with eight pesticides by heterogeneous photocatalysis using a modular facility. A case study	Garrido, I., et al. (2020). "Solar reclamation of agro-wastewater polluted with eight pesticides by heterogeneous photocatalysis using a modular facility. A case study." Chemosphere 249: 126156.	In this work, we have studied the removal of eight pesticides, commonly used in fruit crops, in agro-wastewater generated in commercial farms by the cleaning of trace of phytosanitary products in containers and tanks from treatment equipment. The studied pesticides were acetamiprid, cyproconazole, cyprodinil, difenoconazole, fenhexamid, hexythiazox, myclobutanil and thiamethoxam. The trials were performed in a pilot facility located in Murcia (SE of Spain), using natural sunlight and titanium dioxide (TiO ₂) in tandem with Na ₂ S ₂ O ₈ . Five photocatalytic treatments were carried out during autumn 2017. Results show that the mean (n = 5) final amount was about 13% of the initial pesticide mass present in agro-wastewater. Therefore, we have proved that this technology could be used for tackling the elimination of pesticide residues in agro-wastewater and has favourable prospects of being applied in the water treatment sector.
13	Solid-phase extraction cartridges with multi-walled carbon nanotubes and effect of the oxygen functionalities on the recovery efficiency of organic micropollutants	M. O. R. Barbosa, R. S., et. al. Sci Rep 10, 1, 22304 https://www.ncbi.nlm.nih.gov/pubmed/33339850	Pristine and functionalized multi-walled carbon nanotubes (MWCNTs) were investigated as adsorbent materials inside solid-phase extraction (SPE) cartridges for extraction and preconcentration of 8 EU-relevant organic micropollutants (with different pKa and polarity) before chromatographic analysis of surface water. The recoveries obtained were > 60% for 5/8 target pollutants (acetamiprid, atrazine, carbamazepine, diclofenac, and isoproturon) using a low amount of this reusable adsorbent (50 mg) and an eco-friendly solvent (ethanol) for both conditioning and elution steps. The introduction of oxygenated surface groups in the carbon nanotubes by using a controlled HNO ₃ hydrothermal oxidation method, considerably improved the recoveries obtained for PFOS (perfluorooctanesulfonic acid) and methiocarb, which was ascribed to the hydrogen bond adsorption mechanism, but decreased those observed for the pesticide acetamiprid and for two pharmaceuticals (carbamazepine and diclofenac), suggesting pi-pi dispersive interactions. Moreover, a good correlation was found between the recovery obtained for methiocarb and the amount of oxygenated surface groups on functionalized MWCNTs, which was mainly attributed to the increase of phenols and carbonyl and quinone groups. Thus, the HNO ₃ hydrothermal oxidation method can be used to finely tune the surface chemistry (and texture) of MWCNTs according to the specific micropollutants to be extracted and quantified in real water samples.
13	Solid-phase extraction disk based on multiwalled carbon nanotubes for the enrichment of targeted pesticides from aqueous samples	N. K. Zdolsek, K., et. al. J Sep Sci 40, 7, 1564-1571 https://www.ncbi.nlm.nih.gov/pubmed/28160421	A sensitive method for the determination of six varying polarity pesticides (imidacloprid, acetamiprid, carbendazim, simazine, linuron, and tebufenozide) based on a solid-phase extraction disk with multiwalled nanotubes is proposed. A dispersion of multiwalled nanotubes in a surfactant aqueous solution (Triton X-100) was used for the preparation of the solid-phase extraction disk. The effect of surfactant on the functional groups of multiwalled nanotubes was examined by applying temperature-programmed desorption. It was found that this treatment increased the amount of oxygen groups of treated multiwalled nanotubes comparing with untreated ones. The factors that may influence the adsorption and recovery such as the kind and volume of eluent, volume, flow rate and pH of sample were investigated and optimized. Under the optimized conditions, the maximal enrichment factors for low polar pesticides are ranging from 4000 to 4985 and for more polar are 2250 and 2750. The linear range of calibration curves was 10-500 ng/L with correlation coefficient higher than 0.9960, and the detection limit was 6.2-23.7 ng/L. Finally optimized method was applied for determination trace level of five out of six pesticides in tap and river water samples with good recovery.
13	Solubilization of seven hydrophobic pesticides in quaternary ammonium based eco-friendly ionic liquid aqueous systems	Chen, C., et al. (2017). "Solubilization of seven hydrophobic pesticides in quaternary ammonium based eco-friendly ionic liquid aqueous systems." New Journal of Chemistry 41(19): 10598-10606.	In this work, quaternary ammonium based ionic liquids (ILs) are proven to be good candidates to act as green solvents/solubilizers for pesticide formulations. The surface activity of six ionic liquids ([M ₃ CnN]X; M = CH ₃ ; n = 10, 12, 14; X = Cl, Br) was tested, along with the corresponding critical aggregation concentration (CAC), lowest surface tension (γ CAC), maximum surface excess concentration (Γ max), minimum area per molecule (Amin) and higher adsorption efficiency (pC ₂₀), which were measured using several methods, including surface tension measurements, electrical conductivity measurements, steady-state fluorescence measurements and ¹ H NMR. The thermodynamic parameters of micellization, the viscosities and the activation energies of the six ILs in 30% aqueous solutions, over the temperature range of 288-308 K, were determined and calculated. The results indicated that the solubilities of representative pesticides (metolachlor, acetochlor, clethodim, thiamethoxam, prochloraz, acetamiprid and fosthiazate) in different concentrations of these ILs were significantly higher than in pure water, especially for prochloraz (e.g., 137.2 g L ⁻¹ in 30% C10Br, 4035 times higher than in pure water). The microenvironment existing between the pesticide and micelle was investigated using ¹ H NMR techniques, revealing that micelle localization of pesticide molecules and a change in micelle conformation occurred in the dissolving process.
9	Spatial and seasonal occurrence of micropollutants in four Portuguese rivers and a case study for fluorescence excitation-emission matrices	M. O. R. Barbosa, A. R., et. al. Sci Total Environ 644, , 1128-1140 https://www.ncbi.nlm.nih.gov/pubmed/30743826	The European Union (EU) has recommended the monitoring of specific priority substances (PSs; Directive 2013/39) and some contaminants of emerging concern (CECs; Decision 2015/495) in surface waterbodies. The present study provides spatial distributions and temporal variations of a wide range of multi-class PSs and CECs in four stressed rivers in Portugal (Ave, Leca, Antua, and Certima). Thirteen micropollutants were found in all four rivers, including the priority pesticide isoproturon (up to 92ngL ⁻¹), various pharmaceuticals (up to 396ngL ⁻¹), and the UV-filter 2-ethyl-hexyl-4-methoxycinnamate (EHMC, up to 562ngL ⁻¹) identified in Decision 2015/495. The industrial priority compound perfluorooctanesulfonic acid (PFOS) was found in three rivers (Antua, Certima, and Leca) below the method quantification limit, together with four pharmaceuticals not included in these EU guidelines. The already banned priority pesticide atrazine was detected in Ave, Antua, and Leca (up to 41ngL ⁻¹) and simazine in Certima and Leca (up to 26ngL ⁻¹). Acetamiprid and imidacloprid (included in Decision 2015/495) were only detected during the dry season in the Ave. Leca river was selected as a waterbody case study for assessment of fluorescence excitation-emission matrices (EEMs). These results matched the spatial distribution trend of micropollutants along the river, with stronger fluorescence response and higher concentrations being found downstream of industrial areas and urban wastewater treatment plants (WWTPs). Moreover, the fluorescence signature of surface water collected downstream of an urban WWTP aligned very well with that obtained for the respective WWTP effluent. Thus, actions are needed to preserve a good environmental status of these stressed European waterbodies.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Spatial and temporal distribution, degradation, and metabolism of three neonicotinoid insecticides on different parts, especially pests' target feeding parts of apple tree	Wu, C., Dong, F., Chen, X., Zhang, T., Mei, X., Ning, J. and She, D. (2020), Spatial and temporal distribution, degradation, and metabolism of three neonicotinoid insecticides on different parts, especially pests' target feeding parts of apple tree. <i>Pest Manag Sci</i> , 76: 2190-2197. https://doi.org/10.1002/ps.5756	BACKGROUND Neonicotinoid insecticides (NIs) have been recently banned in some countries because of increased pest resistance and deleterious risks to non-target organisms. Recent studies considered all parts of crops as a whole part in plant protection. However, there are few reports focused on the distribution and metabolic trends of NIs on target feeding sites of different pests in apple orchards. RESULTS The spatial and temporal distribution, absorption, degradation, and metabolism of three NIs, imidacloprid, acetamiprid, and thiamethoxam, on different parts of apple trees were studied under foliar spray and root irrigation treatments. In the spray treatment, the initial average concentration ratios (TCRs) were 31.6% for lower shoots, 23.3% for upper leaves, 23.2% for upper shoots, 21.0% for lower leaves, and 0.5% and 0.4% for upper and lower fruits, respectively. The average half-lives of the three NIs were 2.9 days for shoots, 7.4 days for leaves, and 10.8 days for fruits. The degradation rate of shoots was 2.5 times that of leaves, and 3.6 times that of fruits. Imidacloprid olefin and N-methyl acetamiprid were two of the main metabolites. In the root treatment, both roots and soils had high TCRs during the whole sampling period. Only imidacloprid was transmitted to above-ground parts of the plants, with TCRs of 0.38–50.94%. CONCLUSION This study found significant differences in spatial and temporal distribution, degradation, metabolism, and trends of NIs on different pest target sites of apple trees. The data obtained may help promote scientific control of target pests and evaluation of safety for non-target species in orchards
Toxicology	Specific immune responses in mice following subchronic exposure to acetamiprid	S. B. D. Marzouki, I., et. al. <i>Life Sci</i> 188, , 44485 https://www.ncbi.nlm.nih.gov/pubmed/28843496	AIMS: Acetamiprid (ACE) is an insecticide of the neonicotinoid family, the most widely used in the world. Herein, we assessed the effect of ACE on either the humoral or cellular immune responses of rodents. We also evaluated the role of curcumin in the restoration of altered immune responses after ACE treatment. METHODS: Five groups of five Swiss Albino mice were immunized intraperitoneally with the recombinant form of CFP32, a virulence factor of <i>Mycobacterium tuberculosis</i>. One group received ACE (5mg/kg) during 61days, a second one received ACE associated with curcumin (100mg/kg). Three control groups were included; one untreated, the second received corn oil and the third received curcumin alone. The humoral immune response was assessed by ELISA testing the anti-rCFP32 antibody concentrations in the serum. The cellular immune response was assessed by analyzing the cellular proliferation of the splenocytes stimulated in vitro by a mitogen or rCFP32. RESULTS: The ACE-treated mice showed a significant immunosuppression of the specific humoral response with a restorative effect of curcumin when administered with ACE. Similarly, ACE significantly decreased the level of splenocyte proliferation after either a non specific or a specific activation. Curcumin partially restores the antigen specific cellular immune response. Moreover, when administered alone, curcumin significantly inhibits the proliferative responses to the mitogen confirming its anti-mitogenic effect. Histological analysis showed alteration of spleens of mice exposed to ACE. SIGNIFICANCE: Altogether, our data indicated that ACE could potentially be harmful to the immune system.
4	Stink bug <i>Agonoscelis</i> spp. (Heteroptera: Pentatomidae)-An emerging threat for seed production in alfalfa crop (<i>Medicago sativa</i> L.) and their successful management	Karar H, Bashir MA, Khaliq A, Ali MJ, Atalla Alajmi R, Metwally DM. Stink bug <i>Agonoscelis</i> spp. (Heteroptera: Pentatomidae) - An emerging threat for seed production in alfalfa crop (<i>Medicago sativa</i> L.) and their successful management. <i>Saudi J Biol Sci</i> . 2021 Jun;28(6):3477-3482.	Fodder crops play an important role in sustainable agriculture as they provide feed for animals, which is ultimately converted to human food. Alfalfa is one of the most important fodder crops having high nutritive value for livestock. However, seed production of alfalfa crop is seriously affected by several factors and the highest reduction in seed yield is caused by stink bug infestation. The current study evaluated different insecticides to control stink bugs during 2016-17. The efficacy of ten insecticides, i.e., acephate, dimethoate, malathion, chlorpyrifos, bifenthrin, lambda-cyhalothrin, deltamethrin, acetamiprid, imidacloprid and carbosulfan was tested on <i>Agonoscelis</i> spp. (Heteroptera Pentatomidae). The mortality of stink bug was recorded at one, three, five, seven, ten and fifteen days after insecticide application. Similarly, the population of pollinators was recorded before and one, three and five days after the application of insecticides. It was observed that acetamiprid (81.14%) and acephate (80.65%) caused the highest mortality of stink bug and proved most effective. Insecticides application decreased the pollinators' population one day after spray; however, it was rehabilitated three days after insecticide application. Insecticide application increased seed yield from 28.05 kg/acre (during last four year without chemical control) to 116 kg/acre in 2016-17 (with chemical control). It is concluded that acetamiprid and acephate can be successfully used in integrated management program of increasing alfalfa seed production.
9	Structure of the beta-cyclodextrin: acetamiprid insecticide inclusion complex in solution and solid state	Alonso, M.L., Sebastián, E., Felices, L.S. et al. Structure of the β -cyclodextrin: acetamiprid insecticide inclusion complex in solution and solid state. <i>J Incl Phenom Macrocycl Chem</i> 86, 103–110 (2016).	The molecular microencapsulation process, through the formation of the inclusion complex with β-cyclodextrin (β-CD), shows numerous environmental and industrial cost advantages, such as, stability improvement of the active substance, synthesis of water-based products, option of commercializing the final product either in solid state or in solution and avoidance of the undesired side-effects derived from the use of insecticides. Furthermore, the inclusion complexes have other advantages that involve controlled and specific release of active component in the medium. In this work the synthesis of the inclusion complex formed by β-CD and the acetamiprid (ACET) nicotinoid insecticide ((E)-N1-[(6-chloro-3-pyridyl)methyl]-N2-cyano-N1-methyl-acetamidine) was done and their molecular structure was studied in solid state and in solution, by means of experimental techniques. The 2:2 stoichiometry found in solid state, a structure based on dimmers classified as a channel type, is similar to that found in solution (1:1 stoichiometry). In both cases, the nitrile and chloropyridine groups of the insecticide molecules are oriented toward primary rim and secondary rim of the β-CD molecule, respectively.
1	Studied on Distribution and Heavy Metal Pollution Index of Heavy Metals in Water from Upper Reaches of the Yellow River, China	H. M. Zuo, X. L., et. al. <i>Guang Pu Xue Yu Guang Pu Fen Xi</i> 36, 9, 3047--52 https://www.ncbi.nlm.nih.gov/pubmed/30085501	In order to understand the spatial distribution and evaluate the pollution degree of heavy metals (As, Cd, Cr, Co, Cu, Mn, Ni, Pb, and Zn) in upper reaches of the Yellow River, surface water samples were collected from 12 selected sites during two field surveys in April 2014 (drought season) and October 2014 (normal season). The concentrations of heavy metals were determined using inductively coupled plasma mass spectrometry (ICP-MS) for spatial variation and heavy metal pollution index. The average concentrations of the metals in the drought season and normal season decreased respectively in the order: Cr (18.56 mug.L-1)>As (2.95 mug.L-1)>Ni (1.87 mug.L-1)>Mn (1.20 mug.L-1)>Cu (1.12 mug.L-1)>Zn (0.59 mug.L-1)>Pb (0.08 mug.L-1)>Cd (0.01 mug.L-1); Mn (596.89 mug.L-1)>Zn (52.46 mug.L-1)>Cu (36.27 mug.L-1)>Ni (25.11 mug.L-1)>Cr (23.19 mug.L-1)>Pb (19.51 mug.L-1)>As (7.30 mug.L-1)>Cd (0.37 mug.L-1). The results were compared with national and international water quality guidelines, as well as literature values reported for the same river in flood season. To assess the composite influence of all the considered metals on the overall quality of the water, heavy metal pollution indices were calculated. The Heavy Metal Pollution Index (HPI) of the river calculated for the individual locations showed ranging from 6.46 to 11.95 in drought season, 4.53 to 210.53 in normal season, respectively. Both the distribution of metals and HPI of two seasons revealed obvious seasonal variation. The results showed that the degree of heavy metal contaminant was not very high and had seasonal variation; both the concentrations of metals and HPIs indicated the pollution level of the normal season was higher than it of the drought season. The results of this paper provided reliable experimental data and theoretical basis for the relevant departments to make further policy decision.

Phase 1 Conformity category	Title	Citation	Abstract
Ecotoxicology	Sublethal acetamiprid doses negatively affect the lifespans and foraging behaviors of honey bee (<i>Apis mellifera</i> L.) workers	J. Y. Shi, H., et. al. Sci Total Environ 738, , 139924 https://www.ncbi.nlm.nih.gov/pubmed/32531610	The neonicotinoid insecticide acetamiprid is applied widely for pest control in agriculture production. However, little is known about the effects of acetamiprid on the foraging behavior of nontarget pollinators. This study aims to investigate effects of sublethal acetamiprid doses on lifespans and foraging behaviors of honey bees (<i>Apis mellifera</i> L.) under natural swarm conditions. Newly emerged worker bees of each treatment received a drop of 1.5 µL acetamiprid solution (containing 0, 0.5, 1, and 2 µg/bee acetamiprid, diluted by water) on the thorax respectively. Bees from 2-day-old to deadline were monitored on foraging behaviors involving the age of bee for first foraging flights, rotating day-off status and the number of foraging flights using the radio frequency identification (RFID) system. We found that acetamiprid at 2 µg/bee significantly reduced the lifespan, induced precocious foraging activity, influenced the rotating day-off status and decreased foraging flights of worker bees. The abnormal behaviors of worker bees may be associated with a decline in lifespan. This work may provide a new perspective into the neonicotinoids that accelerate the colony failure.
Ecotoxicology	A sublethal dose of the neonicotinoid insecticide acetamiprid reduces sperm density in a songbird	S. T. d. M. Humann-Guillemot, et. al. Environ Res 177, , 108589 https://www.ncbi.nlm.nih.gov/pubmed/31330492	Farmland bird species are particularly exposed to pesticides through various pathways. Among pesticides, neonicotinoids insecticides are commonly used in agriculture, but their influence on bird reproductive capacities is poorly understood. In this study, we experimentally tested the effects of the neonicotinoid acetamiprid on House sparrows' sperm quality and oxidative status following ingestion of a low and field-realistic dose of the compound. To do so, 56 males were captured, held and orally dosed seven times over 19 days of experiment with either a saline solution (control) or an acetamiprid-saline solution, and sperm samples were retrieved before and after the experiment. The overall dose given to the birds corresponded to 0.5% of the LD50 for the Zebra finch (5.7mg/kg BW) spread into 7 separate doses and administered every three days over the entire duration of the study (ca. 0.07% LD50 per oral dose). Sperm mobility and sperm oxidative status were unaffected by the treatment, but sperm density was. Birds that received oral doses of acetamiprid suffered a significant decline in their sperm density compared to control birds. This result was confirmed by a significant decrease in the activity of the antioxidant enzyme SOD in the sperm of acetamiprid-dosed birds. These results provide the first evidence of sublethal toxicity of acetamiprid in a songbird and suggest that passerine birds' fertility may be negatively affected by very small doses of neonicotinoids in the wild.
5	Supported TiO ₂ solar photocatalysis at semi-pilot scale: degradation of pesticides found in citrus processing industry wastewater, reactivity and influence of photogenerated species	Jiménez, M., Ignacio Maldonado, M., Rodríguez, E.M., Hernández-Ramírez, A., Saggioro, E., Carra, I. and Sánchez Pérez, J.A. (2015), Supported TiO ₂ solar photocatalysis at semi-pilot scale: degradation of pesticides found in citrus processing industry wastewater, reactivity and influence of photogenerated species. J. Chem. Technol. Biotechnol., 90: 149-157.	BACKGROUND Thiabendazole, imazalil and acetamiprid, pesticides found in wastewater in the citrus fruit processing industry, are recalcitrant to biological treatments. This study deals with the preparation of TiO ₂ supported on glass beads and its use as a photocatalyst in a compound parabolic collector (CPC) solar reactor for the elimination of a mixture of these pesticides (100 µg L ⁻¹ each) in different water matrices. RESULTS The TiO ₂ supported catalyst prepared exhibited good mechanical stability and photocatalytic activity with acetaminophen as the test compound, even in complex matrices. Imazalil degradation was complete, regardless of the type of water, but strong influence of the matrix was observed in the photocatalytic degradation of thiabendazole and acetamiprid. CONCLUSIONS The TiO ₂ -coated glass spheres showed good performance after five cycles in a real municipal wastewater treatment plant (MWWTP) secondary effluent. Both the type of water and the nature of the pollutant play an important role in photocatalytic degradation efficiency. The main photogenerated species involved in the photocatalytic degradation of each pesticide in distilled water were identified. © 2013 Society of Chemical Industry
9	Survival and growth of foodborne pathogens in pesticide solutions routinely used in leafy green vegetables and tomato production	Dobhal S, Zhang G, Royer T, Damicone J, Ma LM. Survival and growth of foodborne pathogens in pesticide solutions routinely used in leafy green vegetables and tomato production. J Sci Food Agric. 2014 Nov;94(14):2958-64	Background: The consumption of fresh produce has increased tremendously in the past few years as have outbreaks of foodborne illnesses associated with these commodities. Pesticides routinely used in crop production could influence the outcomes of foodborne pathogen contamination of fresh produce. Experiments were performed to determine the effects of pesticides on the survival and growth characteristics of <i>Escherichia coli</i> O157:H7 and <i>Salmonella</i> spp. Eight commercial fungicides and insecticides commonly used for disease and insect pest control on leafy green vegetables and tomatoes were evaluated. Results: Among the pesticides tested, copper hydroxide, acetamiprid, cypermethrin and permethrin were found to be significantly ($P < 0.05$) inhibitory to pathogens while no effect was observed for chlorothalonil, flonicamid and methoxyfenozide. At the highest concentration tested (2.66%), azoxystrobin had a significant ($P < 0.05$) stimulatory effect on the growth of <i>E. coli</i> O157:H7 after 24 h incubation. The results indicated that some pesticides can stimulate the growth of human pathogens if contaminated water is used in their preparation, whereas others were likely to inhibit or reduce pathogen populations. Conclusion: This information is helpful in mitigating the risk of microbial contamination in fresh produce, which is critical to public health and safety.
4	Susceptibility of MED-Q1 and MED-Q3 Biotypes of <i>Bemisia tabaci</i> (Hemiptera: Aleyrodidae) Populations to Essential and Seed Oils	D. O. Samuel Fogne, G., et. al. J Econ Entomol 110, 3, 1031-1038 https://www.ncbi.nlm.nih.gov/pubmed/28369577	<i>Bemisia tabaci</i> (Gennadius) (Hemiptera: Aleyrodidae) is a major pest of many agricultural and ornamental crops in tropical and subtropical regions causing damages that result in important economic losses. Insecticides are commonly used in greenhouses or fields to control <i>B. tabaci</i> populations leading to rapid evolution of resistance that render treatments inefficient. Therefore, and for environmental and human health concerns, other approaches must be developed for this pest management. In the present study, we compare, using the leaf dip method, the toxicity of three essential oils (<i>Cymbopogon citratus</i> , <i>Ocimum americanum</i> , and <i>Hyptis spicigera</i>) and three seed oils (<i>Lannea microcarpa</i> , <i>Lannea acida</i> , and <i>Carapa procera</i>) with three chemical insecticides (acetamiprid, deltamethrin, and chlorpyrifos-ethyl) on adults. Two <i>B. tabaci</i> biotypes (MED-Q1 and MED-Q3) belonging to the Mediterranean species and collected in Burkina Faso were used. Essential oils were analyzed by gas chromatography-mass spectrometry and gas chromatography-flame ionization detector. We showed that these two biotypes have different levels of resistance to the three insecticides, MED-Q3 being more sensitive than MED-Q1. Moreover, they differ in the frequency of resistance alleles to insecticides, especially for organophosphates, as these alleles are almost fixed in MED-Q1. On the other hand, the two biotypes prove to be more susceptible to the plant extracts than to insecticides except for chlorpyrifos-ethyl, with essential oils that showed the highest insecticidal activities. Monoterpenes content were the most abundant and showed the highest insecticidal activities. Our results indicated that essential oils, but also seed oils, have the potential to constitute an alternative strategy of pest management.

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Suspected poisoning of domestic animals by pesticides	Caloni F, Cortinovis C, Rivotta M, Davanzo F. Suspected poisoning of domestic animals by pesticides. Sci Total Environ. 2016 Jan 1;539:331-336.	A retrospective study was carried out by reviewing all suspected cases of domestic animal poisoning attributed to pesticides, reported to the Milan Poison Control Centre (MPCC) between January 2011 and December 2013. During this period, pesticides were found to be responsible for 37.3% of all suspected poisoning enquiries received (815). The most commonly species involved was the dog (71.1% of calls) followed by the cat (15.8%), while a limited number of cases involved horses, goats and sheep. Most cases of exposure (47.1%) resulted in mild to moderate clinical signs. The outcome was reported in 59.9% of these cases, with death occurring in 10.4% of them. Insecticides (40.8%) proved to be the most common group of pesticides involved and exposure to pyrethrins-pyrethroids accounted for the majority of calls. According to the MPCC data, there has been a decrease in the number of suspected poisonings cases attributed to pesticides that have been banned by the EU, including aldicarb, carbofuran, endosulfan and paraquat. In contrast, there has been an increase of suspected poisoning cases attributed to the neonicotinoids, imidacloprid and acetamiprid, probably due to their widespread use in recent years. Cases of suspected poisoning that involved exposure to rodenticides accounted for 27.6% of calls received by the MPCC and anticoagulant rodenticides were the primary cause of calls, with many cases involving brodifacoum and bromadiolone. Herbicides were involved in 14.2% of calls related to pesticides and glyphosate was the main culprit in cases involving dogs, cats, horses, goats and sheep. As far as exposure to molluscicides (11.5%) and fungicides (5.9%), most of the cases involved dogs and the suspected poisoning agents were metaldehyde and copper compounds respectively. The data collected are useful in determining trends in poisoning episodes and identifying newly emerging toxicants, thus demonstrating the prevalence of pesticides as causative agents in animal poisonings.
8,9	Synthesis, molecular docking studies, and larvicidal activity evaluation of new fluorinated neonicotinoids against <i>Anopheles darlingi</i> larvae	R. K. da Silva Mesquita, A. , et. al. PLoS One 15, 2, e0227811 https://www.ncbi.nlm.nih.gov/pubmed/32023266	<i>Anopheles darlingi</i> is the main vector of malaria in Brazil, characterized by a high level of anthrophilia and endophagy. Imidacloprid, thiacloprid, and acetamiprid are the most widespread insecticides of the neonicotinoid group. However, they produce adverse effects on the non-target insects. Flupyradifurone has been marketed as an alternative to non-fluorinated neonicotinoids. Neonicotinoids containing trifluoroacetyl substituent reveal increased insecticidal activity due to higher hydrophobicity and metabolic stability. We synthesized novel neonicotinoid insecticides containing fluorinated acceptor groups and their interactions were estimated with the nicotinic acetylcholine receptor (nAChR) binding site by molecular docking studies, to evaluate their larvicidal activity against <i>A. darlingi</i> , and to assess their outdoor photodegradation behavior. New neonicotinoid analogues were prepared and characterized by NMR and mass-spectrometry. The synthesized molecules were modelled by time-dependent density functional theory and analyzed, their interaction with nAChR was investigated by molecular docking. Their insecticide activity was tested on <i>Anopheles</i> larvae collected in suburban area of Manaus, Brazil. Four new fluorinated neonicotinoid analogs were prepared and tested against 3rd instars larvae of <i>A. darlingi</i> showing high larvicidal activity. Docking studies reveal binding modes of the synthesized compounds and suggest that their insecticidal potency is governed by specific interactions with the receptor binding site and enhanced lipophilicity. 2-Chloro-5-(2-trifluoromethyl-pyrrolidin-1-ylmethyl)pyridine 5 showed fast degradation in water maintaining high larvicidal activity. All obtained substances possessed high larvicidal activity in low concentrations in 48 hours of exposure, compared to commercial flupyradifurone. Such activity is connected to a unique binding pattern of the synthesized compounds to insect's nAChR and to their enhanced bioavailability owing to introduction of fluorinated amino-moieties. Therefore, the compounds in question have a high potential for application as control agents for insects transmitting tropical diseases, and they will be less persistent in the environment.
15	The Targeted Pesticides as Acetylcholinesterase Inhibitors: Comprehensive Cross-Organism Molecular Modelling Studies Performed to Anticipate the Pharmacology of Harmfulness to Humans In Vitro	Mladenović M, Arsić BB, Stanković N, Mihović N, Ragno R, Regan A, Miličević JS, Trtić-Petrović TM, Micić R. The Targeted Pesticides as Acetylcholinesterase Inhibitors: Comprehensive Cross-Organism Molecular Modelling Studies Performed to Anticipate the Pharmacology of Harmfulness to Humans In Vitro. Molecules. 2018 Aug 30;23(9):2192.	Commercially available pesticides were examined as <i>Mus musculus</i> and <i>Homo sapiens</i> acetylcholinesterase (mAChE and hAChE) inhibitors by means of ligand-based (LB) and structure-based (SB) in silico approaches. Initially, the crystal structures of simazine, monocrotophos, dimethoate, and acetamiprid were reproduced using various force fields. Subsequently, LB alignment rules were assessed and applied to determine the inter synaptic conformations of atrazine, propazine, carbofuran, carbaryl, tebufenozide, imidacloprid, diuron, monuron, and linuron. Afterwards, molecular docking and dynamics SB studies were performed on either mAChE or hAChE, to predict the listed pesticides' binding modes. Calculated energies of global minima (Eglob_min) and free energies of binding ($\Delta G_{\text{binding}}$) were correlated with the pesticides' acute toxicities (i.e., the LD50 values) against mice, as well to generate the model that could predict the LD50s against humans. Although for most of the pesticides the low Eglob_min correlates with the high acute toxicity, it is the $\Delta G_{\text{binding}}$ that conditions the LD50 values for all the evaluated pesticides. Derived pLD50 = $f(\Delta G_{\text{binding}})$ mAChE model may predict the pLD50 against hAChE, too. The hAChE inhibition by atrazine, propazine, and simazine (the most toxic pesticides) was elucidated by SB quantum mechanics (QM) DFT mechanistic and concentration-dependent kinetic studies, enriching the knowledge for design of less toxic pesticides.
8,9	tau-Fluvalinate and other pesticide residues in honey bees before overwintering	Erban T, Václavikova M, Tomesova D, Halesova T, Hubert J. tau-Fluvalinate and other pesticide residues in honey bees before overwintering. Pest Manag Sci. 2019 Dec;75(12):3245-3251.	Background: Pesticides have often been linked to honey bee colony losses, which occur mainly over winter. In this study, we investigated residues in nine colonies at a model agricultural research site during the period before wintering. Moreover, we applied the acaricide tau-fluvalinate to the colonies via a strip formulation. The pesticide content was determined by UHPLC-QqQ-MS/MS in bees from brood comb initially collected in mid-September immediately prior to the start of tau-fluvalinate treatment and 30 later at the time of tau-fluvalinate strip removal. Results: In addition to commonly analyzed pesticides, we detected two plant growth regulators, chlormequat and metazachlor, in the bee colonies. Whereas thiacloprid, chlormequat and acetamiprid decreased after 30 days and contributed considerably to differences between sample time points, other pesticides appeared to be rather stable. Interestingly, we identified diazinon, which has been banned in the European Union since 2007. The residues of methiocarb sulfoxide and imidacloprid-urea in the absence of their parent compounds indicate historical environmental contamination that can be identified by the detection of residues in a bee colony. tau-Fluvalinate was detected only after the 30-day treatment at an average ($\pm$ SD) concentration of 1.29 ± 1.93 ng/bee, ranging from 0.06 to 7.13 ng/bee. Conclusion: The multidimensional behavior of pesticides in a bee colony was indicated. Although the research area is used for agriculture, the measured pesticide level was relatively low. The recorded concentrations of tau-fluvalinate should not be dangerous to bees, as the values were ~ 200-5000-fold lower than the reported median lethal dose (LD50) values. © 2019 Society of Chemical Industry.
9	Temporal Levels of Urinary Neonicotinoid and Dialkylphosphate Concentrations in Japanese Women Between 1994 and 2011	Ueyama J, Harada KH, Koizumi A, Sugiyama Y, Kondo T, Saito I, Kamijima M. Temporal Levels of Urinary Neonicotinoid and Dialkylphosphate Concentrations in Japanese Women Between 1994 and 2011. Environ Sci Technol. 2015 Dec 15;49(24):14522-8.	Over the last two decades, usage of neonicotinoid (NEO) insecticides has increased due to their high selectivity for insects versus mammals and their effectiveness for extermination of insects resistant to conventional pesticides such as pyrethroids and organophosphates (OPs). However, historical change of the NEO exposure level in humans is poorly understood. The aim of this study is to reveal changes in the levels of NEO and OP exposure in the human body over the last two decades using biomonitoring technique. We quantified urinary concentrations of 7 NEOs (acetamiprid, clothianidin, dinotefuran, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam) and 4 metabolites of OPs (dimethylphosphate, dimethylthiophosphate, diethylphosphate, and diethylthiophosphate) in 95 adult females aged 45-75 in 1994, 2000, 2003, 2009, and 2011 (n = 17-20 different individuals in each year). The results show that the detection rates of urinary NEOs in Japanese women increased significantly between 1994 and 2011, suggesting that intakes of NEOs into the human body rose during that period. In contrast, exposure to OPs having O,O-dimethyl moieties decreased steadily according to a finding that geometric means of urinary dimethylphosphate concentrations kept diminishing considerably. These changes may reflect the amounts of NEOs and OPs used as insecticides in Japan.

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5	Theoretical studies on the hydrolysis mechanism of acetamidrid	Si, H., Zhang, C., Luo, X. et al. Theoretical studies on the hydrolysis mechanism of acetamidrid. <i>Theor Chem Acc</i> 135, 80 (2016).	The possible hydrolysis mechanisms for acetamidrid (AAP) with H3O+, H2O and OH ⁻ in the gas phase were studied by employing the B3LYP/6-311+G(d,p) and MP2/6-311+G(d,p) levels. In each case, two different pathways were taken into account in our calculations. Moreover, the solvent effect of water was estimated at the B3LYP/6-311+G(d,p) level by using the conductor-like polarizable continuum model (CPCM). The calculated results clearly showed that hydrolysis of AAP with OH ⁻ could readily take place in comparison with hydrolysis with H3O+, H2O. The most favorable pathway in the gas phase is the proton transfer toward the N atom in the single bond of AAP in the hydrolysis with OH ⁻ . The solvent effect does not significantly change the conclusion. The free energy barrier height of 25.74 kcal/mol (107.6 kJ/mol) is in excellent agreement with the available experimental value (106.3 kJ/mol)
4	Thiamethoxam resistance selected in the western flower thrips <i>Frankliniella occidentalis</i> (Thysanoptera: Thripidae): Cross-resistance patterns, possible biochemical mechanisms and fitness costs analysis	C. F. M. Gao, S. Z. , et. al. <i>Pestic Biochem Physiol</i> 114, , 90-6 https://www.ncbi.nlm.nih.gov/pubmed/25175655	The western flower thrips (WFT) <i>Frankliniella occidentalis</i> (Pergande) (Thysanoptera: Thripidae), an important pest of various crops in the world, has invaded China since 2003. To understand the risks and to determine possible mechanisms of resistance to thiamethoxam in WFT, a resistant strain was selected under the laboratory conditions. Cross-resistance and the possible biochemical resistance mechanisms were investigated in this study. A 15.1-fold thiamethoxam-resistant WFT strain (TH-R) was established after selection for 55 generations. Compared with the susceptible strain (TH-S), the selected TH-R strain showed extremely high level cross-resistance to imidaclothiz (392.1-fold) and low level cross-resistance to dinotefuran (5.7-fold), acetamidrid (2.9-fold) and emamectin benzoate (2.1-fold), respectively. No cross-resistance to other fourteen insecticides was detected. Synergism tests showed that piperonyl butoxide (PBO) and triphenyl phosphate (TPP) produced a high synergism of thiamethoxam effects in the TH-R strain (2.6- and 2.6-fold respectively). However, diethyl maleate (DEM) did not act synergistically with thiamethoxam. Biochemical assays showed that mixed function oxidase (MFO) activities and carboxylesterase (CarE) activity of the TH-R strain were 2.8- and 1.5-fold higher than that of the TH-S strain, respectively. When compared with the TH-S strain, the TH-R strain had a relative fitness of 0.64. The results show that WFT develops resistance to thiamethoxam after continuous application and thiamethoxam resistance had considerable fitness costs in the WFT. It appears that enhanced metabolism mediated by cytochrome P450 monooxygenases and CarE was a major mechanism for thiamethoxam resistance in the WFT. The use of cross-resistance insecticides, including imidaclothiz and dinotefuran, should be avoided for sustainable resistance management.
Toxicology	Toxic effects of subchronic oral acetamidrid exposure in rats	B. U. A. Karaca, Y. E., et. al. <i>Toxicol Ind Health</i> 35, 44512, 679-687 https://www.ncbi.nlm.nih.gov/pubmed/31818243	Acetamidrid, a selective agonist of type-2 nicotinic acetylcholine receptors, is one of the most widely used neonicotinoids. The hepato- and nephrotoxic potential of acetamidrid has not been clarified although it is known to be toxic to other several organ systems, including the nervous, respiratory and immune systems. The present study aimed to investigate acetamidrid liver and kidney toxicity in male rats after a 90-day subchronic exposure to 12.5, 25 and 35 mg/kg. The biochemical and oxidative damage parameters were determined in the plasma and tissue samples as well as histopathological evaluation in the liver and kidney tissues. Acetamidrid caused oxidative damage and affected the liver, denoted by injury markers including the levels of cholesterol, and alanine aminotransferase and aspartate aminotransferase enzymes. There was also a decrease in plasma urea, uric acid and creatinine levels, all of which might result from liver injury. Additionally, acetamidrid was more toxic to the liver than the kidney according to the histopathological examinations. In conclusion, acetamidrid exhibited hepatotoxic potential at all treatment doses on male Sprague Dawley rats.
Ecotoxicology	Toxicity and biochemical changes in the honey bee <i>Apis mellifera</i> exposed to four insecticides under laboratory conditions	Badawy, M.E.I., Nasr, H.M. & Rabea, E.I. Toxicity and biochemical changes in the honey bee <i>Apis mellifera</i> exposed to four insecticides under laboratory conditions. <i>Apidologie</i> 46, 177–193 (2015).	The toxicity and biochemical changes in honey bees (<i>Apis mellifera</i>) treated with four insecticides—acetamidrid, dinotefuran, pymetrozine, and pyridalyl—were evaluated under controlled laboratory conditions. Foraging bees were exposed to different dosages of tested insecticides by oral feeding at different dosages recommended by the manufacturers for agricultural crops in Egypt (0.01-, 0.02-, 0.04-, 0.1-, and onefold). Moreover, the acute toxicity of these insecticides was evaluated by topical application on the thorax of foragers to calculate the LD50 values. The specific activities of acetylcholinesterase (AChE), carboxylesterase, glutathione S-transferase (GST), and polyphenol oxidase (PPO) were measured in different tissues of surviving foragers after 24 h of treatment to explore the possible mode of action of insecticides and honey bees' strategies for detoxification and tolerance. The results indicated that regardless of how the bees were exposed to insecticides, dinotefuran was extremely toxic to adult <i>A. mellifera</i> (topical LD50 = 0.0006 µg/bee and oral feeding LC50 = 1.29 mg/L). Pyridalyl showed moderate toxicity compared to dinotefuran at the recommended application rate; however, acetamidrid and pymetrozine were relatively less toxic to bees (<25 % mortality at the recommended application rates). Data showed that tested insecticides varied in their influence on AChE, carboxylesterase, GST, and PPO activities that were highly correlated to their toxicity against <i>A. mellifera</i> . The biochemical analysis of carboxylesterase and GST showed that these enzymes detoxified the low doses of acetamidrid, pymetrozine, and pyridalyl, but not dinotefuran. Overall, our results are valuable not only in evaluating the toxicity of common insecticides onto honey bees, but also in highlighting the validity of enzymes activities as proper indicators for exposure to agrochemicals.
4	Toxicity and resistance of the cotton leaf hopper, <i>Amrasca devastans</i> (Distant) to neonicotinoid insecticides in Punjab, Pakistan	Saeed, R., et al. (2017). "Toxicity and resistance of the cotton leaf hopper, <i>Amrasca devastans</i> (Distant) to neonicotinoid insecticides in Punjab, Pakistan." <i>Crop Protection</i> 93: 143-147.	Cotton leaf hopper, <i>Amrasca devastans</i> (Distant) is a key pest of cotton (<i>Gossypium hirsutum</i> L.), vegetables, and many other crops in several Asian countries including Pakistan. Insecticides are most often used as the sole management tactic for this pest. Resistance to neonicotinoids have been studied in several insect pests, but there is a lack of information on <i>A. devastans</i> . Therefore, the aim of this study was to monitor the resistance in this pest to neonicotinoids. Six populations of <i>A. devastans</i> collected from Bahawalpur, Multan, Muzaffargarh, Rajanpur, Sahiwal and Vehari were evaluated for resistance to selected neonicotinoid insecticides by the leaf dip method. Resistance ratios (RRs) were in the range of 2.3–29.3 fold for acetamidrid, 4.8–95.0 fold for imidacloprid, and 19.1–1197.9 fold for thiamethoxam in different populations of <i>A. devastans</i> compared to the reference Multan population. Insecticide resistance monitoring plans and integrated resistance management approaches including the judicious use of insecticides with correct application rate and methods, rotation of insecticides with different modes of action and bio-control tools should be implemented to prevent field control failures, particularly in areas where <i>A. devastans</i> has developed resistance to the tested neonicotinoids
Ecotoxicology	Toxicity assessment of chronic exposure to common insecticides and bee medications on colony development and drones sperm parameters	F. C. Ben Abdelkader, I., et. al. <i>Ecotoxicology</i> 30, 5, 806-817 https://www.ncbi.nlm.nih.gov/pubmed/33932203	The effect of agrochemicals and beekeeping treatments on drones have not been widely investigated compared to workers or queens. In the present study, we investigated the chronic exposure of chemicals set (deltamethrin, acetamidrid, oxalic acid, fumagillin, and amitraz) on some sperm parameters and on the histomorphology of seminal vesicles. We also assessed the colony development and nosema load before and after the exposure. Thirty native <i>Apis mellifera anatolica</i> honeybee colonies with sister queens equalized with brood and total frame of bees were used for this experiment. Five colonies were used for each group. Deltamethrin, acetamidrid and fumagillin were given as oral chronic exposure at final concentrations of 25.10(-6) mg L(-1), 0.01 m L(-1) and 50 mg L(-1) respectively in syrup solution (50/50). Colonies were exposed to oxalic acid by spraying 5 mL per frame space of 3% (w/v) of oxalic acid dihydrate. Finally, the amitraz was applied based on the manufacturer's instructions. The concentrations chosen represented the field-realistic concentrations and those used by beekeepers in the region. Results showed that deltamethrin reduced brood production. In the same group, we found a high increase in nosema load. All treatments decreased sperm count except for fumagillin but this compound increased sperm mortality and increased the percentage of sperm with defected acrosome integrity. The amitraz exhibited a high sperm mortality and high percentage of sperm with defected membrane integrity function. The sperm parameters such as the count, the motility, the acrosome integrity, the membrane function of sperm, and the histomorphology of seminal vesicles of drones exposed to oxalic acid were the most affected. Bee medications commonly used such as oxalic acid and fumagillin should be more investigated and should be considered by beekeepers and particularly queen breeders.

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Ecotoxicology	Toxicity evaluation of the active ingredient acetamiprid and a commercial formulation (Assail (R) 70) on the non-target gastropod <i>Biomphalaria straminea</i> (Mollusca: Planorbidae)	P. F. H. Cossi, L. T., et. al. <i>Ecotoxicol Environ Saf</i> 192, , 110248 https://www.ncbi.nlm.nih.gov/pubmed/32036096	Neonicotinoids emerged as an environmentally safe alternative to previous generations of insecticides becoming one of the most widely applied in modern agriculture. Nevertheless, they have been reported to affect several non-target organisms. Most toxicity studies focus on the effects on pollinators or terrestrial invertebrates and evaluate either the active ingredient or the commercial formulation. In the present study, we aimed to assess the long-term effects of the active ingredient acetamiprid and a broadly used commercial formulation (Assail(R) 70) on the non-target freshwater gastropod <i>Biomphalaria straminea</i> using a battery of biomarkers. A 14 day-exposure of adult organisms to both active ingredient and commercial formulation increased carboxylesterase activity and glutathione content, inhibited superoxide dismutase activity and decreased reactive oxygen species levels. The commercial formulation additionally increased glutathione S-transferase activity and inhibited catalase activity. The results indicate a greater toxicity of the commercial formulation than that of the active ingredient alone. Cholinesterase activity, development and offspring survival of <i>B. straminea</i> were not impaired. We conclude that the toxicity of acetamiprid on this gastropod species is mainly related to effects on detoxification and oxidative metabolism responses. This study provides novel information about the adverse effects of the active ingredient and a commercial formulation of a widely used neonicotinoid on a non-target aquatic species.
Ecotoxicology	Toxicity of insecticides on Neotropical stingless bees <i>Plebeia emerina</i> (Friese) and <i>Tetragonisca fiebrigi</i> (Schwarz) (Hymenoptera: Apidae: Meliponini)	A. C. P. Padilha, B., et. al. <i>Ecotoxicology</i> 29, 1, 119-128 https://www.ncbi.nlm.nih.gov/pubmed/31863232	Use of pesticides in agroecosystems is considered a major cause of bees diversity losses in the Neotropics, where <i>Plebeia emerina</i> (Friese) and <i>Tetragonisca fiebrigi</i> (Schwarz) (Hymenoptera: Apidae: Meliponini) are wild pollinators of native and crop plants. The aim of this study was to know the acute lethal toxicity of acetamiprid, malathion, phosmet and spinosad insecticides on <i>P. emerina</i> and <i>T. fiebrigi</i> . We obtained the mean concentration and mean lethal dose (LC50 and LD50) and the mean survival of workers after oral and topical exposure to insecticides, respectively. The LC50 values (ng a.i./mul of diet) and the decreasing order of toxicity for <i>P. emerina</i> was spinosad (4.96) > malathion (18.75) > phosmet (97.33) > acetamiprid (4204.06), and for <i>T. fiebrigi</i> also was spinosad (5.65) > malathion (8.39) > phosmet (53.91) > acetamiprid (9841.32), when orally exposed. The LD50 values (ng a.i./bee) and the decreasing order of toxicity for <i>P. emerina</i> was spinosad (1.90) > malathion (10.90) > phosmet (19.54) > acetamiprid (6216.55) and for <i>T. fiebrigi</i> was malathion (29.29) > spinosad (29.79) > phosmet (41.95) > acetamiprid (1421.23), when topically exposed. The mean survival (hours) of contaminated bees by malathion, phosmet, and spinosad, was 11.81, 7.20, and 12.32 for <i>P. emerina</i> and 8.55, 7.20, and 13.34 for <i>T. fiebrigi</i> when orally exposed; and was 4.87, 9.87 and 11.17 for <i>P. emerina</i> , and 4.87, 4.76, and 19.05 for <i>T. fiebrigi</i> when topically exposed. Malathion, phosmet, and spinosad were highly toxic, while acetamiprid was moderately toxic. Our results indicated that the insecticides tested, mainly malathion, phosmet, and spinosad may be harmful to <i>P. emerina</i> and <i>T. fiebrigi</i> , making it essential to propose measures to minimize their impact on wild pollinators.
9	Toxicity of the insecticide sulfoxaflor alone and in combination with the fungicide fluxapyroxad in three bee species	C. B. Azpiazu, J., et. al. <i>Sci Rep</i> 11, 1, 6821 https://www.ncbi.nlm.nih.gov/pubmed/33767274	The sulfoximine insecticide sulfoxaflor is regarded as a potential substitute for neonicotinoids that were recently banned in the EU due to their side effects on bees. Like neonicotinoids, sulfoxaflor acts as a competitive modulator of nicotinic acetylcholine receptors. In agricultural environments, bees are commonly exposed to combinations of pesticides, and neonicotinoids are known to interact synergistically with fungicides. The objective of our study is to assess the acute oral toxicity of sulfoxaflor alone and in combination with a single dose of fluxapyroxad, a succinate dehydrogenase inhibitor (SDHI) fungicide, in three bee species: <i>Apis mellifera</i> , <i>Bombus terrestris</i> and <i>Osmia bicornis</i> . Because synergism may be dose-dependent, we tested a range of sulfoxaflor doses. Synergistic effects were assessed using three different approaches: Bliss criterion of drugs independence, ratio test comparing LD50s and model deviation ratio. <i>Osmia bicornis</i> was the most sensitive species to sulfoxaflor and both <i>O. bicornis</i> and <i>A. mellifera</i> showed significant synergism between the insecticide and the fungicide. For the most part, these synergistic effects were weak and only occurred at early assessment times and intermediate sulfoxaflor doses. The potential ecological relevance of these effects should be confirmed in field and/or cage studies. Overall, our laboratory results demonstrate that sulfoxaflor is somewhat less toxic than the recently banned neonicotinoids imidacloprid, thiamethoxam and clothianidin, but much more toxic than other neonicotinoids (acetamiprid, thiacloprid) still in use in the EU at the time this study was conducted.
12	Toxicological assessment of lambda-cyhalothrin and acetamiprid insecticides formulated mixture on hatchability rate, histological aspects, and protein electrophoretic pattern of <i>Biomphalaria alexandrina</i> (Ehrenberg, 1831) snails	A. M. S. Ibrahim, S. S. M., et. al. <i>Environ Sci Pollut Res Int</i> 25, 32, 32582-32590 https://www.ncbi.nlm.nih.gov/pubmed/30242652	Several formulated mixtures of pesticides are widely used in modern agriculture. Nevertheless, the agriculture runoff causes a serious damage to the aquatic ecosystem. Therefore, the present study aims to use <i>B. alexandrina</i> snails as bioindicators for 30 g/l lambda-cyhalothrin and 17 g/l acetamiprid as a formulated mixture insecticide. Results showed that it has a molluscicidal activity against snails at LC50 7.9 mg/l. The hatchability percent of both treated 1-day-aged and/or 3-day-aged groups were less than that of the control group. The sublethal concentrations of the tested insecticide caused a remarkable abnormal necrosis in male and female gametogenic cells, besides a severe damage in both secretory and digestive cells. The results of SDS-PAGE protein profiles of treated snails showed that the least number of protein bands was noticed in snail groups that subjected to LC10 (6.6 mg/l) and LC25 (7.2 mg/l) concentrations when compared to control protein fractions.
5	Transfer rates on nine pesticides from dry tea to infusion by QuEChERS purification followed by LC-MS/MS analysis	Xiaoqian Dong, Baoqing Zhu, Xinying Zhao, Hua Wang & Songnan Liu (2021) Transfer rates on nine pesticides from dry tea to infusion by QuEChERS purification followed by LC-MS/MS analysis, <i>International Journal of Environmental Analytical Chemistry</i>	In this study, the transfer rates of nine pesticides with different water solubility (imidaclothiz, acetamiprid, thiamethoxam, imidacloprid, clothianidin, carbendazim, pyraclostrobin, phoxim and etoxazole) from dry tea to infusion were carefully determined using the liquid-chromatography-tandem mass spectrometry (LC-MS/MS). The obtained results show that the transfer of each pesticide from tea spiked with the pesticides to the infusion ranged from 4.54% (etoxazole) to 58.0% (acetamiprid) under the traditional brewing condition in China, which indicates that transfer of pesticides was dependent on their water solubilities. Increases in infusion time resulted in increased transfer within 30 min. However, there was little influence of infusion time on transfer rates after 30 min. When the infusion temperature was between 50 and 100° C, the transfer rates of acetamiprid, thiamethoxam, imidacloprid, carbendazim, pyraclostrobin, phoxim and etoxazole increased with temperature, while transfer rates for imidaclothiz and clothianidin decreased with increasing temperature. After three infusions, the transfer rates of imidaclothiz, thiamethoxam, acetamiprid, and clothianidin were >70%. Our results provide a basis for the rational use of pesticides in tea gardens and a reasonable evaluation of dietary exposure levels of pesticide residues in brewed tea.
5	Treatment of acetamiprid insecticide from artificially contaminated water by colloidal manganese dioxide in the absence and presence of surfactants	Qamruzzaman and A. Nasar (2014). "Treatment of acetamiprid insecticide from artificially contaminated water by colloidal manganese dioxide in the absence and presence of surfactants." <i>RSC Advances</i> 4(108): 62844-62850.	Acetamiprid is one of the most important pesticides and is effective against a number of insects. The increasing use of insecticides in the agricultural field is associated with a significant risk to water resources and aquatic systems. Thus the degradation of such compounds, after fulfillment of their insecticidal role, is essential to eliminate or minimize the contamination of water. The degradative treatment of acetamiprid insecticide from artificially contaminated water by water soluble colloidal MnO2 in acidic medium (HClO4) has been studied spectrophotometrically in the absence and presence of surfactants. The experiments have been performed under the pseudo-first-order reaction conditions with respect to MnO2. The degradation kinetics has been observed to be first-order with respect to MnO2 while fractional-order in both acetamiprid and HClO4. The anionic surfactant, sodium dodecyl sulfate (SDS) has been observed to be ineffective. On the other hand the reaction in the presence of cationic surfactant, cetyltrimethyl ammonium bromide (CTAB) could not be followed as well because it possesses a positive charge opposite to that of colloidal MnO2 causing flocculation and therefore could not be studied further. However, the addition of non-ionic surfactant, polyethylene glycol tert-octylphenyl ether (TX-100) accelerates the reaction rate. The catalytic effect of TX-100 has been discussed in the light of the available mathematical model. The kinetic data have been exploited to generate the various activation parameters for the oxidative degradation of acetamiprid by colloidal MnO2 in the absence and presence of non-ionic surfactant, TX-100.

Phase 1 Conformity category	Title	Citation	Abstract
9	Trends in neonicotinoid pesticide residues in food and water in the United States, 1999-2015	H. A. H. Craddock, D., et. al. Environ Health 18, 1, 7 https://www.ncbi.nlm.nih.gov/pubmed/30634980	BACKGROUND: Neonicotinoids are a class of systemic insecticides widely used on food crops globally. These pesticides may be found in "off-target" food items and persist in the environment. Despite the potential for extensive human exposure, there are limited studies regarding the prevalence of neonicotinoid residues in foods sold and consumed in the United States. METHODS: Residue data for seven neonicotinoid pesticides collected between 1999 and 2015 by the US Department of Agriculture's Pesticide Data Program (PDP) were collated and summarized by year across various food commodities, including fruit, vegetable, meat, dairy, grain, honey, and baby food, as well as water to qualitatively describe and examine trends in contamination frequency and residue concentrations. RESULTS: The highest detection frequencies (DFs) for neonicotinoids by year on all commodities were generally below 20%. Average DFs over the entire study period, 1999-2015, for domestic and imported commodities were similar at 4.5%. For all the samples (both domestic and imported) imidacloprid was the neonicotinoid with the highest overall detection frequency at 12.0%. However, higher DFs were observed for specific food commodity-neonicotinoid combinations such as: cherries (45.9%), apples (29.5%), pears (24.1%) and strawberries (21.3%) for acetamiprid; and cauliflower (57.5%), celery (20.9%), cherries (26.3%), cilantro (30.6%), grapes (28.9%), collard greens (24.9%), kale (31.4%), lettuce (45.6%), potatoes (31.2%) and spinach (38.7%) for imidacloprid. Neonicotinoids were also detected in organic commodities, (DF < 6%). Individual commodities with at least 5% of samples testing positive for two or more neonicotinoids included apples, celery, and cherries. Generally, neonicotinoid residues on food commodities did not exceed US Environmental Protection Agency tolerance levels. Increases in detection trends for both finished and untreated water samples for imidacloprid were observed from 2004 to 2011. CONCLUSIONS: Analysis of PDP data indicates that low levels of neonicotinoids are present in commonly-consumed fruits and vegetables sold in the US. Trends in detection frequencies suggest an increase in use of acetamiprid, clothianidin and thiamethoxam as replacements for imidacloprid. Given these findings, more extensive surveillance of the food and water supply is warranted, as well as biomonitoring studies and assessment of cumulative daily intake in high risk groups, including pregnant women and infants.
Toxicology	Trophoblast toxicity of the neonicotinoid insecticide acetamiprid and an acetamiprid-based formulation	S. D. B. Gomez, P. S., et. al. Toxicology 431, , 152363 https://www.ncbi.nlm.nih.gov/pubmed/31935421	The neonicotinoid (Neo) insecticide family is a relatively new class of pesticides of growing use. There is an increasing concern that human exposure to environmental pollutants in utero may be associated with diseases in adulthood. A functional placenta and trophoblasts are a requisite for a healthy pregnancy. The aim of this study was to investigate whether the Neo Acetamiprid (Ace) and one of its commercial formulations (Ace CF) display toxic features to a human first trimester trophoblast cell line. HTR-8/SVneo cells were cultured in the presence of Ace or Ace CF (0.1-100 µM) for 4 and 24 h, and changes in cell viability, reactive oxygen species, antioxidant system and macromolecule damage levels were evaluated. Ace and Ace CF are cytotoxic for HTR-8/SVneo trophoblasts. Cell viability loss and oxidative imbalance were triggered by Ace and Ace CF treatments. Impact in the antioxidant enzymes catalase, superoxide dismutase and glutathione S-transferase activities were observed after 24 h exposure to Ace CF. Moreover, Ace CF caused oxidative damage in proteins, lipids and DNA, whereas Ace only damaged proteins. To test oxidative stress as a toxicity mechanism, cells were pre-incubated with the antioxidant N-acetyl-L-cysteine (NAC), prior Neo treatment. NAC protected trophoblasts from cell death and prevented oxidative damage. Results demonstrate that Ace (as active principle or CF) is cytotoxic for human trophoblasts, and oxidative stress is a toxicity mechanism. Ace CF exhibited a more toxic effect than the active principle, in an identical exposure scenario.
5	A Turn-on Biosensor-Based Aptamer-Mediated Carbon Quantum Dots Nanoaggregate for Acetamiprid Detection in Complex Samples	Jiao, Z., Zhang, H., Jiao, S. et al. A Turn-on Biosensor-Based Aptamer-Mediated Carbon Quantum Dots Nanoaggregate for Acetamiprid Detection in Complex Samples. Food Anal. Methods 12, 668-676 (2019)	In this paper, we developed a new biosensor-based on aptamer-mediated carbon quantum dots (apt-CQDs) nanoaggregate for acetamiprid detection. The acetamiprid aptamer, 5' - and its complementary DNA were labeled on CQDs, respectively. The hybridization of aptamer and its complementary DNA triggered the formation of nanoaggregate of CQDs, leading to the fluorescence quenching of the CQDs. Upon addition of acetamiprid, specific recognition of acetamiprid caused the release of the cDNA-CQDs and the fluorescence intensity recovered which was linearly related to the concentration of acetamiprid. The sensor provided a linear range from 0.2 to 20 ng/L for acetamiprid with a detection limit of 0.04 ng/L in an aqueous buffer. The same linear range was obtained in spiked human serum samples and lettuce samples with similar detection limits (0.15 and 0.11 ng/L), demonstrating high robustness of the sensor in a complex sample matrix. The as-prepared biosensor was used to monitor acetamiprid level in real samples with recovery ranged from 86 to 107%, and RSDs ranged from 1.3-6.9% (n = 3). The proposed study not only provided a simple method through CQDs nanoaggregate and also provided a turn-on detection mode for acetamiprid in real samples with high signal-to-noise ratios.
5	Ultra-trace level determination of neonicotinoids in honey as a tool for assessing environmental contamination	Kammoun, S., et al. (2019). "Ultra-trace level determination of neonicotinoids in honey as a tool for assessing environmental contamination." Environmental Pollution 247: 964-972.	Neonicotinoids and the closely related insecticide classes sulfoximines and butenolides have recently attracted growing concerns regarding their potential negative effects on non-target organisms, including pollinators such as bees. Indeed, it is becoming increasingly clear that these effects may occur at much lower levels than those considered to be safe for humans. To properly assess the ecological and environmental risks posed by neonicotinoids, appropriate sampling and analytical procedures are needed. Here, we used honey as reliable environmental sampler and developed an unprecedentedly sensitive method based on QuEChERS and UHPLC-MS/MS for the simultaneous determination of the nine neonicotinoids and related molecules currently present on the market (acetamiprid, clothianidin, dinotefuran, flupyradifurone, imidacloprid, nitenpyram, sulfoxaflor, thiacloprid and thiamethoxam). The method was validated and provided excellent levels of precision and accuracy over a wide concentration range of 3-4 orders of magnitude. Lowest limits of quantification (LLOQs) as low as 2-20 pg/g of honey depending on the analytes were reached. The method was then applied to the analysis of 36 honey samples from various regions of the World which had already been analysed for the five most common neonicotinoids (acetamiprid, clothianidin, imidacloprid, thiacloprid and thiamethoxam) in a previous study. This allowed us to determine the long-term stability (i.e. up to 40 months) of these molecules in honey, both at room temperature and - 20 ° C. We found that the five pesticides were stable over a period of several years at - 20 ° C, but that acetamiprid and thiacloprid partially degraded at room temperature. Finally, we also measured the levels of dinotefuran, nitenpyram, sulfoxaflor and flupyradifurone and found that 28% of the samples were contaminated by at least one of these pesticides.
5	Ultrasensitive and practical chemiluminescence sensing pesticide residue acetamiprid in agricultural products and environment: Combination of synergistically coupled co-amplifying signal and smart interface engineering	F. L. Xiu, Y., et. al. Talanta 235, , 122811 https://www.ncbi.nlm.nih.gov/pubmed/34517668	Practical detection of single-component pesticide residue at ultra-low concentrations in agricultural products and environment is very important for assessment of environmental risks and protection of human health. Herein, a practical and highly sensitive chemiluminescence (CL) sensing acetamiprid in agricultural products and environmental media was constructed based on the synergistic co-catalysis of graphene oxide (GO)/gold nanoparticles (AuNPs) nanocomposites for luminol CL reaction and the smart interface engineering. ss-DNA could inhibit co-catalysis of GO/AuNPs for luminol CL reaction. Once acetamiprid was added, aptamer conformation changed in dimension and synergistically catalytic amplification signal of GO/AuNPs was restored significantly. The limit of detection was 8.9 pM. High sensitivity could be due to strong signal amplification from synergistic catalysis of GO/AuNPs for CL reaction and perfect regulation of composite interface by DNA dimension. Moreover, the used GO/AuNPs could be stably stored for six months, which was superior to previously reported AuNPs (only half a month). The analysis exhibited excellent selectivity for acetamiprid. The detection results for real samples confirmed reliability in practical application. This analysis is an extremely useful method for monitoring pesticide residues in environment and agricultural products. Synergetic co-catalysis of GO/AuNPs and ingenious interface engineering provide important ideas for other biosensors.

Phase 1 Conformity category	Title	Citation	Abstract
5	Ultrasonically Modified Amended-Cloud Point Extraction for Simultaneous Pre-Concentration of Neonicotinoid Insecticide Residues	R. V. Kachangoon, J., et. al. Molecules 23, 5, https://www.ncbi.nlm.nih.gov/pubmed/29757232	An effective pre-concentration method, namely amended-cloud point extraction (CPE), has been developed for the extraction and pre-concentration of neonicotinoid insecticide residues. The studied analytes including clothianidin, imidacloprid, acetamiprid, thiamethoxam and thiacloprid were chosen as a model compound. The amended-CPE procedure included two cloud point processes. Triton X-114 was used to extract neonicotinoid residues into the surfactant-rich phase and then the analytes were transferred into an alkaline solution with the help of ultrasound energy. The extracts were then analyzed by high-performance liquid chromatography (HPLC) coupled with a monolithic column. Several factors influencing the extraction efficiency were studied such as kind and concentration of surfactant, type and content of salts, kind and concentration of back extraction agent, and incubation temperature and time. Enrichment factors (EFs) were found in the range of 20(-)/333 folds. The limits of detection of the studied neonicotinoids were in the range of 0.0003(-)0.002 microg mL(-1) which are below the maximum residue limits (MRLs) established by the European Union (EU). Good repeatability was obtained with relative standard deviations lower than 1.92% and 4.54% for retention time (tR) and peak area, respectively. The developed extraction method was successfully applied for the analysis of water samples. No detectable residues of neonicotinoids in the studied samples were found.
9	Uptake and accumulation of emerging contaminants in soil and plant treated with wastewater under real-world environmental conditions in the Al Hayer area (Saudi Arabia)	Y. A.-R. Pico, R., et. al. Sci Total Environ 652, , 562-572 https://www.ncbi.nlm.nih.gov/pubmed/30368185	In arid and semi-arid areas the use of treated wastewater for crop irrigation and other agricultural practices, such as the use of pesticides, increase the number of emerging contaminants (ECs) in crops. Hazards of these practices to human being are largely unknown since there are few studies yet covering a short range of compounds and most of them under non-realistic conditions. This study aims at assessing this problem that will become global soon in an area of Saudi Arabia heavily affected by the reuse of treated wastewater and pesticide in order to ascertain its scale. The novelty of the study relays in the large number of ECs covered and the variety of crops (cabbage, barley, green beans, eggplants, chili, tomato and zucchini) analysed. Extraction procedure developed provided an appropriate extraction yield (up to 50% of the compounds were recovered within a 70-120% range), with good repeatability (relative standard deviations below 20% in most cases) and sensitivity (LOQ<25ngg(-1)) for the model compounds. Determination by liquid chromatography quadrupole time-of-flight (LC-QqTOF-MS) is able to identify >2000 contaminants. Sixty-four ECs were identified in wastewater but of the sixty-four compounds, six pharmaceuticals (atenolol, caffeine, carbamazepine and its metabolites 10,11-epoxycarbamazepine, gemfibrozil, and naproxen) and seven pesticides (acetamiprid, atrazine deethyl, azoxystrobin, bupirimate, diazinon, malathion, pirimicarb and some of their metabolites) were detected in plants. Furthermore, one metabolite of the ibuprofen (not detected in water or soil), the ibuprofen hexoside was also found in plants. Up to our knowledge, this study demonstrate for the first time the accumulation of ECs in crops irrigated with treated wastewater under real non-controlled environmental conditions.
Epidemiology	Urinary Metabolites of Neonicotinoid Insecticides: Levels and Recommendations for Future Biomonitoring Studies in China	Song, S., et al. (2020). "Urinary Metabolites of Neonicotinoid Insecticides: Levels and Recommendations for Future Biomonitoring Studies in China." Environmental Science & Technology 54(13): 8210-8220.	Neonicotinoids (NEOs) are insecticides that are widely used around the world. Following exposure, NEOs get metabolized in human bodies. The biomarkers to assess human NEO exposure are not well described because of the lack of information on the metabolites of NEOs (m-NEOs). In this study, five m-NEOs including N-desmethyl-acetamiprid (N-dm-ACE), 5-hydroxy-imidacloprid (5-OH-IMI), olefin-imidacloprid (Of-IMI), 1-methyl-3-(tetrahydro-3-furylmethyl) guanidine (DIN-G), and 1-methyl-3-(tetrahydro-3-furylmethyl) (DIN-U) were measured in 275 urine samples collected from 10 cities in China. All of the m-NEOs were frequently detected in urine samples with the median concentrations ranging from 0.42 (DIN-G) to 1.02 (5-OH-IMI) ng/mL. The urinary concentrations of N-dm-ACE and 5-OH-IMI measured in China were higher than those reported from Japan and the USA. In comparison to the parent NEO (i.e., acetamiprid, ACE; imidacloprid, IMI; and dinotefuran, DIN) concentrations reported in the same set of samples by our research group, the median ratios of m-NEO to the corresponding parent NEO (m-NEO/NEO) ranged from 4.95 (DIN-G/DIN) to 37.7 (N-dm-ACE/ACE), indicating that NEOs are mainly present as metabolites rather than the parent forms. Furthermore, the ratio of Σ m-NEOs/ Σ NEOs was significantly ($p < 0.01$) higher in females than in males, suggesting that NEOs are more readily metabolized in females or females are more highly exposed to m-NEOs. To our knowledge, this is the first study to measure Of-IMI, DIN-G, and DIN-U levels in urine samples from China. We recommend biomonitoring studies to include N-dm-ACE, 5-OH-IMI, and DIN-U (and DIN-G) for clear understanding of human exposure to ACE, IMI, and DIN, respectively.
1	The use of algae in the process of heavy metal ions removal from wastewater	Mehta SK, Gaur JP. Use of algae for removing heavy metal ions from wastewater: progress and prospects. Crit Rev Biotechnol. 2005 Jul-Sep;25(3):113-52.	Many algae have immense capability to sorb metals, and there is considerable potential for using them to treat wastewaters. Metal sorption involves binding on the cell surface and to intracellular ligands. The adsorbed metal is several times greater than intracellular metal. Carboxyl group is most important for metal binding. Concentration of metal and biomass in solution, pH, temperature, cations, anions and metabolic stage of the organism affect metal sorption. Algae can effectively remove metals from multi-metal solutions. Dead cells sorb more metal than live cells. Various pretreatments enhance metal sorption capacity of algae. CaCl2 pretreatment is the most suitable and economic method for activation of algal biomass. Algal periphyton has great potential for removing metals from wastewaters. An immobilized or granulated biomass-filled column can be used for several sorption/desorption cycles with unaltered or slightly decreased metal removal. Langmuir and Freundlich models, commonly used for fitting sorption data, cannot precisely describe metal sorption since they ignore the effect of pH, biomass concentration, etc. For commercial application of algal technology for metal removal from wastewaters, emphasis should be given to: (i) selection of strains with high metal sorption capacity, (ii) adequate understanding of sorption mechanisms, (iii) development of low-cost methods for cell immobilization, (iv) development of better models for predicting metal sorption, (v) genetic manipulation of algae for increased number of surface groups or over expression of metal binding proteins, and (vi) economic feasibility.
5	UV-A activation of peroxymonosulfate for the removal of micropollutants from secondary treated wastewater	S. R. Guerra-Rodríguez, A. R. L., et. al. Sci Total Environ 770, , 145299 https://www.ncbi.nlm.nih.gov/pubmed/33736410	The occurrence of micropollutants (MPs) in the aquatic environment poses a threat to the environment and to the human health. The application of sulfate radical-based advanced oxidation processes (SR-AOPs) to eliminate these contaminants has attracted attention in recent years. In this work, the simultaneous degradation of 20 multi-class MPs (classified into 5 main categories, namely antibiotics, beta-blockers, other pharmaceuticals, pesticides, and herbicides) was evaluated for the first time in secondary treated wastewater, by activating peroxymonosulfate (PMS) with UV-A radiation, without any pH adjustment or iron addition. The optimal PMS concentration to remove the spiked target MPs (100 mug L(-1)) from wastewater was 0.1 mM, leading to an average degradation of 80% after 60 min, with most of the elimination occurring during the first 5 min. Synergies between radiation and the oxidant were demonstrated and quantified, with an average extent of synergy of 69.1%. The optimized treatment was then tested using non-spiked wastewater, in which 12 out of the 20 target contaminants were detected. Among these, 7 were degraded at some extent, varying from 10.7% (acetamiprid) to 94.4% (ofloxacin), the lower removals being attributed to the quite inferior ratio of MPs to natural organic matter. Phytotoxicity tests carried out with the wastewater before and after photo-activated PMS oxidation revealed a decrease in the toxicity and that the plants were able to grow in the presence of the treated water. Therefore, despite the low degradation rates obtained for some MPs, the treatment effectively reduces the toxicity of the matrix, making the water safer for reuse.

Phase 1 Conformity category	Title	Citation	Abstract
5	Validation of a QuEChERS method for analysis of neonicotinoids in small volumes of blood and assessment of exposure in Eurasian eagle owl (<i>Bubo bubo</i>) nestlings	A. G.-R. Taliansky-Chamudis, P., et. al. Sci Total Environ 595, , 93-100 https://www.ncbi.nlm.nih.gov/pubmed/28376431	Neonicotinoid pesticides have gained great interest in the last years both for agricultural and domestic use. Since the information on their environmental distribution or the effects derived from exposure to ecosystems and biota is scarce, new analytical techniques are being developed for monitoring studies. In this sense, two extraction techniques based on QuEChERS (Quick, Easy, Cheap, Effective, Rugged, and Safe) methodology to detect the neonicotinoids authorised in Spain (acetamiprid, clothianidin, dinotefuran, imidacloprid, thiacloprid, nitenpyram and thiamethoxam) were adapted and compared: a) using acetate buffer (AB); and b) using citrate buffer (CB). For detection and quantification, high performance liquid chromatography coupled with time of flight mass spectrometry (HPLC/TOF-MS) was used. The CB method provided a wide range of recoveries (68-134%) and accuracy (4-9%). The AB method provided good recoveries (59-76%, 59% corresponded to clothianidin) precision (4-11%) linearity (0.987-0.998%) and limit of quantification (2-10ng/mL) for all the compounds. To test the effectiveness of the technique, we analysed 30 blood samples of free-ranging nestlings of Eurasian eagle owl (<i>Bubo bubo</i>). The only compound detected, in one nestling from a dry land farming area, was imidacloprid, with a concentration of 3.28ng/mL. To our knowledge, this is the first study of neonicotinoid pesticides in free-ranging birds of prey using non-destructive samples, providing the first insight for biomonitoring studies. Further studies, including toxicokinetics and toxicodynamics, are recommended to assess the risk for these species.
9	Variability in urinary neonicotinoid concentrations in single-spot and first-morning void and its association with oxidative stress markers	A. J. M.-M. Li, M. P., et. al. Environ Int 135, . 105415 https://www.ncbi.nlm.nih.gov/pubmed/31869729	Human exposure to neonicotinoid insecticides (hereafter "neonics") is a concern. Spot urine samples have been widely used in the assessment of exposure to neonics. Urinary concentrations, however, can vary greatly over time due to variable exposure, potentially leading to exposure misclassification. In this study, within- and between-individual variability of urinary concentrations of 13 neonics and their metabolites collected consecutively for up to 44 days from 19 individuals were examined. We also measured seven oxidative stress biomarkers (OSBs) in repeated urine samples to elucidate their relationship with neonic exposure by mixed regression models. Intraclass correlation coefficients (ICCs, a ratio of between-individual variance to total variance) were used to assess the reproducibility of neonic/metabolite concentrations. Sensitivity and specificity were used to evaluate how well spot urine samples determined an individual's average exposure over 44 days. A fair to good reproducibility was observed for N-desmethyl-acetamiprid (ICC = 0.42), whereas thiamethoxam, imidacloprid, clothianidin, imidaclothiz, 6-chloronicotinic acid, and sulfoxaflor showed poor reproducibility (ICC = 0.02-0.37). Use of single-spot urine samples to classify high (top 33%) exposure showed higher specificities (0.68-0.92) than sensitivities (0.32-0.88). The minimum number of specimens (k) required to estimate participant-specific mean for neonic exposures within 20% of the "true" values ranged from 16 to 172. Significant positive correlations were found between some of neonic and OSB concentrations. The high variability found in the urinary concentrations of most neonics/metabolites suggests that a single measurement can result in exposure misclassification.
9	Washing fresh tea leaves before picking decreases pesticide residues in tea	Gao, W., et al. (2019). "Rinsing Tea before Brewing Decreases Pesticide Residues in Tea Infusion." <i>Journal of Agricultural and Food Chemistry</i> 67(19): 5384-5393.	Rinsing dried tea leaves before brewing is a traditional way of preparing rolled oolong tea in China. This study analyzes how rinsing green, black, and oolong tea before brewing affects the levels of pesticide residues in the tea infusion. Eight representative insecticides of different polarities were tracked, namely, three neonicotinoids (acetamiprid, imidacloprid, and thiamethoxam), two organophosphates (dimethoate and malathion), and three pyrethroids (bifenthrin, β -cypermethrin, and fenvalerate). The results showed that the eight pesticides transferred into the rinse water at rates between 0.2 and 24% after 5, 10, 20, or 30 s. Rinsing tea before brewing reduced the pesticide risk levels by 5–59% in the tea infusion. Five functional components, such as epigallocatechin gallate and caffeine, were reduced by 0–11% in the tea infusion. The results can be used to develop an effective method of rinsing tea before brewing that reduces pesticide exposure risks.
8,9	Widespread occurrence and spatial distribution of glyphosate, atrazine, and neonicotinoids pesticides in the St. Lawrence and tributary rivers	J. M. M. Montiel-Leon, G., et. al. Environ Pollut 250, , 29-39 https://www.ncbi.nlm.nih.gov/pubmed/30981933	The occurrence and spatial distribution of selected pesticides were investigated along a 200-km reach of the St. Lawrence River (SLR) and tributaries in Quebec, Canada. Surface water samples (n=68) were collected in the summer 2017 and analyzed for glyphosate, atrazine (ATZ), 8 systemic insecticides (acetamiprid, clothianidin, dinotefuran, fipronil, imidacloprid, nitenpyram, thiacloprid, and thiamethoxam) and some metabolites. Overall, 99% of the surface water samples were positive to at least one of the targeted pesticides. The most recurrent compounds were glyphosate (detection frequency: 84%), ATZ (82%), thiamethoxam (59%), desethylatrazine (DEA: 47%), and clothianidin (46%). Glyphosate displayed variable levels (4-3,000ngL ⁻¹), with higher concentrations in south tributaries (e.g., Nicolet and Yamaska). In positive samples, the sum of ATZ and DEA varied between 5 and 860ngL ⁻¹ , and the sum of 6 priority neonicotinoids between 1.5 and 115ngL ⁻¹ . From Repentigny to the Sorel Islands, the spatial distribution of pesticides within the St. Lawrence River was governed by the different upstream sources (i.e., Great Lakes vs. Ottawa River) due to the limited mixing of the different water masses. Cross-sectional patterns revealed higher concentrations of glyphosate and neonicotinoids in the north portions of transects, while the middle and south portions showed higher levels of atrazine. In Lake St. Pierre and further downstream, cross-sections revealed higher levels of the targeted pesticides near the southern portions of the SLR. This may be due to the higher contributions from south shore tributaries impacted by major agricultural areas, compared to north shore tributaries with forest land and less cropland use. Surface water samples were compliant with guidelines for the protection of aquatic life (chronic effects) for glyphosate and atrazine. However, 31% of the samples were found to surpass the guideline value of 8.3ngL ⁻¹ for the sum of six priority neonicotinoids.
8,9	Widespread Use and Frequent Detection of Neonicotinoid Insecticides in Wetlands of Canada's Prairie Pothole Region	Main AR, Headley JV, Peru KM, Michel NL, Cessna AJ, Morrissey CA. Widespread use and frequent detection of neonicotinoid insecticides in wetlands of Canada's Prairie Pothole Region. <i>PLoS One</i> . 2014 Mar 26;9(3):e92821.	Neonicotinoids currently dominate the insecticide market as seed treatments on Canada's major Prairie crops (e.g., canola). The potential impact to ecologically significant wetlands in this dominantly agro-environment has largely been overlooked while the distribution of use, incidence and level of contamination remains unreported. We modelled the spatial distribution of neonicotinoid use across the three Prairie Provinces in combination with temporal assessments of water and sediment concentrations in wetlands to measure four active ingredients (clothianidin, thiamethoxam, imidacloprid and acetamiprid). From 2009 to 2012, neonicotinoid use was increasing; by 2012, applications covered an estimated ~11 million hectares (44% of Prairie cropland) with >216,000 kg of active ingredients. Thiamethoxam, followed by clothianidin, were the dominant seed treatments by mass and area. Areas of high neonicotinoid use were identified as high density canola or soybean production. Water sampled four times from 136 wetlands (spring, summer, fall 2012 and spring 2013) across four rural municipalities in Saskatchewan similarly revealed clothianidin and thiamethoxam in the majority of samples. In spring 2012 prior to seeding, 36% of wetlands contained at least one neonicotinoid. Detections increased to 62% in summer 2012, declined to 16% in fall, and increased to 91% the following spring 2013 after ice-off. Peak concentrations were recorded during summer 2012 for both thiamethoxam (range: <LOQ--1490 ng/L, canola) and clothianidin (range: <LOQ--3110 ng/L, canola). Sediment samples collected during the same period rarely (6%) contained neonicotinoid concentrations (which did not exceed 20 ng/L). Wetlands situated in barley, canola and oat fields consistently contained higher mean concentrations of neonicotinoids than in grasslands, but no individual crop singularly influenced overall detections or concentrations. Distribution maps indicate neonicotinoid use is increasing and becoming more widespread with concerns for environmental loading, while frequently detected neonicotinoid concentrations in Prairie wetlands suggest high persistence and transport into wetlands.
9	A worldwide survey of neonicotinoids in honey	E. A. D. M. Mitchell, B., et. al. Science 358, 6359, 109-111 https://www.ncbi.nlm.nih.gov/pubmed/28983052	Growing evidence for global pollinator decline is causing concern for biodiversity conservation and ecosystem services maintenance. Neonicotinoid pesticides have been identified or suspected as a key factor responsible for this decline. We assessed the global exposure of pollinators to neonicotinoids by analyzing 198 honey samples from across the world. We found at least one of five tested compounds (acetamiprid, clothianidin, imidacloprid, thiacloprid, and thiamethoxam) in 75% of all samples, 45% of samples contained two or more of these compounds, and 10% contained four or five. Our results confirm the exposure of bees to neonicotinoids in their food throughout the world. The coexistence of neonicotinoids and other pesticides may increase harm to pollinators. However, the concentrations detected are below the maximum residue level authorized for human consumption (average +/- standard error for positive samples: 1.8 +/- 0.56 nanograms per gram).

Phase 1 Conformity category	Title	Citation	Abstract
8,9	Year-round presence of neonicotinoid insecticides in tributaries to the Great Lakes, USA	M. L. C. Hladik, S. R., et. al. Environ Pollut 235, , 1022-1029 https://www.ncbi.nlm.nih.gov/pubmed/29357997	To better characterize the transport of neonicotinoid insecticides to the world's largest freshwater ecosystem, monthly samples (October 2015-September 2016) were collected from 10 major tributaries to the Great Lakes, USA. For the monthly tributary samples, neonicotinoids were detected in every month sampled and five of the six target neonicotinoids were detected. At least one neonicotinoid was detected in 74% of the monthly samples with up to three neonicotinoids detected in an individual sample (10% of all samples). The most frequently detected neonicotinoid was imidacloprid (53%), followed by clothianidin (44%), thiamethoxam (22%), acetamiprid (2%), and dinotefuran (1%). Thiacloprid was not detected in any samples. The maximum concentration for an individual neonicotinoid was 230ngL ⁻¹ and the maximum total neonicotinoids in an individual sample was 400ngL ⁻¹ . The median detected individual neonicotinoid concentrations ranged from non-detect to 10ngL ⁻¹ . The detections of clothianidin and thiamethoxam significantly increased as the percent of cultivated crops in the basins increased ($\rho=0.73$, $P=.01$; $\rho=0.66$, $P=.04$, respectively). In contrast, imidacloprid detections significantly increased as the percent of the urbanization in the basins increased ($\rho=0.66$, $P=.03$). Neonicotinoid concentrations generally increased in spring through summer coinciding with the planting of neonicotinoid-treated seeds and broadcast applications of neonicotinoids. More spatially intensive samples were collected in an agriculturally dominated basin (8 sites along the Maumee River, Ohio) twice during the spring, 2016 planting season to provide further information on neonicotinoid inputs to the Great Lakes. Three neonicotinoids were ubiquitously detected (clothianidin, imidacloprid, thiamethoxam) in all water samples collected within this basin. Maximum individual neonicotinoid concentrations were 330ngL ⁻¹ and maximum total neonicotinoid concentration was 670ngL ⁻¹ ; median detected individual neonicotinoid concentrations were 7.0 to 39ngL ⁻¹ .

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
Tox 1	Mitigation of acetamiprid - induced renotoxicity by natural antioxidants via the regulation of ICAM, NF-kB and TLR 4 pathways	Pharmacological Reports	2019	Alhusaini et al.	Pharmacology Department, Faculty of Pharmacy, King Saud University, Riyadh, Saudi Arabia	Pharmacol Rep 71, 6, 1088-1094 https://www.ncbi.nlm.nih.gov/pubmed/31629938	Renotoxicity	Original work	Unknown	-	Rat	100 mg/kg/day	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 2). This paper looks at the action of Quercetin (Qrctn) and/or Nano-glutathione (N-Gluta) to counterbalance the effects of ACPM administered to rat for one month.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No purity data specified. No multiple dosing.
Tox 2	Acetamiprid, a neonicotinoid insecticide, induced cytotoxicity and genotoxicity in PC12 cells	Toxicology Mechanisms and Methods	2019	Annabi et al.	Faculty of Dental Medicine, Laboratory for Research on Biologically Compatible Compounds (LRSBC), University of Monastir, Monastir, Tunisia	Toxicol Mech Methods 29, 8, 580-586 https://www.ncbi.nlm.nih.gov/pubmed/31170869	Cytotoxicity and genotoxicity	Original work	Unknown	-	In vitro rat	-	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b). Uncertain cell line (Rat pheochromocytoma adrenal medulla).	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a relevant test species that can be properly evaluated.
Tox 3	Reproductive effects of subchronic exposure to acetamiprid in male rats	Scientific Reports	2020	Arican et al.	Istanbul University, Faculty of Pharmacy, Department of Pharmaceutical Toxicology, 34116, Istanbul, Turkey	Sci Rep 10, 1, 8985 https://www.ncbi.nlm.nih.gov/pubmed/32488017	General toxicology - DART	Original work	Unknown	-	Rat	12.5, 25 and 35 mg/kg for 90 days	Not assigned by the author	Not assigned by the author	-		C or not applicable No mention of a guidance document followed, the experiment is unlikely to have been conducted properly and cannot be reliable; (see Notes)	Not applicable (only Cat A studies are designated Klimisch scores).	Rat, oral route. Test guidelines unclear. OECD 408 states 20 animals per group, paper has only 10 per group. Only spermatogenesis. No requirement to measure GnRH, FSH, LH or GSH in the testes. The 90 day dose regime is twice the normal Repro timepoint for OECD 421/422 and greater than the OECD 415. Insufficient Repro parameters measured. The control group gained only about 7 grams of body weight for 90 days, suggesting for poor dosing technique and/or animal handling. A experiment with a body weight gain of only 7g for 90 days in the control group is hardly reliable.
Tox 4	Exposure to neonicotinoid insecticides induces embryotoxicity in mice and rabbits	Toxicology	2017	Babel'ova et al.	Institute of Animal Physiology, Slovak Academy of Sciences, Šoltésovej 4-6, 040 01 Košice Slovak Republic	Toxicology 392, 71-80 https://www.ncbi.nlm.nih.gov/pubmed/29061322	General toxicology - DART	Original work	Unknown	-	Mice and Rabbits	Mice = 0.1, 1, 10 and 100 uM. Rabbit =	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b). Mouse isolated blastocyst cell	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No mention of a guidance document followed. The methodology is not common and unacceptable. Only isolated blastocyst cell tested with acetamiprid. Acetamiprid has not been tested in vitro and in vivo in rabbits.
Tox 5	Assessment of acetamiprid-induced genotoxic effects in bone marrow cells of Swiss albino male mice	Drug and Chemical Toxicology	2019	Bagri et al.	Department of Veterinary Pharmacology and Toxicology College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Department of Veterinary Pharmacology and Toxicology College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Haryana, India	Drug Chem Toxicol 42, 4, 357-363 https://www.ncbi.nlm.nih.gov/pubmed/29405074	Genotoxicity	Original work	Unknown	-	Mice	4.6 and 2.3 mg/kg/day	Not assigned by the author	Not assigned by the author	-		C No mention of a guidance document followed; Only 2-doses (see notes)	Not applicable (only Cat A studies are designated Klimisch scores).	OECD Guidance stated for in vivo micronucleus. However, dosing was for 60 or 90 days instead of just 2 days. So the observations do not conform to any guidance as MNT can be taken from longer term testing such as the 7 or 28-day subacute. Data is severely lacking for 28-Day and even more so for 60-90-day studies. So the reliability of this data is very questionable. Not matched testing guide line (only 2 doses, the number of observed cells does not reach the standard (4000 cells) and the power of detection is low, ip dosing is not recommended in the study guidelines)
Tox 6	Hematological, biochemical, and toxicopathic effects of subchronic acetamiprid toxicity in Wistar rats	Environmental Science and Pollution Research	2016	Chakroun et al.	Laboratory of Histology and Cytogenetic (Research Unit of Genetic, Genotoxicity and Childhood Illness UR12ES10), Faculty of Medicine, University of Monastir, Street Avicenne, 5019 Monastir, Tunisia	Environ Sci Pollut Res Int 23, 24, 25191-25199 https://www.ncbi.nlm.nih.gov/pubmed/27680006	General toxicology	Original work	Unknown	-	Rat	1/20 of LD50 (10.85 mg/kg). 1/10 of LD50 (21.7 mg/kg). 1/5 of LD50 (43.4 mg/kg).	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). The dose of the test substance does not match the description in the test method section. 1e).The influence of co-formulant was not taken into consideration.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No mention of a guidance document followed. No mention of purity. Rat, oral route.
Tox 7	Developmental neurotoxicity of different pesticides in PC-12 cells in vitro	Toxicology and Applied Pharmacology	2017	Christen et al.	University of Applied Sciences and Arts Northwestern Switzerland, School of Life Sciences, Grödenstrasse 40, CH-4132, Muttenz, Switzerland	Toxicol Appl Pharmacol 325, , 25-36 https://www.ncbi.nlm.nih.gov/pubmed/28385489	Neurotoxicity	Original work	Unknown	-	In vitro rat	-	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1a). Few methods discussed. 1b). Uncertain relevance of this cell line (Rat pheochromocytoma adrenal medulla). 1c). In vitro cell culture. 2). PC-12, cell line originating from a rat adrenal tumour. This paper looks at the action of ACM in a Genetox study but is not representative of usage conditions in soil.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Few methods described. Not a relevant test species that can be properly evaluated. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)
Tox 8	Immunotoxicity assessment of sub-chronic oral administration of acetamiprid in Wistar rats	Drug and Chemical Toxicology	2015	Devan et al.	Central Animal Facility, SASTRA University, Thanjavur, Tamil Nadu, India	Drug Chem Toxicol 38, 3, 328-36 https://www.ncbi.nlm.nih.gov/pubmed/25308553	General toxicology - Subchronic - Immunotoxicity	Original work	Unknown	-	Rat	27.5, 55 and 110 mg/kg b.w. (equivalent to 5.5, 11 and 22 mg/kg b.w.) for a period of 90 days	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1e). The influence of co-formulant was not taken into consideration	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Rat, oral route exposure. No mention of a guidance document followed. No mention of purity. Insufficient description of statistical methods (Only ANOVA). Control group was administered dist. water (The influence of co-formulant was not taken into consideration). Number of animals per group is only 3 rats.
Tox 9	Does Repeat Low-Dose Oral Exposure to Acetamiprid (Neonicotinoid Insecticide) during Gestation Alter the Physiology of the Triad Mother- Placenta- Fetus in the Rat?	Placenta	2019	Gambarte et al.	Departamento de Química Biológica, UBA/IQUIBICENCONICET, Ciudad Autónoma de Buenos Aires, Argentina	Placenta 83: e112.	Reproductive toxicity	Original work	Unknown	-	Rat	Unknown	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Technical material and doses unknown. 1e). Media unknown. 2). Unknown.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Conference proceedings, hence light information available. A full article could not be sourced.
Tox 10	Trophoblast toxicity of the neonicotinoid insecticide acetamiprid and an acetamiprid-based formulation	Toxicology	2020	Gomez et al.	Departamento de Ciencias del Ambiente, Facultad de Ciencias del Ambiente y la Salud, Universidad Nacional del Comahue, Buenos Aires 1400, Neuquén, 8300, Argentina	Toxicology 431, 152363 https://www.ncbi.nlm.nih.gov/pubmed/31935421	General toxicology - DART	Original work	Unknown	-	human first trimester trophoblast cell line (HTR-8/SVneo cells).	0.1, 1, 10 and 100 μ M	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b) Not a recommended test cell lines in related JMAFF guidelines.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Rat, In vitro study. No mention of a guidance document followed.
Tox 11	Exposures of children to neonicotinoids in pine wilt disease control areas	Environmental Toxicology and Chemistry	2019	Ikenaka et al.	Laboratory of Toxicology, Department of Environmental Veterinary Science, Faculty of Veterinary Medicine, Hokkaido University, Sapporo, Hokkaido, Japan	Environ Toxicol Chem 38, 1, 71-79 https://www.ncbi.nlm.nih.gov/pubmed/30478955	General toxicology - Human Exposure	Original work	Unknown	-	Human Children	General exposure post insecticide spraying events.	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). The data only includes amount of test materials in urine and did not describe human health effects.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No mention of a guidance document followed. No mention of purity. Test material not specified. Human children exposure in the environment. There was no change in the amount of acetamiprid in the urine of children before and after spraying acetamiprid. The data were only amount of test materials in urine and did not describe human health effects. The air concentration of Thiacloprid (Not Acetamiprid) did not change before and after the spraying at one area as sampling was performed 14 day after spraying. Therefore, the study protocol was questionable and inappropriate.
Tox 12	Neurodevelopmental toxicity in the mouse neocortex following prenatal exposure to acetamiprid	Journal of Applied Toxicology	2018	Kagawa et al.	Laboratory of Developmental Biology, Department of Life Sciences, Kindai University, 3 - 4 - 1 Kowakae, Higashiosaka, Osaka 577 - 8502, Japan	J Appl Toxicol 38, 12, 1521-1528 https://www.ncbi.nlm.nih.gov/pubmed/30047162	Neurotoxicity	Original work	Unknown	-	Mouse	5 mg/kg	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Single dose at NOEL of 7.1 mg/kg.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Poor indication of the amount of test substance administered. Insufficient doses.
Tox 13	Toxic effects of subchronic oral acetamiprid exposure in rats	Toxicology and Industrial Health	2019	Karaca et al.	Department of Pharmaceutical Toxicology, Faculty of Pharmacy, Istanbul University, Istanbul, Turkey	Toxicol Ind Health 35, 44512, 679-687 https://www.ncbi.nlm.nih.gov/pubmed/31818243	General toxicology - Subchronic	Original work	Unknown	-	Rat	12.5, 25 and 35 mg/kg	Not assigned by the author	Not assigned by the author	-		C or not applicable No mention of a guidance document followed, the experiment is unlikely to have been conducted properly and cannot be reliable; (see Notes)	Not applicable (only Cat A studies are designated Klimisch scores).	Rat, oral route. No mention of a guidance document followed. Male rats only. The control group gained only about 7 grams of body weight for 90 days, suggesting for poor dosing technique and/or animal handling. A experiment with a body weight gain of only 7g for 90 days in the control group is hardly reliable.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
Tox 14	Interspecies differences in cytochrome P450-mediated metabolism of neonicotinoids among cats, dogs, rats, and humans	Comparative Biochemistry and Physiology - Part C Toxicological Pharmacology	2021	Khidkhan et al.	Faculty of Veterinary Medicine, Hokkaido University, Kita 18, Nishi 9, Kita-ku, Sapporo, Hokkaido 060-0818, Japan	Comp Biochem Physiol C Toxicol Pharmacol. 2021 Jan;239:108898. doi: 10.1016/j.cbpc.2020.108898. Epub 2020 Oct 3. PMID: 32979584.	Comparative metabolism	Original work	Unknown	-	In vitro cats, dogs, rats, and humans	NA	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 2). Specific to Cytochrome P450 activation and these concentrations cannot be easily linked to concentration usage conditions in soil or ingested by animals.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.).
Tox 15	Neonicotinoid Insecticides Alter the Gene Expression Profile of Neuron-Enriched Cultures from Neonatal Rat Cerebellum	International Journal of Environmental Research and Public Health	2016	Kimura-Kuroda et al.	Department of Brain Development and Neural Regeneration, TokyoMetropolitan Institute ofMedical Science, Setagaya-ku, Tokyo 156-8506, Japan	J. N. Kimura-Kuroda, Y., et. al. Int J Environ Res Public Health 13, 10, https://www.ncbi.nlm.nih.gov/pubmed/27782041	Neurotoxicity	Original work	Unknown	-	In vitro rat	NA	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Poor indication of the amount of test substance administered or treated 2). This paper looks at cerebellar cultures.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Amount of test substance administered/ treated poorly described. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)
Tox 16	Acetamidrid inhibits testosterone synthesis by affecting the mitochondrial function and cytoplasmic adenosine triphosphate production in rat Leydig cells	Biology of Reproduction	2017	Kong et al.	Department of Basic Medical Science, Zunyi Medical College, Zunyi Guizhou, People's Republic of China	Biol Reprod 96, 1, 254-265 https://www.ncbi.nlm.nih.gov/pubmed/28395332	General toxicology - Subchronic	Original work	Unknown	-	Rat	(I) control group (CG): 0.5 mL peanut oil, (II) low-dose group (LG), 10 mg/kg acetamidrid; (III) high-dose group (HG): 30 mg/kg acetamidrid; (IV) 30 mg/kg acetamidrid + 20 mg/kg vitamin E group (VEG).	Not assigned by the author	Not assigned by the author	-		C Not part of an OECD or OPPTS guideline. Only 2 concentrations applied (see Notes)	Not applicable (only Cat A studies are designated Klimisch scores).	Rat, oral gavage. Not part of an OECD or OPPTS guideline. The number of sperm was determined using guidelines set by the World Health Organization (WHO, 2010). Only 2 concentrations applied No purity information
Tox 17	Specific immune responses in mice following subchronic exposure to acetamidrid	Life Sciences	2017	Marzouki et al.	Laboratory of Transmission, Control and Immunobiology of Infections, LR11IPT02, Institut Pasteur de Tunis, Tunis, Tunisia	Life Sci 188., 44485 https://www.ncbi.nlm.nih.gov/pubmed/28843496	Immunotoxicity	Original work	Unknown	-	Mice	5 mg/kg/day, 100 mg/kg/day	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1a). Test methods are not described. 1d). Poor indication of the amount of test substance administered or treated.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Rats pretreated with CFP32, a virulence factor of Mycobacterium tuberculosis. Single dose at 5 mg/kg of ACE. Single dose of 100 mg/kg ACE + Curcumin 100 mg/kg.
Tox 18	The neonicotinoids acetamidrid and imidacloprid impair neurogenesis and alter the microglial profile in the hippocampal dentate gyrus of mouse neonates	Journal of Applied Toxicology	2019	Nakayama et al.	Laboratory of Developmental Biology, Department of Life Science, Kindai University, 3 - 4 - 1 Kowakae, Higashiosaka, Osaka 577 - 8502, Japan	J Appl Toxicol 39, 6, 877-887 https://www.ncbi.nlm.nih.gov/pubmed/30693975	Neurotoxicity	Original work	Unknown	-	Mice	0.5 mg/kg/day	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Single concentration at 0.5 mg/kg. 2). This paper looks at neurogenesis and microglial profiles.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Poor indication of the amount of test substance administered or treated. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.).
Tox 19	The insecticides chlorpyrifos and acetamidrid induce redox imbalance in umbilical cord blood erythrocytes in vitro	Pesticide Biochemistry and Physiology	2018	Quintana et al.	Facultad de Ciencias Médicas, Universidad Nacional del Comahue, Av. Luis Toschi, 8324 Cipolletti, Río Negro, Argentina	Pestic Biochem Physiol. 2018 Jun;148:87-92. 148., 87-92 https://www.ncbi.nlm.nih.gov/pubmed/29891383	General toxicology - Subchronic	Original work	Unknown	-	Human in vitro	NA	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b). human umbilical cord blood erythrocytes (UCBE). 1c). In vitro/ex vivo system. 2). The doses cannot be linked to concentration usage conditions in soil or oral exposure in animals.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a relevant test species that can be properly evaluated. Not administered/treated by appropriate route. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)
Tox 20	Abnormal sperm morphology in mouse germ cells after short-term exposures to acetamidrid, propineb, and their mixture	Archives of Industrial Hygiene and Toxicology		Rasgele, P.G.	Duzce University, Faculty of Agriculture and Natural Sciences, Department of Biosystems Engineering, Duzce, Turkey	Arh Hig Rada Toksikol. 2014 Mar;65(1):47-56.	General toxicology - Germ cells	Original work	Unknown	-	Mice	Mice were injected intraperitoneally with 0.625, 1.25, and 2.50 µg mL-1 of Acm, 12.5, 25, and 50 µg mL-1 of Pro, and their mixture at the same concentrations over 24 and 48 h.	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b) no information of strain 1e) no information on diluting solvents	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Mice interperitoneal exposure. No test guideline Low number of animals No information of purity Inappropriate setting of the control group (the influence of co-formulant was not taken into consideration)
Tox 21	Postnatal development of rat pups after maternal low-dose exposure to the neonicotinoid insecticide acetamidrid during gestation	Toxicology Letters	2016	Rueda et al.	Departamento Química Biológica, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Argentina	Toxicology Letters Volume 259, Supplement, 10 October 2016, Pages S215-S216	Reproductive toxicity	Original work	Unknown	-	Rat	1 and 6 mg/kg/day.	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Technical material unknown. Doses 1 and 6 mg/kg/day. 1e). Media unknown. 2). Unknown.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Conference proceedings, hence light information available. A full article could not be sourced.
Tox 22	In utero and Lactational Exposure to Acetamidrid Induces Abnormalities in Socio-Sexual and Anxiety-Related Behaviors of Male Mice	Frontiers in Neuroscience	2016	Sano et al.	Center for Health and Environmental Risk Research,National Institute for Environmental Studies, Tsukuba, Japan	Front Neurosci 10, 228 https://www.ncbi.nlm.nih.gov/pubmed/27375407	General toxicology - Behavioural study on sexual and aggression of male mice.	Original work	Unknown	-	Rat	ACE via gavage at doses of either 0mg/kg. 1.0mg/kg or 10.0mg/kg from gestational day 6 to lactation day 21.	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b) mouse is not a recommended test species in JMAFF guidelines. 2) Non-test guideline method.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Mice oral route. Not part of an OECD or OPPTS guideline. Male mice only. Two doses only.
Tox 23	Investigation of the genotoxic and cytotoxic effects of widely used neonicotinoid insecticides in HepG2 and SH-SY5Y cells	Toxicology and Industrial Health	2018	Şenyildiz et al.	Faculty of Pharmacy, Department of Pharmaceutical Toxicology, Istanbul University, Istanbul, Turkey	Toxicol Ind Health. 2018 Jun;34(6):375-383. doi: 10.1177/0748233718762609. Epub 2018 Mar 28. PMID: 29591886.	Genetic Toxicology	Original work	Unknown	-	In vitro	0.125, 0.25, 0.5, 1, 2, and 4mMfor 24 and 48 h exposure times.DMSO(1%) was used as a control.	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1b) Not a recommended test cell lines in related JMAFF guidelines.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	SHSY-5Y and HepG2 cells, In vitro. Not conducted in a GLP lab. Small number of cells observed (100 cells) Possibly inappropriate method for assessing toxicity (number of hedgehog cells unknown)
Tox 24	Effect of Acetamidrid on spatial memory and hippocampal glutamatergic system	Environmental Science and Pollution Research (International)	2021	Shamsi et al.	Department of Toxicology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran	Environ Sci Pollut Res Int 28, 22, 27933-27941 https://www.ncbi.nlm.nih.gov/pubmed/33523378	General toxicology - neurological/behavioural	Original work	Unknown	-	Rat	10, 20, and 40 mg/kg	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 2) Non-test guideline method.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Rat oral gavage. OECD 407: Subacute repeated dose guideline stated However, three dose levels, only MALE rats, o females, so no oestrus cycle determined (Section 30 of OECD 407). Conclusion: study does not match test guideline
Tox 25	Acetamidrid Accumulates in Different Amounts in Murine Brain Regions	International Journal of Environmental Research and Public Health	2016	Terayama et al.	Department of Anatomy, Division of Basic Medicine, Tokai University School of Medicine, Kanagawa 259-1193, Japan	Int J Environ Res Public Health 13, 10, https://www.ncbi.nlm.nih.gov/pubmed/27669271	Genetic Toxicology	Original work	Unknown	-	Mice	Details are unclear	NA	NA	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Two doses, 71 ug/g/day and 710 ug/g/day. 2). The in vivo doses cannot be linked to concentration usage conditions in soil.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Poor indication of the amount of test substance administered or treated. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)
Tox 26	Effect of acetamidrid on the immature murine testes	International Journal of Environmental Research and Public Health	2018	Terayama et al.	Department of Anatomy, Division of Basic Medicine, Tokai University School of Medicine, Kanagawa 259-1193, Japan	Int J Environ Health Res 28, 6, 683-696 https://www.ncbi.nlm.nih.gov/pubmed/30103633	Reproductive toxicity	Original work	Unknown	-	Mice	The average ACE amounts administered to the individual mice in the ACE1 and ACE2 groups were approximately 2.6 and 21.4 mg/day/mouse, respectively.	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 2). The doses cannot be linked to concentration usage conditions in soil.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.) No mention of a guidance document followed.
Tox 27	Neonicotinoid insecticides exposure cause amino acid metabolism disorders, lipid accumulation and oxidative stress in ICR mice	Chemosphere	2020	Yan et al.	Beijing Advanced Innovation Center for Food Nutrition and Human Health, Department of Applied Chemistry, China Agricultural University, Beijing, 100193, PR China	Chemosphere 246., 125661 https://www.ncbi.nlm.nih.gov/pubmed/31891846	Genetic Toxicology - metabolism	Original work	Unknown	-	Mice	0.5 mg/kg bw/day	Not assigned by the author	Not assigned by the author	-	Does not not meet the purpose of the evaluation. Exclusion reason: 1d). Single concentration at 1/200 of the LD50. 2). Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Poor indication of the amount of test substance administered or treated. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.).
ECO 1	Toxicity and biochemical changes in the honey bee Apis mellifera exposed to four insecticides under laboratory conditions	Apidologie	2015	Badawy et al.	Department of Pesticide Chemistry and Technology, Faculty of Agriculture, Alexandria University, 21545 El-Shatby Alexandria, Egypt	Apidologie 46, 177-193 (2015).	Effects on bees	Original work	Unknown	-	honey bee Apis mellifera	0.6, 1.2, 2.4, 6.0, and 60.0 mg (a.i.)/L	Not assigned by the author	Not assigned by the author	LD50 = 1.69 µg/bee (95%CI: 0.62-2.48 µg/bee)	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. The size of test vessels (density) was not mentioned and duration of exposure was different from test guidelines. The endpoint cannot be used for a support parameter of a risk assessment according to the open retreater research guideline in Japan.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
ECO 2	Neonicotinoids act like endocrine disrupting chemicals in newly-emerged bees and winter bees	Scientific Reports	2017	Baines et al.	Agriculture and Agri-Food Canada, Lethbridge Research and Development Centre, 5403 1 Avenue South, Lethbridge, Alberta, T1J 4B1, Canada	Sci Rep 7, 1, 10979 https://www.ncbi.nlm.nih.gov/pubmed/28887455	Effects on bees	Original work	Unknown	-	Bombus impatiens, Apis mellifera, Megachile rotundata	Bombus impatiens:50 µg/ µl, 2.5 µg/ µl, 125 ng/ µl 6.25 ng/ µl, 312.5 pg/ µl, 15.6 pg/ µl, 0.78 pg/ µl and 0.039 pg/ µl 312.5 pg/ µl, 15.6 pg/ µl, 0.78 pg/ µl and 0.039 pg/ µl	NOAELs: Bombus impatiens 37.5 ng/bee (acute & chronic); Apis mellifera 1 ng/bee (acute and chronic); Megachile rotundata 4.2 ug/bee (acute)	Not assigned by the author	Bombus impatiens LD50 = 300 µg/bee; Apis mellifera LD50 =9.1 µg/bee (summer), 21.5 ng /bee and 72.6 µg/bee (winter); Megachile rotundata LD50 =9.3 µg/bee	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Not a recommended test species (Megachile rotundata) in JMAFF guideline. No analytical method. Exposure methods and duration of exposure were different from test guidelines.
ECO 3	Lethal and sublethal toxicity of neonicotinoid and butenolide insecticides to the mayfly, Hexagenia spp	Environmental Pollution	2018	Bartlett et al.	Water Science and Technology Directorate, Environment and Climate Change, Burlington, ON, Canada	Environ Pollut 238, 63-75 https://www.ncbi.nlm.nih.gov/pubmed/29544197	Toxicity to aquatic invertebrates	Original work	Unknown	-	Hexagenia spp	0.1, 1, 10, 100, 1000, and 10,000 µg/L 0.1, 1, and 10 µg/L	NOEC 1 ug/L	LOEC 10 ug/L	96-h LC50= 780 µg/L	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Not a recommended test species in JMAFF guideline. No analytical method
ECO 4	Acute and chronic toxicity of neonicotinoid and butenolide insecticides to the freshwater amphipod, Hyalella azteca	Ecotoxicology and Environmental Safety	2019	Bartlett et al.	Water Science and Technology Directorate, Environment and Climate Change, Burlington, ON, Canada	Ecotoxicol Environ Saf 175, 215-223 https://www.ncbi.nlm.nih.gov/pubmed/30901639	Toxicity to aquatic invertebrates	Original work	Unknown	-	Hyalella azteca	0.08-5 µg/L	Not assigned by the author	Not assigned by the author	7-d LC50= 4.7 µg/L; 28-d LC50= 4.2 µg/L; 28-d EC50= 3.4 µg/L	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. Exposure methods (the size of test organisms, duration of exposure, etc.) were not according to the JMAFF guideline. The endpoint cannot be used for a support parameter of a risk assessment.
ECO 5	Toxicity assessment of chronic exposure to common insecticides and bee medications on colony development and drones sperm parameters	Ecotoxicology	2021	Ben Abdelkader et al.	Bursa Uludag University, Beekeeping Development-Application and Research Center, Bursa, Turkey	Ecotoxicology 30, 5, 806-817 https://www.ncbi.nlm.nih.gov/pubmed/33932203	Effects on bees	Original work	Unknown	-	Apis mellifera	25.10-6 mg /L, 0.01 mg/L and 50 mg/L	Not assigned by the author	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No guideline methods. The endpoints of colony development and drones sperm parameters cannot be used for a support parameter of a risk assessment. No analytical method.
ECO 6	Efficacies of Common Ready to Use Insecticides against Halyomorpha Halys (Hemiptera: Pentatomidae)	Entomologist	2014	Bergmann et al.	University of Maryland, Department of Entomology, College Park, MD 20742, USA	Entomologist, 97(2), 791-800, (1 June 2014)	Effects on arthropods	Original work	Unknown	-	Halyomorpha halys	0.006 % solution	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a recommended test species in JMAFF guideline. No analytical method
ECO 7	Acute toxicity, accumulation and sublethal effects of four neonicotinoids on juvenile Black Tiger Shrimp (Penaeus monodon)	Chemosphere	2021	Butcherine et al.	Marine Ecology Research Centre, Southern Cross University, PO Box 157, Lismore, NSW, 2480, Australia	Chemosphere 275, 129918 https://www.ncbi.nlm.nih.gov/pubmed/33639551	Toxicity to aquatic invertebrates	Original work	Unknown	-	Penaeus monodon	0, 5, 25, 125, 250 and 500 µg/L	Not assigned by the author	Not assigned by the author	48-h LC50 >500 µg/L	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Not a recommended test species in JMAFF guideline. No test guideline method. No analytical method.
ECO 8	Effects of the Neonicotinoid Acetamiprid in Pollen on Bombus impatiens Microcolony Development	Environmental Toxicology and Chemistry	2020	Camp et al.	Oak Ridge Associated Universities, Research Triangle Park, North Carolina, USA	Environ Toxicol Chem 39, 12, 2560-2569 https://www.ncbi.nlm.nih.gov/pubmed/32997831	Effects on bees	Original work	Unknown	-	Bombus impatiens	0.452, 4.52, 45.2, 452, and 4520 µg/kg pollen	NOAEL: 45.2 µg/kg pollen	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. The endpoint cannot be used for a support parameter of a risk assessment according to the open retreaters research guideline in Japan. The microcolony model is not part of the OECD 246 or 247 guidance.
ECO 9	Effects of the neonicotinoid acetamiprid in syrup on Bombus impatiens (Hymenoptera: Apidae) microcolony development	PLOS One	2020	Camp et al.	ORISE Researcher, Oak Ridge Associated Universities, Research Triangle Park, North Carolina, United States of America	PLoS One 15, 10, e0241111 https://www.ncbi.nlm.nih.gov/pubmed/33119659	Effects on bees	Original work	Unknown	-	Hymenoptera: Apidae (Bumble Bee)	1.13, 11.3, 113, 1,130, 11,300 µg/L	NOAEL: 113 µg/L (drone production)	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. The endpoint cannot be used for a support parameter of a risk assessment according to the open retreaters research guideline in Japan. The microcolony model is not part of the OECD 246 or 247 guidelines. No cotton layer to help facilitate the selective choice of worker bumblebees and randomisation prior to collection. OECD guidance is 48 hours, this is 6 weeks.
ECO 10	Toxicity evaluation of the active ingredient acetamiprid and a commercial formulation (Assail (R) 70) on the non-target gastropod Biomphalaria straminea (Mollusca: Planorbidae)	Ecotoxicology and Environmental Safety	2020	Cossi et al.	Universidad de Buenos Aires, Facultad de Ciencias Exactas y Naturales, Departamento de Química Biológica, Laboratorio de Ecotoxicología Acuática: Invertebrados Nativos, Buenos Aires, Argentina	Ecotoxicol Environ Saf 192, , 110248 https://www.ncbi.nlm.nih.gov/pubmed/32036096	Toxicity to aquatic invertebrates	Original work	Unknown	-	Biomphalaria straminea	150 and 1500 µg/L	Not assigned by the author	Not assigned by the author	survival was not affected	1b) Not a recommended test species in test guidelines. 1d). Only 2 concentrations applied. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Relevant species (Mollusca: Planorbidae) but not a recommended species in test guidelines. The endpoint cannot be used for a support parameter of a risk assessment according to the open retreaters research guideline in Japan. No current guidance for the gastropod Biomphalaria straminea (Mollusca: Planorbidae). Only 2 dose levels. No analytical method.
ECO 11	The influence of acetamiprid and deltamethrin on the mortality and behaviour of honeybees (Apis mellifera carnicaPollman) in oilseed rape cultivations	Apidologie	2020	Dworzanska et al.	Institute of Plant Protection - National Research Institute, ul. Władysława Węgorka 20, 60-318, Poznań, Poland	Apidologie 51, 1143-1154 (2020).	Effects on bees	Original work	Unknown	-	Apis mellifera	0.12 kg/ha (120 ppm)	Safe for honeybees at the concentration tested	Not assigned by the author	Safe for honeybees at the concentration tested	1f). No analytical method 2) Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. No test guideline method. Single application concentration. Field studies were conducting on oilseed rape fields in the years 2012–2018 (7 years).
ECO 12	Does Waterborne Exposure Explain Effects Caused by Neonicotinoid-Contaminated Plant Material in Aquatic Systems?	Environmental Science & Technology	2017	Englert et al.	Institute for Environmental Sciences, University of Koblenz-Landau, Landau Campus, Fortstrasse 7, 76829 Landau, Germany	Environ Sci Technol. 2017 May 16;51(10):5793-5802.	Toxicity to aquatic invertebrates	Original work	Unknown	-	G. fossarum, C. villosa	0, 1.5, 3, 6, 12, 24 ug/L 0, 5, 15, 30, 60, 90 ug/L	Not assigned by the author	Not assigned by the author	7-d LC50 = not observed within the range of concentrations tested.	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method No test guideline method.
ECO 13	Effects of abamectin and acetamiprid pesticides on the survival and behavior of Scaptotrigona aff. xanthotricha (Apidae, Meliponini)	Journal of Apicultural Research	2020	Fernanda de Oliveira Ferreira et al.	Instituto de Biologia, Universidade Federal de Uberlândia, Uberlândia, MG, Brazil	Journal of Apicultural Research Volume 61, 2022 - Issue 1 https://www.tandfonline.com/doi/abs/10.1080/00218839.2020.1835262	Effects on bees	Original work	Unknown	-	Scaptotrigona aff. Xanthotricha	Unclear	Not assigned by the author	Not assigned by the author	LD50 = 0.49 µg/mL (stated, but unclear)	1a) Those for which test methods are not described. 1b) Not a recommended test species in JMAFF guideline. 1d). 1 concentration only. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Single concentration only. Methods are unclear. No analytical method.
ECO 14	A comparative study on the effects of selected pesticides on hemato-biochemistry and tissue histology of freshwater fish Cirrhinus mrigala (Hamilton, 1822)	Saudi Journal of Biological Sciences	2021	Ghayyur et al.	Department of Zoology, Hazara University, Mansehra, Pakistan	Saudi J Biol Sci 28, 1, 603-611 https://www.ncbi.nlm.nih.gov/pubmed/33424346	Toxicity to fish	Original work	Unknown	-	Cirrhinus mrigala	3 ppb	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in JMAFF guideline. 1d). 1 concentration only at 3 ppb, sampled on day 10, 20 and 30. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. Not a recommended test species in test guidelines. 1 concentration only No analytical method The endpoint cannot be used for a support parameter of a risk assessment.
ECO 15	Comparative acute toxicity of two phytosanitary molecules, lambda-cyhalothrin and acetamiprid, on Nile Tilapia (Oreochromis Niloticus) juveniles	Journal of Environmental Science and Health	2019	Guedegba et al.	Research Unit in Environmental and Evolutionary Biology (URBE), Institute of Life, Earth & Environment (ILEE), University of Namur, Namur, Belgium	J Environ Sci Health B 54, 7, 580-589 https://www.ncbi.nlm.nih.gov/pubmed/31266377	Toxicity to fish	Original work	Unknown	-	Oreochromis Niloticus	15 g/L	Not assigned by the author	Not assigned by the author	Not assigned by the author	Phase 1-12: The toxicity of mixed formulations derived from different active ingredients. 1d). 1 concentration only at 15 g/L. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	The toxicity of mixed formulations derived from different active ingredients. 1 concentration only No analytical method
ECO 16	Inhibitory Effects of Four Neonicotinoid Active Ingredients on Acetylcholine Esterase Activity	Acta Biologica Hungarica	2017	Gyori et al.	Department of Experimental Zoology, MTA Centre for Ecological Research	Acta Biol Hung 68, 4, 345-357 https://www.ncbi.nlm.nih.gov/pubmed/29262703	General neonicotinoid toxicity	Original work	Unknown	-	In vitro purified eel acetylcholine esterase activity	Unclear	Not assigned by the author	Not assigned by the author	IC50 = 75.2 µM	1b). In vitro method 1d). No indication of the amount of test substance administered 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	In vitro method No indication of the amount of test substance administered No analytical method

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)/Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
ECO 17	Chronic toxicity and biochemical response of <i>Apis cerana cerana</i> (Hymenoptera: Apidae) exposed to acetamiprid and propiconazole alone or combined	Ecotoxicology	2019	Han et al.	Environment and Plant Protection Institute, Chinese Academy of Tropical Agricultural Sciences, Haikou, China	Ecotoxicology 28, 4, 399-411 https://www.ncbi.nlm.nih.gov/pubmed/30874992	Effects on bees	Original work	Unknown	-	<i>Apis cerana cerana</i>	3.66 ng/ μ L and 9.15 ng/ μ L	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in JMAFF guideline. 1d). 1 concentration only at 15 g/L-1. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	1 concentration only No analytical method In this study, it was only calculated LT50 (time to achieve a lethal concentration for 50% of organisms), not calculated LD50.
ECO 18	Neonicotinoid insecticides hinder the pupation and metamorphosis into adults in a crabronid wasp	Scientific Reports	2020	Heneberg et al.	Charles University, Third Faculty of Medicine, Prague, Czech Republic	Sci Rep. 2020 Apr 27;10(1):7077. https://www.ncbi.nlm.nih.gov/pubmed/31330492	Effects on non-target arthropods other than bees	Original work	Unknown	-	<i>Pemphredon fabricii</i>	126.0 ng cm-2 or 512.4 ng cm-2 of 20% formulation	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in test guidelines. 1d). 1 concentration only as Mospilan 20 SP; 126.0 ng cm-2 or 512.4 ng cm-2) 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	1 concentration only No analytical method No test guideline method. This species is not recommended in accordance with IOBC guidelines.
ECO 19	Acute neurotoxicity evaluation of two anticholinesterasic insecticides, independently and in mixtures, and a neonicotinoid on a freshwater gastropod	Chemosphere	2021	Herbert et al.	Universidad de Buenos Aires. Facultad de Ciencias Exactas y Naturales. Departamento de Química Biológica, Laboratorio de Ecotoxicología Acuática: Invertebrados Nativos, Buenos Aires, Argentina	Chemosphere 265, , 129107 https://www.ncbi.nlm.nih.gov/pubmed/33288284	Toxicity to aquatic invertebrates	Original work	Unknown	-	<i>Chilina gibbosa</i>	1, 10, 100, 500, 1000, 1500, 10000 μ g/L	Not assigned by the author NOEC $\geq$ 10000 μ g/L	Not assigned by the author	> 10000 μ g/L	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method No test guideline method.
ECO 20	A sublethal dose of the neonicotinoid insecticide acetamiprid reduces sperm density in a songbird	Environmental Research	2019	Humann-Guillemín et al.	Laboratory of Evolutionary Ecophysiology, Institute of Biology, University of Neuchâtel, Neuchâtel, Switzerland	Environ Res 177, , 108589 https://www.ncbi.nlm.nih.gov/pubmed/31330492	Effects on birds	Original work	Unknown	-	<i>Passer domesticus</i>	0.5% of the LD50 for the Zebra finch (28.5 μ g/kg BW)	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in JMAFF guideline. 1d). 1 concentration only at 0.5% of the LD50 for the Zebra finch. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	1 concentration only No analytical method <i>Passer domesticus</i> is not recommended species and was not shown the justification of using <i>Passer domesticus</i> . Moreover, wild population was used.
ECO 21	Oral acute toxicity and impact of neonicotinoids on <i>Apis mellifera</i> L. and <i>Scaptotrigona postica</i> Latreille (Hymenoptera: Apidae)	Ecotoxicology	2019	Jacob et al.	Department of Entomology and Acarology, "Luiz de Queiroz" College of Agriculture/University of São Paulo (ESALQ/USP), Piracicaba, São Paulo 13418-900, Brazil	Ecotoxicology 28, 7, 744-753 https://www.ncbi.nlm.nih.gov/pubmed/31254187	Effects on bees	Original work	Unknown	-	<i>Apis mellifera</i> and <i>Scaptotrigona postica</i> Latreille	Unclear	Not assigned by the author	Not assigned by the author	<i>Apis mellifera</i> LC50 = 189.62ng a.i./ μ L <i>Scaptotrigona postica</i> Latreille LC50 = 475.94ng a.i./ μ L	1a, d). Food consumption and test dose were unclear. 1b) <i>Scaptotrigona postica</i> Latreilleis not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method Food consumption and test dose were not described.
ECO 22	Developmental Toxicity of a Neonicotinoid Insecticide, Acetamiprid to Zebrafish Embryos	Journal of Agricultural and Food Chemistry	2019	Ma et al.	School of Environment and Guangdong Key Laboratory of Environmental Pollution and Health, Jinan University, Guangzhou 510632, China	J Agric Food Chem 67, 9, 2429-2436 https://www.ncbi.nlm.nih.gov/pubmed/30735371	Toxicity to fish	Original work	Unknown	-	Zebrafish	107, 537 and 760 mg/L.	Not assigned by the author	Not assigned by the author	EC50(mortality) = 513 mg/L	1a). The morphological scoring method was unclear. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. No OECD/OPPTS guidance followed. The OECD 250 (EASZY assay) was published in 2021. However, this paper does not look at the cyp19a1b gene which codes for the brain aromatase, the enzyme responsible for the synthesis of estrogens from androgens. No analytical method. The morphological scoring method was unclear.
ECO 23	Acute Oral and Contact Toxicity of Three Plant Protection Products to Adult Solitary Bees <i>Osmia bicornis</i>	Polish Journal of Environmental Studies	2021	Mokkapatí et al.	Institute of Environmental Sciences, Jagiellonian University, Gronostajowa 7, 30-387 Kraków, Poland	Polish Journal of Environmental Studies. 2021;30(5):4105-4113. doi:10.15244/pjoes/130516.	Effects on bees	Original work	Unknown	-	<i>Bees Osmia bicornis</i>	Oral: 0.04, 0.16, 0.64, 2.56, 10.24 Contact: 0.1, 0.4, 1.6, 6.4, 25.6 ? Dose unit was not described.	Not assigned by the author	Not assigned by the author	Oral: LC50 = 0.033 mg/mL Contact: LD50 = 3.19 μ g/bee	1d). Food consumption and test dose were unclear. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method Food consumption and dose unit were not described.
ECO 24	The development of the solitary bee <i>Osmia bicornis</i> is affected by some insecticide agrochemicals at environmentally relevant concentrations	Science of The Total Environment	2021	Mokkapatí et al.	Institute of Environmental Sciences, Jagiellonian University, Gronostajowa 7, 30-387 Kraków, Poland	Science of The Total Environment 775: 145588.	Effects on bees	Original work	Unknown	-	<i>Osmia bicornis</i>	1, 7, 36, 182 and 909 ng/g pollen	Not assigned by the author	Not assigned by the author	Not assigned by the author	1a) 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No test guideline method. The control emerged was only 43% of initial. Toxicity test procedure for topical application of insecticides on <i>O. bicornis</i> was partially adapted from the OECD test guidelines no. 214 given for the acute contact test for honey bees. No analytical method. No purity information. No guidance given for acute oral test.
ECO 25	Aquatic toxicity and loss of linear alkylbenzenesulfonates alone and in a neonicotinoid insecticide formulation in surface water	Science of The Total Environment	2019	Mortl et al.	Agro-Environmental Research Institute, National Agricultural Research and Innovation Centre, Herman O. u. 15, H-1022 Budapest, Hungary	Sci Total Environ 652, , 780-787 https://www.ncbi.nlm.nih.gov/pubmed/30380485	Aquatic toxicity	Original work	Unknown	-	<i>Daphnia magna</i>	Unclear	Not assigned by the author	Not assigned by the author	> 200 mg/L	2). Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Test dose and method of combined study were unclear. Moreover, EC50 of combined study was 1.47 mg/L but detected level of ACE in surface water was ranging from 0.000008 to 0.044 mg/L according to Morrissey et al.. Therefore, acetamiprid is low risk. Literature that cannot be used for evaluation in typical usage/conditions in Japan (Field conditions, soil properties, etc.)
ECO 26	Toxicity of insecticides on Neotropical stingless bees <i>Plebeia emerina</i> (Fries) and <i>Tetragonisca fiebrigi</i> (Schwarz) (Hymenoptera: Apidae: Melliponini)	Ecotoxicology	2020	Padilha et al.	Departament of Plant Protection, Federal University of Pelotas (UFPEl), P.O. Box 354, Postal Code 96010-900, Capão-do-Leão, RS, Brazil	Ecotoxicology 29, 1, 119-128 https://www.ncbi.nlm.nih.gov/pubmed/31863232	Effects on bees	Original work	Unknown	-	<i>Plebeia emerina</i> (P.e.) and <i>Tetragonisca fiebrigi</i> (T.f.)	Unclear	Not assigned by the author	Not assigned by the author	Oral: P.e. LC50 = 4204 ng a.i./ μ L T.f. LC50 = 9841 ng a.i./ μ L Contact:: P.e. LD50 = 6217 ng a.i./bee T.f. LD50 = 1421 ng a.i./bee	1b).These species are not recommended in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method These species are not recommended in accordance with OECD guidelines. The food consumption values were unclear.
ECO 27	Sensitivity of the early-life stages of freshwater mollusks to neonicotinoid and butenolide insecticides	Environmental Pollution	2016	Prosser et al.	Environment and Climate Change Canada, Aquatic Contaminants Research Division, Burlington, Ontario, Canada	Environ Pollut 218, , 428-435 https://www.ncbi.nlm.nih.gov/pubmed/27450416	Toxicity to aquatic invertebrates	Original work	Unknown	-	~~<i>Eriodaphnia dubia</i>~~ and ~~<i>Daphnia magna</i>~~ : <i>Lamprolaima fasciola</i>	1 to 1000 mg/L.	Not assigned by the author	Not assigned by the author	LC10, 20, 50 > 456 μ g/L	1b). Not a relevant test species that can be properly evaluated.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a relevant test species that can be properly evaluated. No test guideline method. No OECD/OPPTS guidance followed. Water samples were analyzed at the National Wildlife Research Centre in Ottawa, ON, Canada, using a method that is accredited by the Canadian Association for Laboratory Accreditation (CALA).

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
ECO 28	Acute Toxicity of 6 Neonicotinoid Insecticides to Freshwater Invertebrates	Environmental Toxicology and Chemistry	2018	Raby et al.	School of Environmental Sciences, University of Guelph, Guelph, Ontario, Canada	Environ Toxicol Chem 37, 5, 1430-1445 https://www.ncbi.nlm.nih.gov/pubmed/29336495	Toxicity to aquatic invertebrates	Original work	Unknown	-	Ceriodaphnia dubia, Chironomus dilutus, Daphnia magna, Hexagenia spp., Hyalella azteca, Lumbriculus variegatus, and Neocloeon triangulifer.	Various (unclear)	Not assigned by the author	Not assigned by the author	LC50 (μ g/L) C. dubia = > 33500 C. dilutus = 2.8 D. magna = Not assigned by the author Hexagenia = >35600 Hyalella = 4.8 Lumbriculus = 26.5 Neocloeon = 1.7 EC50 (μ g/L) C. dubia = < 556 C. dilutus = 2.7 D. magna = Not assigned by the author Hexagenia = 1.8 Hyalella = 4.4	1b). Ceriodaphnia dubia, Hexagenia spp. Lumbriculus variegatus, and Neocloeon triangulifer are not relevant test species for JMAFF required. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No control data was described. No analytical method. No control data was described, so it is unknown whether or not the control results were appropriate according to the test guidelines. Test dose was unclear. D. magna, C. dilutus and Hyalella were provided with feeding during the test duration. Only 10 daphnids per treatment or control, C. dilutus was 3rd instar and test duration was 96 hours. The stage of Hyalella was younger than required stage by JMAFF guideline.
ECO 29	Chronic toxicity of 6 neonicotinoid insecticides to Chironomus dilutus and Neocloeon triangulifer	Environmental Toxicology and Chemistry	2018	Raby et al.	School of Environmental Sciences, University of Guelph, Guelph, Ontario, Canada	Environ Toxicol Chem 37, 10, 2727-2739 https://www.ncbi.nlm.nih.gov/pubmed/30055027	Toxicity to aquatic invertebrates	Original work	Unknown	-	Chironomus dilutus and Neocloeon triangulifer	Various (unclear)	Not assigned by the author	Not assigned by the author	EC50 = 0.70 μ g/L	1b).Neocloeon triangulifer is not a relevant test species for JMAFF required. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Poor methodology, only silica sand was used as sediment for midge test, and poor or no concentration–response relationship was observed. The endpoint cannot be used for a support parameter of a risk assessment. No analytical methods. This study type is not required by JMAFF. C. dilutus study method was not according to OECD or OCSPP guidelines. The deveopmental stage of organisms tested was not according to the guidelines.
ECO 30	Relative chronic sensitivity of neonicotinoid insecticides to Ceriodaphnia dubia and Daphnia magna	Ecotoxicology and Environmental Safety	2018	Raby et al.	School of Environmental Sciences, University of Guelph, Guelph, Ontario, Canada	Ecotoxicol Environ Saf 163, , 238-244 https://www.ncbi.nlm.nih.gov/pubmed/30056337	Toxicity to aquatic invertebrates	Original work	Unknown	-	Freshwater Invertebrates	Various (unclear)	Not assigned by the author	Not assigned by the author	Not assigned by the author	Phase 1-10: D. magna reproduction test was literature data. 1b). C.dubia is not a relevant test species for JMAFF (No.6278) required.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a JMAFF required method. Static renewal life-cycle tests with C. dubia were conducted according to Environment Canada (2007). Not an OECD or OPPTS guideline. An OECD 211 Daphnia Magna Reproduction test was only carried out with imidacloprid.
ECO 31	Contact application of neonicotinoids suppresses the predation rate in different densities of prey and induces paralysis of common farmland spiders	Scientific Reports	2019	Rezac et al.	Crop Research Institute, Biodiversity Lab, Prague, Czech Republic. 2Czech Academy of Sciences, Institute of Microbiology, Prague, Czech Republic	Sci Rep 9, 1, 5724 https://www.ncbi.nlm.nih.gov/pubmed/30952926	Effects on non-target arthropods other than bees	Original work	Unknown	-	common farmland spiders	512.4 ng of acetamiprid cm-2	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b) Not a recommended test species in test guidelines. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a recommended test species in test guidelines. No current guidance for the common farmland spiders. No test material purity. No analytical method. Only 1 dose level.
ECO 32	Acute and chronic toxicity tests of systemic insecticides, four neonicotinoids and fipronil, using the tadpoles of the western clawed frog Silurana tropicalis	Chemosphere	2021	Saka et al.	Division of Aquatic Environment, Kyoto Prefectural Institute of Public Health and Environment, Murakamicho 395, Fushimi-ku, Kyoto, 612e8369, Japan	Chemosphere 270: 129418.	Effects on amphibians	Original work	Unknown	-	Silurana tropicalis	Dosing unclear - 2 Concentrations (1/100 and 1/10 of the 96-h LC50)	Not assigned by the author	Not assigned by the author	96 h-LC ₅₀ >100 mg/L	1b) Not a recommended test species in test guidelines. 1d). Only 2 Concentrations (1/100 and 1/10 of the 96-h LC50).	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a recommended test species in test guidelines. Only 2 Concentrations conducted
ECO 33	Comparative toxicity of two neonicotinoids and a pyrethroid to forager honeybees (Apis mellifera L, 1758) (Hymenoptera: Apidae) by different exposure methods	Turkish Journal of Entomology	2020	Shah et al.	Sultan Qaboos University, College of Agriculture and Marine Sciences, Department of Plant Science, PO 34, Al-Khoud, 123, Muscat, Oman	Turkish Journal of Entomology 44 (2020): 111-121	Effects on bees	Original work	Unknown	-	Apis mellifera	0.37, 1.11, 3.33, 10, 30 and 90 μ g/mL	Not assigned by the author	Not assigned by the author	72 h-LC ₅₀ > 90 μ g/mL	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. No test guideline method. The separation factor of the tested concentrations was 3.0 which exceeded the recommended value of 2.2 in OECD TG No.213 and No.214. The endpoint cannot be used for a support parameter of a risk assessment.
ECO 34	Effects of sublethal acetamiprid doses on the lifespans and foraging behaviors of honey bee (Apis mellifera L.) workers	Apidologie	2019	Shi et al.	Honeybee Research Institute, Jiangxi Agricultural University, Nanchang 330045, China	Apidologie 50, 553–563 (2019).	Effects on bees	Original work	Unknown	-	Apis mellifera	0.5, 1, and 2 μ g/bee	Not assigned by the author	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. No test guideline method. Endpoints were lifespan and memory-related characteristic of worker bees.
ECO 35	Exposure to acetamiprid influences the development and survival ability of worker bees (Apis mellifera L.) from larvae to adults	Environmental Pollution	2020	Shi et al.	Honeybee Research Institute, Jiangxi Agricultural University, Nanchang 330045, China	Environ Pollut 266, Pt 2, 115345 https://www.ncbi.nlm.nih.gov/pubmed/32814180	Effects on bees	Original work	Unknown	-	Apis mellifera	0, 5, and 25 mg/L	Not assigned by the author	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. No test guideline method. Endpoints were development of worker bees and gene expression.
ECO 36	Sublethal acetamiprid doses negatively affect the lifespans and foraging behaviors of honey bee (Apis mellifera L.) workers	Science of the Total Environment	2020	Shi et al.	Honeybee Research Institute, Jiangxi Agricultural University, Nanchang 330045, China	Sci Total Environ 738, 139924 https://www.ncbi.nlm.nih.gov/pubmed/32531610	Effects on bees	Original work	Unknown	-	Apis mellifera	0, 0.5, 1, and 2 μ g/bee	Not assigned by the author	Not assigned by the author	Not assigned by the author	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. No test guideline method. Endpoint was lifespan and foraging behaviors of worker bees.
ECO 37	Comparative ecotoxicity of insecticides with different modes of action to Osmia excavata (Hymenoptera: Megachilidae)	Ecotoxicology and Environmental Safety	2021	Song et al.	Institute of Plant Protection, Shandong Academy of Agricultural Sciences, Jinan, China	Ecotoxicol Environ Saf 212, , 112015 https://www.ncbi.nlm.nih.gov/pubmed/33561775	Effects on bees	Original work	Unknown	-	Osmia excavata	Acute: 50, 100, 200, 400, 800 ug a.i./mL Sublethal: 50, 100, 200, 400 ug a.i./mL	Not assigned by the author	Not assigned by the author	Acute:48 h-LD ₅₀ 0.91 ug a.i./bee	1b) Not a recommended test species in JMAFF guideline. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method. Not a recommended test species in test guidelines.
ECO 38	Evaluation of pesticide toxicity at their field recommended doses to honeybees, Apis cerana and A-mellifera through laboratory, semi-field and field studies	Chemosphere	2015	Stanley et al.	Vivekananda Institute of Hill Agriculture, Indian Council of Agricultural Research, Almora 263 601, Uttarakhand, India	Chemosphere. 2015 Jan;119:668-674.	Effects on bees	Original work	Unknown	-	Apis cerana and Apis mellifera	Single concentration of 50 ppm	Not assigned by the author	Not assigned by the author	Not assigned by the author	1d). Single concentration of 50 ppm. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Single concentration only. No analytical method.
ECO 39	Similar Comparative Low and High Doses of Deltamethrin and Acetamiprid Differently Impair the Retrieval of the Proboscis Extension Reflex in the Forager Honey Bee (Apis mellifera)	Insects	2015	Thany et al.	LBLGC UPRES EA 1207, Collé gium Sciences et Techniques, Université d'Orléans, 2 rue de Chartres, BP 6759, Orléans 45067, France	Insects 6, 4, 805–14 https://www.ncbi.nlm.nih.gov/pubmed/26466901	Effects on bees	Original work	Unknown	-	Apis mellifera	low, 10 ng/bee and high, 100 ng/bee	Not assigned by the author	Not assigned by the author	Not assigned by the author	1d). Two concentrations (low, 10 ng/bee and high, 100 ng/bee). 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Two concentrations only. No analytical method.
ECO 40	Evaluation of Highly Detectable Pesticides Sprayed in Brassica napus L.: Degradation Behavior and Risk Assessment for Honeybees	Molecules	2018	Tong et al.	Institute of Plant Protection and Agro-Product Safety, Anhui Academy of Agricultural Sciences, Hefei 230031, China	Molecules 23, 10, https://www.ncbi.nlm.nih.gov/pubmed/30262759	Effects on bees	Original work	Unknown	-	Apis mellifera	Single concentration of 60 g a.i./ha.	Not assigned by the author	Not assigned by the author	Not assigned by the author	1d). Single concentration of 60 g a.i./ha.	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Single concentration only.
ECO 41	Neonicotinoid insecticides inhibit cholinergic neurotransmission in a molluscan (Lymnaea stagnalis) nervous system	Aquatic Toxicology	2015	Vehovszky et al.	Department of Experimental Zoology, MTA Centre for Ecological Research, Balaton Limnological Institute, H-8237 Tihany, POB 35, Hungary	Aquat Toxicol 167, 172–9 https://www.ncbi.nlm.nih.gov/pubmed/26340121	Toxicity to aquatic invertebrates	Original work	Unknown	-	Lymnaea stagnalis	Unclear	Not assigned by the author	Not assigned by the author	Not assigned by the author	1b). In vitro test on the neurons of Pond Snail. 1d). No clear indication of the amount of test substance administered	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Not a relevant test species that can be properly evaluated No clear indication of the amount of test substance administered

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Information on compatibility with the purpose of evaluation. I. Exclusion conditions (1a-f, 2)	Information on compatibility with the purpose of evaluation. II. Classification of non- excluded articles	Information on compatibility with the purpose of evaluation. Klimisch reliability assessment of category A articles	Notes
ECO 42	Single and joint toxicity assessment of four currently used pesticides to zebrafish (Danio rerio) using traditional and molecular endpoints	Chemosphere	2018	Wang et al.	State Key Laboratory Breeding Base for Zhejiang Sustainable Pest and Disease Control, Key Laboratory for Pesticide Residue Detection of Ministry of Agriculture, Laboratory (Hangzhou) for Risk Assessment of Agricultural Products of Ministry of Agriculture, Institute of Quality and Standard for Agroproducts, Zhejiang Academy of Agricultural Sciences, Hangzhou, 310021, Zhejiang, China	Chemosphere. 2018 Feb;192:14-23.	Effects on fish	Original work	Unknown	-	Danio rerio	Unclear	Not assigned by the author	Not assigned by the author	Embryo 13.33 mg a.i./L Larvae 15.52 mg a.i./L Juvenile 36.91 mg a.i./L Adult 10.36 mg a.i./L	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method Not clear indication of solvent concentration (combination use with acetone and Tween-80) No control data was described, so it is unknown whether or not the control results were appropriate according to the test guidelines. The endpoint cannot be used for a support parameter of a risk assessment.
ECO 43	Acute and chronic toxicity of acetamiprid, carbaryl, cypermethrin and deltamethrin to Apis mellifera larvae reared in vitro	Pest Management Science	2020	Yang et al.	Key Laboratory of Pollinating Insect Biology of Agriculture, Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China	Pest Manag Sci 76, 3, 978-985 https://www.ncbi.nlm.nih.gov/pubmed/31486576	Effects on bees	Original work	Unknown	-	Apis mellifera	Acute testing: 25, 50, 100, 200 and 400 µg/mL Chronic testing: 2.5, 5, 10, 20, 40, 80 mg/L	NOAEC chronic: 5 mg/L	Not assigned by the author	72 h-LC ₅₀ 188.49 mg/L 72 h-LD ₅₀ 5.65 ug/larva	1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	No analytical method Non-test guideline method Mortality in solvent control data was lower than 15%, but it is unknown whether or not the control results were appropriate according to the test guidelines within 10%. The endpoint cannot be used for a support parameter of a risk assessment.
ECO 44	The effects of acetamiprid on the motor coordination and sucrose sensitivity of the honey bee, Apis mellifera	Annual Meeting of the Society-for-Integrative-and-Comparative-Biology	2015	Young et al.	Muhlenberg College; University of Chicago	Annual Meeting of the Society-for-Integrative-and-Comparative-Biology (SICB), West Palm Beach, FL, United States Of America, 3 - 07 January 2015, vol.55, pp.355	Effects on bees	Original work	Unknown	-	Apis mellifera	1/5 to 1/1000 of the LD50 Dosing unclear	Not assigned by the author	Not assigned by the author	Not assigned by the author	Phase 1-8. Conference proceedings only, hence limited information available. 1a). Abstract only available - test methods not described 1c). Abstract only available - no treatment detail 1d). 1/5 to 1/1000 of the LD50. Not sure how many doses. 1f). No analytical method	Not applicable (article excluded under Phase 2 (I))	Not applicable (article excluded under Phase 2 (I))	Conference proceedings only, hence limited information available. Unclear number of doses No analytical method

No.	Title of literature	Journal name, etc.	Published	Author name	Author's institution	Bibliographic information	Original / Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier
1	Assessment of human exposure to pesticides by hair analysis: The case of vegetable-producing areas in Burkina Faso	Environmental International (2018), Vol. 111, p. 317 - 331	2018	Lehmann et al.	École Polytechnique Fédérale de Lausanne, Central Environmental Laboratory, Station 2, CH-1015 Lausanne, Switzerland	https://doi.org/10.1016/j.envint.2017.10.025	Original work	-	-
2	Biological Monitoring Method for Urinary Neonicotinoid Insecticides Using LC-MS/MS and Its Application to Japanese Adults	Journal of Occupational Health (2014), Vol. 56, p. 461-468	2014	Ueyama et al.	Department of Pathophysiological Laboratory Sciences, Field of Radiological and Medical Laboratory Sciences, Nagoya University Graduate School of Medicine, Japan	https://doi.org/10.1539/joh.14-0077-OA	Original work	-	-
3	Biological Monitoring of Human Exposure to Neonicotinoids Using Urine Samples, and Neonicotinoid Excretion Kinetics	Plos One (2015), Vol 11, e0146335	2015	Harada et al.	Department of Health and Environmental Sciences, Kyoto University Graduate School of Medicine, Kyoto, 6068501, Japan	https://doi.org/10.1371/journal.pone.0146335	Original work	-	-
4	Characteristics of Exposure of Reproductive-Age Farmworkers in Chiang Mai Province, Thailand, to Organophosphate and Neonicotinoid Insecticides: A Pilot Study	International Journal Environmental Reserach and Public Health (2020), Vol. 17, p. 1-14	2020	Suwannarin et al.	Research Institute for Health Sciences (RIHES), Chiang Mai University, Chiang Mai 50200, Thailand	https://doi.org/10.3390/ijerph17217871	Original work	-	-
5	Comprehensive toxicological study over 160 processing factors of pesticides in selected fruit and vegetables after water, mechanical and thermal processing treatments and their application to human health risk assessment	Science of the Total Environment (2019), Vol. 652, p. 1156-1167	2019	Jankowska et al.	Institute of Plant Protection National Research Institute, Laboratory of Food and Feed Safety, Chelmońskiego 22, Postal code: 15-195 Białystok, Poland	https://doi.org/10.1016/j.scitotenv.2018.10.324	Original work	-	-
6	Dietary exposure to neonicotinoid insecticides and health risks in the Chinese general population through two consecutive total diet studies	Environmental International (2020), Vol. 135, p. 1-13	2020	Chen et al.	Food Safety Research Unit of Chinese Academy of Medical Science (2019RU014), NHC Key Lab of Food Safety Risk Assessment, China National Center for Food Safety Risk Assessment, Beijing 100022, China	https://doi.org/10.1016/j.envint.2019.105399	Original work	-	-
7	Dietary risk assessment of pesticides from vegetables and drinking water in gardening areas in Burkina Faso	Science of the Total Environment (2017), Vol. 601-602, p. 1208-1216	2017	Lehmann et al.	École Polytechnique Fédérale de Lausanne, Central Environmental Laboratory, Station 2, CH-1015 Lausanne, Switzerland	https://doi.org/10.1016/j.scitotenv.2017.05.285	Original work	-	-
8	Exposure to neonicotinoid insecticides in the US general population: Data from the 2015-2016 national health and nutrition examination survey	Environmental Research (2019), Vol. 176, p. 1-9	2019	Ospina et al.	Division of Laboratory Sciences, National Center for Environmental Health, Centers for Disease Control and Prevention, 4770 Buford Hwy, MS F17, Atlanta, GA, 30341, USA	https://doi.org/10.1016/j.envres.2019.108555	Original work	-	-
9	Health risks to dietary neonicotinoids are low for Chinese residents based on an analysis of 13 daily consumed foods	Environmental International (2021), Vol. 149, p. 1-12	2021	Cui et al.	Institute of Plant Protection, Chinese Academy of Agricultural Sciences, State Key Laboratory for Biology of Plant Diseases and Insect Pests, Key Laboratory of Control of Biological Hazard Factors (Plant Origin) for Agricultural Product Quality and Safety, Ministry of Agriculture, Beijing 100193, People's Republic of China	https://doi.org/10.1016/j.envint.2021.106385	Original work	-	-
10	The human and ecological risks of neonicotinoid insecticides in soils of an agricultural zone within the Pearl River Delta, South China	Environmental Pollution (2021), Vol. 284, p. 1-9	2021	Yu et al.	Guangdong Key Laboratory of Environmental Pollution and Health, School of Environment, Jinan University, Guangzhou, 511443, China	https://doi.org/10.1016/j.envpol.2021.117358	Original work	-	-
11	Nationwide Biomonitoring of Neonicotinoid Insecticides in Breast Milk and Health Risk Assessment to Nursing Infants in the Chinese Population	Journal of Agricultural and Food Chemistry (2020), Vol. 68, p. 13906-13915	2020	Chen et al.	NHC Key Laboratory of Food Safety Risk Assessment; Chinese Academy of Medical Science Research Unit (2019RU014); China National Center for Food Safety Risk Assessment, Beijing 100021, China	https://doi.org/10.1021/acs.jafc.0c05769	Original work	-	-
12	A nationwide study of occurrence and exposure assessment of neonicotinoid insecticides and their metabolites in drinking water of China	Water Research (2021), Vol. 189, p. 1-12	2021	Mahai et al.	Key Laboratory of Environment and Health, Ministry of Education & Ministry of Environmental Protection, and State Key Laboratory of Environmental Health (Incubation), School of Public Health, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, Hubei, PR China	https://doi.org/10.1016/j.watres.2020.116630	Original work	-	-
13	A nationwide survey of urinary concentrations of neonicotinoid insecticides in China	Environmental International (2019), Vol. 132, p. 1-9	2019	Zhang et al.	School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou 510275, China	https://doi.org/10.1016/j.envint.2019.105114	Original work	-	-
14	Urinary Metabolites of Neonicotinoid Insecticides: Levels and Recommendations for Future Biomonitoring Studies in China	Environmental Science & Technology (2020), Vol. 54, p. 8210-8220	2020	Song et al.	School of Environmental Science and Engineering, Sun Yat-Sen University, Guangzhou 510275, China	https://doi.org/10.1021/acs.est.0c01227	Original work	-	-

No.	Author name	Country/region	Test design	Survey period	Target person, age	Research design	Definition of outcomes	Method of outcome examination	Definition of exposure index	Exposure measurement	N number of the whole test (case / control)	N number of outcomes	Analysis category	Information on health-related events				Remarks (relationship with other documents, etc.)		
														N number related to exposure (case/control)	Relative risk / odds ratio, etc.	95% confidence interval	p value	Consideration of confounding factors		
1	Lehmann et al. (2018a)	Burkinafaso (near Ouagadougou; human exposure assessment through hair analysis)	Case-control study	2015	Agricultural workers/operators (56 persons aged 16 - 73 years) and reference population (45 persons aged 16 - 73 years)	Detection of pesticide residues, including acetamiprid in hair samples	Detection of pesticide residues, including acetamiprid in hair samples	Samples analysed using GC-MS and UPLC-MS/MS	Concentration of 38 pesticide, including acetamiprid (pg/mg) above LOD	Results of samples analysed by GC-MS and UPLC-MS/MS	101 (56/45)	34	Detected or not	34/17	Median value = 25.2 pg/mg for case populations; 7.8 pg/mg for control populations	Min-max = 4.8 - 236.5 pg/mg for control populations; 5.6-69.0 pg/mg for control populations	-	Sex, age, and protective equipment	Several other pesticides were determined. However, only the results for acetamiprid is provided as they are the only ones considered relevant for the current application	
2	Ueyama et al. (2014)	Japan (nationwide; urinary detection of neonicotinoid insecticides in Japanese adults	Biomonitoring survey	Not known	Japanese adults	Urine levels of neonicotinoid insecticides as determined by high-performance LC-MS/MS	Urine levels of neonicotinoid insecticides as determined by high-performance LC-MS/MS	Samples analysed using LC-MS/MS	Detection (in microgram/L) in urine sample above LOD	Results of samples analysed by LC-MS/MS	52	Of 52 individuals, acetamiprid (56%), Imidacloprid (96%), Thiacloprid (67%), Thiamethoxam (100), Clothianidin (96%), Dinotefuran (100), Nitenpyram (29%)	Detected or not	Acetamiprid (28/52); Imidacloprid (50/52); Thiacloprid (35/52); Thiamethoxam (52/52); Clothianidin (50/52); Dinotefuran (52); Nitenpyram (15/52)	Not determined	-	-	-	No health impact assessment was done in the study. Study only reported the development of a method for detection and qualification of neonicotinoids (including acetamiprid) in urine samples	
3	Harada et al. (2015)	Japan (Uji and Kyoto; monitoring of neonicotinoids in Japanese adults using urine samples and excretion kinetics	Biomonitoring survey	2009 - 2014	Japanese adults	Urine levels of selected neonicotinoids as determined by LC-MS/MS	Urine levels of selected neonicotinoids as determined by LC-MS/MS	Samples analysed using LC-MS/MS	Detection (in microgram per day) in excreted urine above LOD	Results of samples analysed by LC-MS/MS	373	Of 373 individuals: acetamiprid (91 or 24.4%), Clothianidin (360 or 96.5%), Dinotefuran (348 or 93.3%), Imidacloprid (286 or 76.7%), Nitenpyram (44 or 11.8%), Thiacloprid (29 or 7.8%), Thiamethoxam (343 or 92.0%), 3Desmethyl-thiamethoxam (4 or 1.1%), Thiacloprid amide (0 or 0%)	Detected or not	Acetamiprid (91/373), Clothianidin (360/373), Dinotefuran (348/373), Imidacloprid (286/373), Nitenpyram (44/373), Thiacloprid (29/373), Thiamethoxam (343/373), Desmethyl-thiamethoxam (4/373), Thiacloprid amide (0/373)	Not determined	-	-	-	No health impact assessment was done in the study. Study only reported the detection of selected neonicotinoid pesticides (including acetamiprid) in urine excreted by samples Japanese adults	
4	Suwanarin et al. (2020)	Thailand (Chiang Mai Province; Pilot study characterising exposure of reproductive age farmworkers to organophosphate and neonicotinoid insecticides)	Biomonitoring survey	2018	Reproductive-age Thai farmworkers	Concentration of urinary organophosphate pesticides and neonicotinoids pesticides or its metabolites, as determined by GC-FID and LC-MS/MS	Concentration of urinary organophosphate pesticides and neonicotinoids pesticides or its metabolites, as determined by GC-FID and LC-MS/MS	Samples analysed using GC-FID and LC-MS/MS at the Chiang Mai University (Thailand) and National Institute for Environmental Studies (Japan)	Urinary concentrations (in microgram per gram creatine) of tested organophosphate pesticides and neonicotinoids above LOD	Results of samples analysed by GC-FID and LC-MS/MS	100	Of 100 reproductive age farmworkers: dimethylphosphate (15%), dimethylthiophosphate (36%), dimethyldithiophosphate (11%), diethylphosphate (100%), diethylthiophosphate (100%), diethyldithiophosphate (65%); acetamiprid (34%), clothianidin (59%), dinotefuran (9%), imidacloprid (94%), nitenpyram (0%), thiacloprid (0%), thiamethoxam (69%), sulfoxaflor (2%),flonicamid (2%), N-desmethyl-ACE (99%), thiacloprid-amide (3%), imidacloprid-olefin(50%), trifluoromethyl-nicotinamide (0%), hydroxy-IMI (0%), N-desmethyl-THX (0%), OH-IMI (0%), Of-IMI (50%), TFNA-AM (0%), TZNG (5%), Fipronil (0%), Fipronil sulphide (0%), Fipronil sulphone (8%), Ethiprole (0%)	Detected or not	Of 100 reproductive age farmworkers: dimethylphosphate (15), dimethylthiophosphate (36), dimethyldithiophosphate (11), diethylphosphate (100), diethylthiophosphate (100), diethyldithiophosphate (65); acetamiprid (34), clothianidin (59), dinotefuran(9), imidacloprid (94), nitenpyram (0), thiacloprid (0), thiamethoxam (69), sulfoxaflor (2),flonicamid (2), N-desmethyl-ACE (99), thiacloprid-amide (3), imidacloprid-olefin(296.6), trifluoromethyl-nicotinamide (0), hydroxy-IMI (0), N-desmethyl-THX (0), OH-IMI (0), Of-IMI (296.6), TFNA-AM (0), TZNG (0.5), Fipronil (0), Fipronil sulphide (0), Fipronil sulphone (0.05), Ethiprole (0)	Max. concentration (microgram per gram creatine : Dimethylphosphate(-), dimethylthiophosphate (-), dimethyldithiophosphate (-), diethylphosphate (5.7 - 8.0), diethylthiophosphate (7.1-11.3), diethyldithiophosphate (5.2 - 10.2), acetamiprid (-), clothianidin (2.0-2.0), dinotefuran(-), imidacloprid (6.6-11.6), nitenpyram (-), thiacloprid (0), thiamethoxam (3.2 - 5.7), sulfoxaflor (1.0),flonicamid (0.2), N-desmethyl-ACE (6.0- 8.8), thiacloprid-amide (-), imidacloprid-olefin(-), trifluoromethyl-nicotinamide (-), hydroxy-IMI (-), N-desmethyl-THX (-), OH-IMI (-), Of-IMI (2.0 -3.3), TFNA-AM (-), TZNG (-), Fipronil (-), Fipronil sulphide (-), Fipronil sulphone (-), Ethiprole (-)	-	-	-	No health impact assessment was done in the study. Study only reported the detection of selected organophosphate and neonicotinoid pesticides/metabolites (including acetamiprid) in urine of reproductive age farmworkers in Thailand.	
5	Jankowska et al. (2019)	Poland (region not relevant as study was not conducted directly on human populations; Toxicological study of several processing factors of pesticides in selected fruits and vegetables and application for human health assessment	Biomonitoring survey	2011-2016	Not specified in report. It was only stated that risk assessment was done on two sub-populations - children (2-4 years) and adults (14-80 years)	Hazard quotients (HQ) from chronic and acute dietary exposure, ARID, ADI	Hazard quotients (HQ) from chronic and acute dietary exposure, ARID, ADI	For pesticides, samples from GC/ECD/NPD and LC-MS/MS analysis conducted at Proficiency Testing (run by the European Commission) and Food Analysis Performance Assessment Scheme Central Science Lab (York, UK); For risk assessment, EFSA PRIMo Pesticide Residue Intake Model reports.	Acceptable risk if HQ does not exceed 100% of the ARID or ADI	Results of samples from GC/ECD/NPD and LC-MS/MS analysis; Modelling reports	Not specified	Not specified. However, long-term exposure of all tested pesticides did not exceed 7% of ADI for adults and children. The short-term exposure for adults and children did not exceed 25% of the ARID	HQ Higher/lower than 100% of ADI/ARID	Not applicable	Not determined	-	-	-	Study was not conducted directly on human population. However, modelling was used to assess human health risk of pesticides on commodities subjected to various processing factors	
6	Chen et al. (2020)	China (Heilongjiang, Liaoning, Hebei, Beijing, Jilin, Shaanxi, Henan, Ningxia, Neimenggu, Qinghai, Shanghai, Fujian, Jiangxi, Jiangsu, Zhejiang, Hubei, Sichuan, Guangxi, Hunan, Guangdong, Shanxi, Gansu, Shandong and Guizhou; Dietary exposure to neonicotinoid insecticides and health risks in Chinese general population)	Biomonitoring survey	2009 - 2018	Adult individuals from at least 30 randomly selected households; 528 composite dietary samples from 24 Chinese provinces	Detection of neonicotinoid residues in food samples; Acceptable daily intake (ADI), Chronic reference dose (cRfD), and relative potency factors (RPF)	Detection of neonicotinoid residues in food samples; Acceptable daily intake (ADI), Chronic reference dose (cRfD), and relative potency factors (RPF)	Pesticide residue analysis by LC-MS/MS; Risk assessment report	Levels of neonicotinoids residues (exceeding LOD), estimated daily intake, cRfD; Acceptable risk if estimated daily intake (EDI) is lower than chronic reference dose (57 microgram/kilogram/body weight/day)	Data of pesticide residue analysis by LC-MS/MS; Risk assessment calculations	528 samples- 5th district (240); 6th district (288)	From 5th district; Of 244: Nitenpyram (5%/ or 12), Dinotefuran (0.4% or 1), Thiacloprid (22.9% or 55), Imidacloprid (60.8% or 146), Clothianidin (9.6% or 23), Acetamiprid (52.9% or 127), Thiamethoxam (2.1% or 5), Imidacloprid (0%), ACE-n-desmethy (31.3% or 75). From 6th District; Of 288: Nitenpyram (6.9% or 20), Dinotefuran (7.3% or 21), Thiacloprid (54.9% or 158), Imidacloprid (61.8% or 178), Clothianidin (52.8% or 152), Acetamiprid (56.9% or 164), Thiamethoxam (2.4% or 7), imidacloprid (0.3% or 1), ACE-n-desmethy (44.8% or 129)	Detected or not; Estimated daily intake (EDI) of total neonicotinoids lower/higher than cRfD	Not applicable	From 5th district; mean concentration (microgram per kilogram): Nitenpyram (0.015), Dinotefuran (0.007), Thiacloprid (0.426), Imidacloprid (1.586), Clothianidin (0.100), Acetamiprid (3.423), Thiamethoxam (0.003), Imidacloprid (0.005), ACE-n-desmethy (0.344). From 6th District; Of 288: Nitenpyram (0.037), Dinotefuran (0.024), Thiacloprid (0.989), Imidacloprid (0.915), Clothianidin (0.486), Acetamiprid (2.589), Thiamethoxam (0.010), Imidacloprid (0.008), ACE-n-desmethy (0.282); EDI much lower than cRfD	From 5th district; max. (microgram per kilogram): Nitenpyram (0.532), Dinotefuran (0.512), Thiacloprid (30.287), Imidacloprid (33.214), Clothianidin (4.909), Acetamiprid (108.211), Thiamethoxam (0.048), Imidacloprid (less than LOD), ACE-n-desmethy (11.322). From 6th District (microgram per kilogram): Nitenpyram (2.338), Dinotefuran (1.697), Thiacloprid (71.309), Imidacloprid (28.045), Clothianidin (39.009), Acetamiprid (185.533), Thiamethoxam (1.421), Imidacloprid (0.897), ACE-n-desmethy (14.977); EDI of total neonicotinoids much lower than cRfD	-	-	-	Study was not conducted directly on human population but data derived from pesticide residues analysis (including acetamiprid) was used to predict human health risk
7	Lehmann et al. (2017)	Burkinafaso (Lake Loubila; Dietary risk assessments of pesticides from vegetables and drinking water in gardening areas)	Biomonitoring survey	2015-2016	126 gardeners, including adults and children	Hazard quotients (HQ) from chronic and acute dietary exposure, ARID, ADI	Hazard quotients (HQ) from chronic and acute dietary exposure, ARID, ADI	Pesticide residue analysis by UPLC-MS/MS and GC-MS analysis; Risk assessment report	Acceptable risk if HQ does not exceed 100% of ARID or ADI	Results of samples from UPLC-MS/MS and GC-MS analysis; Risk assessment calculation reports	126	Of all 31 pesticides assessed, HQ exceeds 100% of the ARID and ADI for chlorpyrifos, lambda-cyhalothrin and dieldrin, in both adults (4% of population, n = 3) and children (greater than 17%, n =13)	HQ Higher/lower than 100% of ADI/ARID	16 of 126	Not determined	-	-	Processing factors, life stage (adult or child)	No unacceptable effects were found for neonicotinoid pesticides (including acetamiprid)	
8	Ospina et al. (2019)	USA (nationwide; Exposure to neonicotinoid insecticides in the U.S. general population)	Biomonitoring survey	2015 - 2016	3038 individuals - 3 - 5 years (n = 505), 6 years and older (n = 2533)	Detection of neonicotinoid insecticides and metabolites in urinary samples	Detection of neonicotinoid insecticides and metabolites in urinary samples	High performance LC-MS/MS	Detection (in microgram/L) in urine sample above LOD	National Health and Nutrition Examination Survey report	3038	Weighted detection frequencies: N-desmethyl-acetamiprid (35%), 5-hydroxy imidacloprid (19.7%); clothianidin (7.7%), Imiacloprid (4.3%), acetamiprid (less than 0.5%), thiacloprid (less than 0.5%)	detcted or not	1492 of 3038	Not determined for the general test population	-	-	Age range, ethnicity	No human health risk assessment was conducted	
9	Cui et al. (2021)	China (Liaoning province, Gansu province, Beijing city, Shandong and Hunan province, Guizhou province, Hainan province, Qinghai province; Health risks to dietary neonicotinoids in Chinese residents)	Biomonitoring survey	2016	3406 dietary samples from general population - children (1-6 years) and adults (above 6 years)	Detection of neonicotinoids in tested food samples; ADI, ARID, Relative Potency Factor (RPF), Hazard quotient and Hazard Index	Detection of neonicotinoids in tested food samples; ADI, ARID, Relative Potency Factor (RPF), Hazard quotient and Hazard Index	High performance LC-MS/MS; Risk assessment report	HQ or HI less than 1 mean acceptable health risk	Results of samples analysed with LC-MS/MS; Risk assessment calculation reports	3406	62.21% of 3406 samples contained neonicotinoids (including acetamiprid) above LOD. However, HQ and HI less than 1 for all tested population	HI and HQ higher or less than 1	Not applicable	Not determined	-	-	-	No unacceptable health effects were found	
10	Yu et al. (2021)	China (Zengcheng; The human and ecological risks of neonicotinoid insecticides in soils of an agricultural zone within the Pearl River Delta, South China)	Biomonitoring survey	2014	General populatin in sampling region	Detection of neonicotinoids in agricultural soils; HQ and HI	Detection of neonicotinoids in agricultural soils; HQ and HI	High performance LC-MS/MS; Risk assessment report	HI less than 1 means acceptable health risk	Results of samples analysed with LC-MS/MS; Risk assessment calculation reports	351	95% of soil samples contain neonicotinoids (including acetamiprid); HI less than 1 for all tested neonicotinoids	HI higher or less than 1	Not applicable	Not determined	-	-	-	No unacceptable effects were found for neonicotinoid pesticides (including acetamiprid) at concentrations between 0.26 - 280 nanogram per gram dry weight	
11	Chen et al. (2020b)	China (Heilongjiang, Liaoning, Hebei, Beijing, Jilin, Shaanxi, Inner Mongolia, Henan, Ningxia, Qinghai, Gansu, Jiangxi, Fujian, Zhejiang, Shanghai, Jiangsu, Shandong, Hubei, Sichuan, Guangxi, Hunan, Guangdong, and Guizhou; Nationwide biomonitoring of neonicotinoid insecticides in breast milk and health risk assessment to nursing infant in Chinese Population)	Biomonitoring survey	2017 - 2019	Lactating women	Detection of neonicotinoids in breast milk; Risk Index	Detection of neonicotinoids in breast milk; Risk Index	High performance LC-MS/MS; Risk assessment report	Detection of neonicotinoid residues (in nanogram per liter); RI less than 1 mean acceptable risk	Results of samples analysed with LC-MS/MS; Risk assessment calculation reports	97 pooled samples from 3570 lactating women	Detection frequencies (of 97 pooled samples): Acetamiprid (71.1%), Clothianidin (84.5%), Nitenpyram (19.6%), Dinotefuran (not determined), Imidacloprid (99.0%), Thiamethoxam (96.9%), Thiacloprid (not determined), Imidacloprid (not determined), Acetamiprid-N-desmethyl (100%); RI is less than 1	Detected in samples or not; RI higher or less than 1	Not applicable	Mean concentrations (nanogram per liter): Acetamiprid (19.1), Clothianidin (13.0), Nitenpyram (7.77), Dinotefuran (not determined), Imidacloprid (41.0), Thiamethoxam (20.3), Thiacloprid (not determined), Imidacloprid (not determined), Acetamiprid-N-desmethyl (161); RI is less than 1	-	-	-	No unacceptable effects were found for tested neonicotinoid pesticides (including acetamiprid)	
12	Mahai et al. (2021)	China (nationwide) and Hong Kong; Nationwide study of occurrence and exposure assessment of neonicotinoid insecticides and thier metabolites in drinking water of China)	Biomonitoring survey	2019	General population in sampling regions	Decton of neonicotinoids in water samples; EDI relative to IMI-equivalent of total neonicotinoids	Decton of neonicotinoids in water samples; EDI relative to IMI-equivalent of total neonicotinoids	LC-MS/MS; Risk assessment report	Detection of neonicotinoid residues above LOD (in nanogram per liter); EDI lower than cRfD means acceptable risk	Results of samples analysed with LC-MS/MS; Risk assessment report calculation reports	884 water samples	Detection frequencies (of 884 samples): ACE (93%), IMI (82%), CLO (69%), THM (66%), THCP (40%), DNT (25%), IMIT (4.5%), NTP (4.9%), FLO (4.0%), DM-ACE (77%), DN-IMI (60%), IMI-urea (67%), DM-THM (12%); EDI of IMIeq is at least two orders of magnitude lower than cRfD	Detected in samples or not; EDI higher or lower than tan cRfD	Not applicable	Median concentration (nanogram per liter): ACE (0.30), IMI (0.80), CLO (0.14), THM (0.22), THCP (below LOD), DNT (below LOD), IMIT (less than LOD), NTP (less than LOD), FLO (less than LOD), DM-ACE (0.06), DN-IMI (0.29), IMI-urea (0.29), DM-THM (less than LOD); EDI of IMIeq is at least two orders of magnitude lower than cRfD	-	-	-	No unacceptable effects were found for tested neonicotinoid pesticides (including acetamiprid, ACE)	
13	Zhang et al. (2021)	China (nationwide; Nationwide survey of urinary concentrations of neonicotinoids insecticides in China)	Biomonitoring survey	2012 - 2017	General population	Detection of neonicotinoids in water samples	Detection of neonicotinoids in water samples	High performance LC-MS/MS	Detection of neonicotinoid pesticides above LOD (in nanogram per milliliter)	Results of samples analysed with LC-MS/MS	324	Detection rates (of 324 samples): Acetamiprid (96%), Clothianidin (99%), dinoterufan (96%), imidacloprid (97%), thiacloprid (92%) and thiamethoxam (98%)	Detected in samples or not	Not applicable	Median concentration (nanogram per milliliter): Acetamiprid (0.014), Clothianidin (0.24), dinoterufan (0.14), imidacloprid (0.21), thiacloprid (0.0016) and thiamethoxam (0.15)	-	-	Sex	No human health risk assessment was conducted; higher urinary levels of neonicotinoids in males compared to females	
14	Song et al. (2020)	China (Gungxi province, Shandong Province, Inner Mongolia Province, Hebei Province, Hunan Province, Jiangsu Province, Shanxi Province, Jiangxi Province, Sichuan Province ; Biomonitoring of urinary metabolites of neonicotinoid insecticides)	Biomonitoring survey	2012 - 2017	General population in sampling regions	Detection of neonicotinoid metabolites in samples	Detection of neonicotinoid metabolites in samples	High performance LC-MS/MS	Detection of neonicotinoid pesticide metabolites above LOD (nanogram per milliliter)	Results of samples analysed with LC-MS/MS	275	Detection rates (of 275 samples): N-desmethyl-acetamiprid (89%), 5-hydroxy-imidacloprid (88%), olefin-imidacloprid (63%), 1-methyl-3-(furyl-methyl) guanidine (68%), and 1-methyl-3-(tetrahydro-3-furylmethyl) (96%)	Detected in sample or not	Not applicable	Detection rates (nanogram per liter): N-desmethyl-acetamiprid (0.45), 5-hydroxy-imidacloprid (1.02), olefin-imidacloprid (6.05), 1-methyl-3-(furyl-methyl) guanidine (0.42), and 1-methyl-3-(tetrahydro-3-furylmethyl) (0.89)	-	-	Age, sex	No human health risk assessment was conducted. Higher levels of neonicotinoid metabolites in generally detected in females	

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Notes
Tox 1	Two cases of acute poisoning with acetamiprid in humans	Clinical Toxicology	2010	Imamura T, Yanagawa Y, Nishikawa K, Matsumoto N	Department of Traumatology and Critical Care Medicine, National Defense Medical College, Tokorozawa, Japan. Department of Pharmacy, National Defense Medical College, Tokorozawa, Japan	Clinical Toxicology (2010) 48, 851–853. DOI: 10.3109/15563650.2010.517207	Acute toxicity	Original work	JMPR	JMPR Tox data	Human	Unkown	NA	NA	NA	
Tox 2	Effects of Acetamiprid on Immune System in Female Wistar Rats	Proceedings of the zoological society	2009	Mondal S, Ghosh RC, Mate MS, Karmakar DB	Department of Veterinary Pathology, College of Veterinary Science and Animal Husbandry, Durg - 491 001 (Chhattisgarh), India. Chembiotek, TCGLS, Kolkata 700091, India	Proc. zool. Soc. 62 (2): 109–117	Subacute toxicity	Original work	JMPR	JMPR Tox data	Rat	25, 100 and 200 mg/kg of body weight	NA	NA	NA	
Tox 3	Spontaneous Malformations in Laboratory Animals: Frequency of External, Internal and Skeletal Malformations in Rats, Rabbits and Mice	Congenital Anomalies	1987	Morita H, Ariyuki F, Inomata N, Nishimura K, Hasegawa Y, Miyamoto M, Watanabe T	Drug Safety Research Center, Daiichi Seiyaku Co., Ltd., 16-13 Kita-kasai 1-Chome, Edogawa-ku, Tokyo 134, Japan	Cong. Anom., 27: 147-206, 1987	Reproductive toxicity	Review	JMPR	JMPR Tox data	mouse, rabbit and rat	NA	NA	NA	NA	
Tox 4	Acute poisoning with Neonicotinoid Insecticide Acetamiprid	Advanced Medical Emergency and Critical Care Centre, Yamaguchi University Hospital, Japan	2008	Todani M, Kaneko T, Hayashida H, Kaneda K, Tsuruta R, Kasaoka S, Maekawa T	Advanced medical emergency and critical care centre, Yamaguchi University Hospital, Japan	21: 387-390	Acute toxicity/poisoning	Original work	JMPR	JMPR Tox data	Human	NA	NA	NA	NA	
Tox 5	Identification and interpretation of developmental neurotoxicity effects. A report from the ILSI Research Foundation/Risk Science Institute expert working group on neurodevelopmental endpoints	Neurotoxicology and Teratology	2008	Tyl RW, Crofton K, Moretto A, Moser V, Sheets LP, Sobotka, TJ	RTI International, United States. NTD/NHEERL/ORD/EPA, United States. Department of Environmental Medicine and Public Health, University of Padova, Italy. Bayer CropScience, United States. FDA/CFSAN, United States.	Neurotoxicology and Teratology 30 (2008) 349 – 381	Neurotoxicity	Review	JMPR	JMPR Tox data	rat	NA	NA	NA	NA	

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Notes
Tox 1	In vitro genotoxicity evaluation of acetamiprid in CaCo-2 cells using the micronucleus, comet and gamma H2AX foci assays	Pesticide Biochemistry and Physiology	2012	Cavas, T., Cinkilic, N., Vatan, O., Yilmaz, D., Coskun, M.	Cell Culture and Genetic Toxicology Laboratory, Department of Biology, Faculty of Sciences and Arts, Uludag University, 16059 Nilüfer, Bursa, Turkey	Pesticide Biochemistry and Physiology (2012) Vol. 104.3, pp. 212-217	Genotoxicity	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vitro micronucleus, comet and cH2AX foci assays	0-350 µmol	NA	NA	NA	The study was not to GLP or Guideline. Although well reported the study was not conducted in a validated cell line. The choice of positive control was also poor as it is not a direct genotoxic agent, but rather a mediator of oxidative stress. This study cannot supersede GLP and guideline compliant studies conducted for the registration of acetamiprid.
Tox 2	Reproductive effects of two neonicotinoid insecticides on mouse sperm function and early embryonic development in vitro	PLoS ONE	2013a	Gu, Y., Li, Y., Huang, X., Zheng, J., Yang, J., Diao, H., Yuan, Y., Xu, Y., Liu, M., Shi, H., Xu, W.	Obstetrics & Gynecology Hospital, Institute of Reproduction & Development, Fudan University, Shanghai, P. R. of China	PLoS ONE 8.7 (Jul 29, 2013)	Reprotoxicity	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vitro gamete exposures	5mM, 500µM	NA	NA	NA	Although this is a well described study it is an in vitro study not relevant to actual gamete exposures, relevance of concentrations tested not justified and way in excess of in vivo exposures, (with the lower concentration being defined as that for nicotine which caused massive fragmentation and death the next day) and exposure to neat material rather than metabolites as would occur in vivo. Superseded by existing in vivo data.
Tox 3	Two cases of acute poisoning with acetamiprid in humans	Clinical Toxicology	2010	Imamura, T., Yanagawa, Y., Nishikawa, K., Matsumoto, M., Sakomoto, T.	Department of Traumatology and Critical Care Medicine, National Defense Medical College, Tokorozawa, Japan. Department of Pharmacy, National Defense Medical College, Tokorozawa, Japan	Clinical Toxicology (2010) Vol. 48(8), pp. 851-853	Human exposure/poisoning	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vivo (human)	1. Subcutaneously injected approximately 8 mL followed by ingestion of 10 mL of 18% acetamiprid formulation. 2. Ingestion of 100 mL 2% acetamiprid formulation.	NA	NA	NA	Reliable first hand reporting from a clinical setting of acute acetamiprid poisoning in humans. Essential was the knowledge of the co-formulants, allowing these potentially confounding elements to be teased-out.
Tox 4	Acute poisoning with neonicotinoid insecticides: A case report and literature review	Basic & Clinical Pharmacology & Toxicology	2013	Lin, P.-C., Lin, H.-J., Liao, Y.-Y., Guo, H.-R., Chen, K.-T.	Emergency Department, Chi-Mei Medical Center, Tainan, Taiwan	Basic & Clinical Pharmacology & Toxicology (2013) Vol. 112.4, pp. 282-286	Human exposure/poisoning	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vivo (human)	Various exposures to imidacloprid and acetamiprid	NA	NA	NA	Reliable first hand reporting from a clinical case of acute imidacloprid poisoning in humans, and examination of additional cases of poisoning with neonicotinoids, including acetamiprid. Essential was the knowledge of the co-formulants, allowing these potentially confounding elements to be teased-out.
Tox 5	Oxidative stress: Role in acetamiprid-induced impairment of the male mice reproductive system	Agricultural Sciences in China	2011b	Zhang, J., Wang, Y., Xiang, H., Li, M., Li, W., Ma, K., Wang, X., Zhang, J.	College of Animal Science and Technology, Southwest University, Chongqing 400716, P.R.China	Agricultural Sciences in China (2011) Vol. 10(5), pp. 786-796	Reproductive toxicity	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vivo (mice)	30 mg/kg bw	NA	NA	NA	The methods in this in vivo gavage study are well described and may indicate that effects on male reproductive function may be due to oxidative stress rather than any pharmacodynamics response. The data does not supersede existing data however and does not impact on the overall risk assessment for acetamiprid.
Tox 6	Nephrotoxicity of acetamiprid on male mice and the rescue role of Vitamin E	Journal of Animal and Veterinary Advances	2012a	Zhang, J.-J., Wang, Y., Xiang, H.-Y., Jia-Hua, Zhang, Wang, X-Z.	Chongqing Key Laboratory of Forage and Herbivore, Coll ege of Animal Science and Technology, Southwest University, 400716 Chongqing, China	Journal of Animal and Veterinary Advances (2012) Vol. 11.15, pp. 2721-2726	Nephrotoxicity	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	In vivo (mice)	30 mg/kg bw	NA	NA	NA	The methods in this in vivo gavage study are well described, and may indicate that effects on kidney function may be due to oxidative stress rather than any pharmacodynamics response. The data does not supersede existing data.
ECO 1	Pesticide compatibility with natural enemies for pest management in greenhouse gerbera daisies	J Econ Entomol	2013	Abraham, C.M., Braman, S.K., Oetting, R.D., Hinkle, N.C.	Department of Entomology, Univeristy of Georgia, 413 Biological Sciences Bldg, Athens, GA 30602-2603	J Econ Entomol. (2013) Vol. 106(4), pp. 1590-601	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Diglyphus isaea, Neoseiulus californicus	NA	NA	NA	NA	Study provides information on the toxicity of acetamiprid to N. californicus and is considered to be of limited reliability as no analytical verification of the test item was performed and no information was provided on test substance purity or source. In addition, the study was not performed to a recognised guideline.
ECO 2	Toxicity of some commonly used insecticides against Coccinella undecimpunctata (Coleoptera: Coccinellidae)	Pakistan Journal of Zoology	2011	Ahmad, M., Rafiq, M., Arif, M.I., Sayyed, A.H.	Department of Entomology, Arid Agriculture University, Murree Road, Rawalpindi, Pakistan	Pakistan Journal of Zoology (2011) Vol. 43(6), pp. 1161-1165	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Coccinella undecimpunctata	125ml/100L	NA	NA	LC50 93.5 ul/ml at 48 hr	The study provides information on the toxicity of acetamiprid to C. undecimpunctata and is considered of limited reliability because chemical analyses to verify the test concentrations were not described. In addition, the study was not performed to a recognised guideline.
ECO 3	Subchronic exposure of honeybees to sublethal doses of pesticides: Effects on behavior	Environmental Toxicology and Chemistry	2009	Aliouane, Y., El Hassani, A.K., Gary, V., Armengaud, C., Lambin, M., Gauthier, M.	Centre de Recherches sur la Cognition Animale—UMR CNRS 5169, Université Paul Sabatier, 118 route de Narbonne, 31062 Toulouse cedex France	Environmental Toxicology and Chemistry (2009) Vol. 28(1), pp. 113-22	effects on Honeybees	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee	acetamiprid (1 and 0.1 mg/bee)	NA	NA	NA	Sublethal effects of pesticides on honeybees were investigated but the study is considered of limited reliability because chemical analyses to verify the test concentrations were not described. In addition, the study was not performed to a recognised guideline.
ECO 4	Impact of neonicotinoid insecticides on beneficial phytoseiid mites	Informatore Agrario	2010	Baldessari, M., Malagnini, V., Tolotti, G., Angeli,	Technological transfer Centre, E.	Informatore Agrario (2010) Vol. 66(45), pp. 67-70	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	phytoseiidae mites	3 and 37.5 g mL/hL	NA	NA	NA	% toxicity and fertility data are reported
ECO 5	Toxicity of biopesticides and synthetic insecticides to egg parasitoid, Trichogramma chilonis Ishii, and coccinellid predator, Cheilomenes sexmaculata (Fabricius).	Journal of Biological Control	2007	Basappa, H.	Directorate of Oilseeds Research (ICAR). Rajendranagar, Hyderabad 500 030, Andhra Pradesh, India	Journal of Biological Control (2007) Vol. 21(1), pp. 31-36	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Trichogramma chilonis Ishii and Cheilomenes sexmaculata	0.002%	NA	NA	NA	% mortality data are reported This study investigates the toxicity of a number of insecticides on T. chilonis and C. sexmaculata but is considered to be of limited reliability as no analytical verification of the test item was performed, statistical tests not defined and no information was provided on test substance purity or source. In addition, the study was not performed to a recognised guideline.
ECO 6	Impacts of orchard pesticides on Galendromus occidentalis: Lethal and sublethal effects	Crop Protection	2014	Beers, E.H., Schmidt, R.A.	Washington State University, Western Ave., Wenatchee, WA 1100 N, USA	Crop Protection (2014) Vol. 56, pp. 16-24	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Galendromus occidentalis	0, 18, 179 tand 357 mg AI/L	NA	NA	NA	% mortality data are reported In female bioassays, acetamiprid mortality was moderate and all treatments caused higher rates of mortality than the control. In larval bioassays, acetamiprid was moderately toxic. The study is considered of limited reliability as no analytical verification of the test item was performed. In addition, the study was not performed to a recognised guideline.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL/ NOEL	LOAEL/ LOEL	L(E)Cx/L(E)Dx	Notes
ECO 7	Potential of 11 pesticides to initiate downstream drift of stream macroinvertebrates	Archives of Environmental Contamination and Toxicology	2008	Beketov, M.A., Liess, M.	Dept. System Ecotoxicology, UFZ – Helmholtz Centre for Environmental Research, Permoserstrasse 15, 04318 Leipzig, Germany	Archives of Environmental Contamination and Toxicology (2009) Vol. 55(2), pp. 247-253	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	amphipods (Gammarus pulex), blackfly larvae (Simulium latigonium), and mayfly larvae (Baetis rhodani)	0.5 and 3 mg/L	NA	NA	see comment	LC50 at 96 hr reported for different species. Six out of 11 pesticides, including acetamiprid, can initiate drift of macroinvertebrates at sublethal concentrations 7-22 times lower than acute LC50 values. Drift of tested animals was detected within 2 h of contamination. The study is considered of limited reliability as no analytical verification of the test item was performed and concentrations where drift was observed in microcosm test not specified.
ECO 8	Comparative toxicities and synergism of apple orchard pesticides to Apis mellifera (L.) and Osmia cornifrons (Radoszkowski)	PLos One	2013	Biddinger, D.J., Robertson, J.L., Mullin, C., Frazier, J., Ashcraft, S.A., Rajotte, E.G., Joshi, N.K., Vaughn, M.	1 Fruit Research and Extension Center, Pennsylvania State University, Biglerville, Pennsylvania, United States of America, 2 USDA Forest Service PSW Station, Albany, California, United States of America, 3 Department of Entomology, Pennsylvania State University, University Park, Pennsylvania, United States of America, 4 The Xerces Society, Portland, Oregon, United States of America	PLos One (2013) 8.9: e72587	effects on bees	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Apis mellifera (L.) (Hymenoptera: Apidae) and Osmia cornifrons (Radoszkowski) (Hymenoptera: Megachilidae)	various doses ranging from 1.38 to 60 mg/bee	NA	NA	see comment	LD50 reported for different species. The study investigated the toxicity of insecticides to A. mellifera and O. cornifrons but is considered of limited reliability as no analytical verification of the test item was performed and it was not performed to a recognised guideline.
ECO 9	Effects of ten pesticides to Anystis baccarum (Acari: Anystidae)	IOBC/WPRS Bulletin	2008	Bostanian, N.J., Laurin, M-C.	Julius Kuehn Institute (JKI), Federal Research Centre for Cultivated Plants Institute for Biological Control. Heinrichstr. 243. D-64287 Darmstadt (Germany), University of Gent Laboratory of Agrozoology Department of Crop Protection Coupure Links 653 B-9000 Gent (Belgium), INRA – Unité de Pathologie Végétale Domaine St Maurice - B.P. 94 F-84143 Montfavet Cedex (France)	IOBC/WPRS Bulletin (2008) Vol. 35, pp. 96-100	effects on plant pests	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Cameraria ohridella	0.05, 0.55, 0.19 and 1.83 g/tree	NA	NA	NA	The study is considered of limited reliability as no analytical verification of the test item was performed and controls were not specified. In addition, the study was not performed to a recognised guideline.
ECO 10	Effect of seven new orchard pesticides in Galendromus occidentalis in laboratory studies	Pest Management Science	2009	Bostanian, N.J., Thistlewood, H.A., Hardman, J.M., Laurin, M-C., Racette, G.	Horticulture Research and Development Centre, Agriculture and Agri-Food Canada, 430 Gouin Blvd, St Jean-sur-Richelieu, Quebec J3B 3E6, Canada. Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Highway, 97, Summerland, British Columbia V0H 1Z0, Canada. Atlantic Food and Horticulture Research Centre, Agriculture and Agri-Food, Canada, 32 Main street, Kentville, Nova Scotia B4N 1J5, Canada	Pest Management Science (2009) Vol. 65(6), pp. 635-639	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Galendromus occidentalis (Nesbitt)	0.1167 g ai/L	NA	NA	LC50 0.0210 g ai/L	The study is considered of limited reliability as no analytical verification of the test item was performed and controls were not specified and it was not performed to a recognised guideline.
ECO 11	Effects of six selected orchard insecticides on Neoseiulus fallacis (Acari: Phytoseiidae) in the laboratory	Pest Management Science	2010a	Bostanian, N.J., Hardman, J.M., Thistlewood, H.A., Racette, G.	Horticulture Research and Development Centre, Agriculture and Agri-Food, anada, St Jean-sur-Richelieu, Quebec, Canada. tlanctic Food and Horticulture Research Centre, Agriculture and Agri-Food, anada, Kentville, Nova Scotia, Canada. Pacific Agri-Food Research Centre, Agriculture and Agri-Food Canada, Summerland, British Columbia, Canada	Pest Management Science (2010) Vol. 66(11), pp. 1263-1267	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Neoseiulus fallacis	0.154 g ai/L	NA	NA	LC50 0.155 g ai/L	The study evaluated the effects of six insecticides on the survival and egg mortality of N. fallacis study is considered of limited reliability as no analytical verification of the test item was performed and it was not performed to a recognised guideline.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL/ NOEL	LOAEL/ LOEL	L(E)Cx/L(E)Dx	Notes
ECO 12	The response of Neoseiulus fallacis (Garman) and Galendromus occidentalis (Nesbitt) (Acari: Phytoseiidae) to six reduced risk insecticides in Canada	IOBC/WPRS Bulletin	2010b	Bostanian, N.J., Hardman, J.M., Thistlewood, H.A., Racette, G.	Horticulture Research and Development Centre, St. Jean-sur-Richelieu, Quebec, Canada, J3B 3E6; bAtlantic Food and Horticulture Research Centre, Kentville, Nova Scotia, Canada, B4N 1J5; cPacific Agri-Food Research Centre, Summer/and, British Columbia, Canada, VOH JZO	IOBC/WPRS Bulletin (2010) Vol. 55, pp. 73-77	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Neoseiulus fallacis (Garman) and Galendromus occidentalis (Nesbitt)	0.117 g ai/L Galendromus occidentalis and 0.154 g ai/L Neoseiulus fallacis	NA	NA	LC50s 0.021 g ai/L Galendromus occidentalis and 0.155 g ai/L Neoseiulus fallacis	The study investigated the toxicity of six insecticides to G. occidentalis N. fallacis. It is considered of limited reliability as no analytical verification of the test item was performed, test conditions and controls were not specified and information on the source and age of the test species was not provided. In addition, the study was not performed to a recognised guideline.
ECO 13	Toxicity of certain pesticides to the predatory mite Euseius finlandicus (Acari: Phytoseiidae)	IOBC/WPRS Bulletin	2008	Broufas, G.D., Pappas, M.L., Vassiliou, G., Koveos, D.S.	Julius Kuehn Institute (JKI), Federal Research Centre for Cultivated Plants Institute for Biological Control Heinrichstr. 243 D-64287 Darmstadt (Germany). University of Gent Laboratory of Agrozoology Department of Crop Protection Coupure Links 653 B-9000 Gent (Belgium). INRA – Unité de Pathologie Végétale Domaine St Maurice - B.P. 94 F-84143 Montfavet Cedex (France)	IOBC/WPRS Bulletin (2008) Vol. 35, pp. 85-91	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mite Euseius finlandicus	5 g a.i./hL	NA	NA	NA	The study investigated the effect of insecticides on E. finlandicus and is considered of limited reliability as no analytical verification of the test item was performed and the control was not specified for the 7 d tests. In addition, the study was not performed to a recognised guideline.
ECO 14	Safety evaluation of eleven insecticides to Trichogramma nubilale (Hymenoptera: Trichogrammatidae)	Journal of Economic Entomology	2013a	Chen, X., Song, M., Qi, S., Wang, C.	Department of Applied Chemistry, China Agricultural University, No. 2 Yuanmingyuan West Road, Haidian District, Beijing, 100193, China	Journal of Economic Entomology (2013) Vol. 106(1), pp. 136-141	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory wasp Trichogramma nubilale	-	NA	NA	LC50 of 0.609 mg/L	The study investigated the acute toxicity of acetamiprid and 10 other pesticides to adult Trichogramma nubilale along with effects on mortality, parasitism and effects on eggs, larvae, prepupae and pupae. The study is considered of limited reliability as no analytical verification of the test item was performed and it was not performed to a recognised guideline.
ECO 15	The impact of selected pesticides used in strawberry production for predatory mite Amblyseius andersoni (Chant) survival	Progress in Plant Protection	2011	Chorazy, A., Garnis, J.	Central School of Rural Farming (SGGW), Warsaw. Departmnt of Applied Entomology. Nowoursynowska 159, 02-776 Warsaw	Progress in Plant Protection (2011) Vol. 51(2), pp. 900-904	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mite Amblyseius andersoni	-	NA	NA	NA	Due to three key deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •A dilution series is not used; the pesticides were only tested at manufacturers recommended application rates. The application rates are not reported in the article. •Not complete reporting of some methods and data analysis
ECO 16	Effect of insecticides on mealybug destroyer (Coleoptera: Coccinellidae) and parasitoid Leptomastix dactylopii (Hymenoptera: Encyrtidae), natural enemies of citrus mealybug (Homoptera: Pseudococcidae)	Journal of Economic Entomology	2006	Cloyd, R.A., Dickinson, A.	Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana, IL 61801	Journal of Economic Entomology (2006) Vol. 99(5), pp. 1596-1604	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Mealybug destroyer (Cryptolaemus montrouzieri Mulsant) and parasitoid Leptomastix dactylopii Howard	-	NA	NA	NA	The study is considered of limited reliability as no analytical verification of the test item was performed and the study was not performed to a standardised guideline.
ECO 17	Toxicity of insecticides used in the Brazilian melon crop to the honey bee Apis mellifera under laboratory conditions	Apidologie	2014	Costa, E.M., Araujo, E.L., Maia, A.V.P., Silva, F.E.L., Bezerra, C.E.S., Silva, J.G.	1Departamento de Ciências Vegetais, Universidade Federal Rural do Semi-Árido (UFERSA), km 47-BR 110, 59625-900 Mossoró, Rio Grande do Norte, Brazil. 2Departamento de Entomologia, Universidade Federal de Lavras, 37200-000 Lavras, Minas Gerais, Brazil. 3Departamento de Ciências Biol ógicas, Universidade Estadual de Santa Cruz, Rod. Ilhéus/Itabuna Km 16, 45650-000 Ilhéus, Bahia, Brazil	Apidologie (2014) Vol. 45.1, pp. 34-44	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honey bee Apis mellifera	-	NA	NA	NA	The study is considered of limited reliability as no analytical verification of the test item was performed and the study was not performed to a standardised guideline.
ECO 18	The impact of insecticides applied in apple orchards on the predatory mite Kampimodromus aberrans (Acari: Phytoseiidae)	Exp Appl Acarol	2014	Duso, C., Ahmad, S., Tirello, P., Pozzebon, A., Klaric, V., Baldessari, M., Malagnini, V., Angeli, G.	Department of Agronomy, Food, Animals, Natural Resources and Environment, University of Padua, Viale dell'Universita' 16, 35020 Legnaro, Padova, Italy. Plant Protection and Agroforestry Biodiversity Unit, Edmund Mach Foundation, Via E. Mach 1, 38010 San Michele all'Adige, Trento, Italy	Exp Appl Acarol. (2014) Vol. 62(3), pp. 391-414	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mite Kampimodromus aberrans	-	NA	NA	NA	The study evaluated the effects of insecticides on K. aberrans but is considered to be of limited reliability as no analytical verification of the test item was performed and the study was not performed to standardised guidelines.
ECO 19	Effects of reduced-risk pesticides and plant growth regulators on rove beetle (Coleoptera: Staphylinidae) adults	Journal of Economic Entomology	2012	Echegaray, E.R., Cloyd, R.A.	Department of Entomology, Kansas State University, 123 Waters Hall, Manhattan, KS 66506	Journal of Economic Entomology (2012) Vol. 105.6, pp. 2097-106	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Rove beetle, Atheta coriaria	-	NA	NA	NA	The study evaluated the effect of pesticides on A. coriaria and is considered of limited reliability as no analytical verification of the test item was performed and the study was not performed to a recognised guideline.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL/ NOEL	LOAEL/ LOEL	L(E)Cx/L(E)Dx	Notes
ECO 20	Effects of sublethal doses of acetamiprid and thiamethoxam on the behavior of the honeybee (<i>Apis mellifera</i>)	Archives of Environmental Contamination and Toxicology	2008	El Hassani, A.K., Dacher, M., Gary, V., Lambin, M., Gauthier, M., Armengaud, C.	Centre de Recherches sur la Cognition Animale, Université Paul Sabatier Toulouse III, CNRS UMR 5169, 118 Route de Narbonne, 31062 Toulouse Cedex 04, France	Archives of Environmental Contamination and Toxicology (2008) Vol. 54(4), pp. 653-61	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (<i>Apis mellifera</i>)	0.1, 0.5, or 1 µg/bee	NA	NA	NA	The study investigates the acute sublethal effects of acetamiprid and thiamethoxam and is considered of limited reliability as no analytical verification of the test item was performed, test conditions were not well-defined and the dose-response was non-linear. In addition the study is not performed to a recognised guideline.
ECO 21	Evaluation of the repellency and acute toxicity of Neonicotinoids insecticides on <i>Apis mellifera ligustica</i>	In Giornate Fitopatologiche	2006	Fanti, M., Maines, R., Angeli, G.	San Michele all' Adige Agrarian Institute, via E. Mach, 1, 38010 S. Michele all'Adife (TN)	In Giornate Fitopatologiche 2006, Riccione (RN), 27-29 marzo 2006. Atti, volume primo, by Fanti, M., Maines, R., Angeli, G., 51-58. Bologna, Italy: Università di Bologna, 2006	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (<i>Apis mellifera</i>)	-	NA	NA	NA	Due to two key deficiencies, this article should be considered with "limited reliability": •There is no analytical data to support the concentrations tested. •Not complete reporting of crucial methods and data analysis
ECO 22	<i>Anblyseius andersoni</i> (Chant) – new alternative for biological control of mite pests	Progress in Plant Protection	2009	Fiedler, Z.	Institute of Plant Protection – State Research Institute. Władysław Węgorka 20, 60-318 Poznań	Progress in Plant Protection (2009) Vol. 49(3), pp. 1469-1473	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mite <i>Amblyseius andersoni</i>	-	NA	NA	NA	Due to two key deficiencies, this article should be considered with "limited reliability": •There is no analytical data to support the concentrations tested. •Not complete reporting of crucial methods and data analysis
ECO 23	Mechanism for differential toxicity of neonicotinoid insecticides in the honey bee, <i>Apis mellifera</i>	Crop Protection	2004	Iwasa, T., Motoyama, N., Ambrose, J.T., Roe, R.M.	Department of Entomology, Dearthstye Entomology Building, Campus Box 7647, North Carolina State University, Raleigh, NC 27695-7647, USA	Crop Protection (2004) Vol. 23(5), pp. 371-378	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (<i>Apis mellifera</i>)	-	NA	NA	LD50 value for acetamiprid was 7.1 µg/bee	The study investigated the effects of neonicotinoids on the honey bee and is considered to be reliable with analytical verification of the test material and well-defined test conditions. The study was not performed in line with a recognised guideline.
ECO 24	Residual toxicity of pymetrozine, spiromesifen, spinosad and acetamiprid to the predacious ladybird <i>Serangium parcesetosum</i> (Coleoptera: Coccinellidae), a predator of the whitefly, <i>Bemisia tabaci</i> (Homoptera: Aleyrodidae) on greenhouse crops in the east Mediterranean region of Turkey	IOBC/WPRS	2009	Kutuk, H., Yigit, A.	Julius Kuehn Institute (UKI), Federal Research Centre for Cultivated Plants Institute for Biological Control Heinrichstr. 243 D-64287 Darmstadt (Germany). University of Gent Laboratory of Agrozoology Department of Crop Protection Coupure Links 653 B-9000 Gent (Belgium). INRA – Unité de Pathologie Végétale Domaine St Maurice - B.P. 94 F-84143 Montfavet Cedex (France)	IOBC/WPRS (2009) Bulletin 49, pp. 353-358	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predacious ladybird <i>Serangium parcesetosum</i>	-	NA	NA	NA	Due to key deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •A dilution series was not used in exposures, only 1 concentration (the recommended field application rate) was used. •Not complete reporting of some methods
ECO 25	Evaluation of chronic toxicity of four neonicotinoids to <i>Adalia bipunctata</i> L. (Coleoptera: Coccinellidae) using a demographic approach	IOBC/WPRS Bulletin	2012	Lanzoni, A., Sangiorgi, L., Luigi, V. de, Consolini, L., Pasqualini, E., Burgio, G.	Dipartimento di Scienze e Tecnologie Agroambientali - Entomologia, Alma Mater Studiorum Università di Bologna, viale G. Fanin 42, 40127 Bologna, Italy.	IOBC/WPRS Bulletin (2012) Vol. 74, pp. 211-217	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Ladybird, <i>Adalia bipunctata</i> L.	-	NA	NA	NA	Due to key deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •There was not a dilution series used in toxicity tests, only 1/5 the recommended field application rate. •Not complete reporting of key methods and data analysis •Study not performed in line with recognised guideline
ECO 26	Laboratory studies to elucidate the residual toxicity of eight insecticides to <i>Anystis baccarum</i> (Acari: Anysridae)	Journal of Economic Entomology	2007	Laurin, M.C., Bostanian, N.J.	Institut des Sciences de l'Environnement, Université du Québec à Montréal, C.P. 8888, Succursale Centre-Ville, Montréal, Québec, Canada, H3C 3P8. Corresponding author: Horticulture Research and Development Center, Agriculture and Agri-Food Canada, 430 Gouin Blvd., St. Jean-sur-Richelieu, Québec, Canada, J3B 3E6	Journal of Economic Entomology (2007) Vol. 100(4), pp. 1210-1214	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mite <i>Anystis baccarum</i>	-	NA	NA	NA	Methodology, results and discussion were well documented. However, the study is considered slightly reliable due to the following concerns: •Negative controls were not described •No size or gender classification for the organisms used •Organisms were field collected from an orchard and it is unknown if they were compromised in any way. •There was no chemical analysis done to determine concentrations used. •Study not performed in line with recognised guideline.
ECO 27	Toxicity of neonicotinoid insecticides to honey bees: laboratory tests	Bulletin of Insectology	2011	Laurino, D., Porporato, M., Patetta, A., Manino, A.	Di.Va.P.R.A. - Entomologia e Zoologia applicate all'Ambiente "Carlo Vidano", Università di Torino, Italy	Bulletin of Insectology (2011) Vol. 64(1), pp. 107-113	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (<i>Apis mellifera</i>)	-	NA	NA	NA	Acetamiprid and Thiacloprid showed no mortality in the ingestion tests, mortality only occurred after starvation. Methodology, results and discussion were well documented. The study is considered very reliable.
ECO 28	Comparative toxicity of imidacloprid and its transformation product 6-chloronitrocinic acid to non-target aquatic organisms: Microalgae <i>Desmodesmus subspicatus</i> and amphipod <i>Gammarus fossarum</i>	Pesticide Biochemistry and Physiology	2012	Malev, O., Klobucar, R.S., Fabbretti, E., Trebse, P.	University of Nova Gorica, Laboratory for Environmental Research, Vipavska 13, P.O. Box 301, 5000 Nova Gorica, Slovenia. Ruđer Bošković Institute, Division of Materials Chemistry, Laboratory for Ichthyopathology – Biological Materials, Bijenicka 54, 10001 Zagreb, Croatia	Pesticide Biochemistry and Physiology (2012) Vol. 104.3, pp. 178-186	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Microalgae <i>Desmodesmus subspicatus</i> and amphipod <i>Gammarus fossarum</i>	-	NA	NA	NA	The study considers imidacloprid (not acetamiprid). Methodology, results and discussion were well documented. The study is considered a limited reliability because it was not performed in line with a recognised guideline and there is no information that it was performed in line with GLP.

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL / NOEL	LOAEL / LOEL	L(E)Cx/L(E)Dx	Notes
ECO 29	Toxicity of new molecules of insecticides against honeybee, Apis mellifera	Trends in Biosciences	2013	Nadaf, H.A., Yadav, G.S., Kaushik, H.D., Sharma, S.K.	Department of Entomology,CCSHaryana Agricultural University, Hisar, India-125004	Trends in Biosciences (2013) Vol. 6(4), pp. 445-447	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (Apis mellifera)	-	NA	NA	NA	The article included detailed methods, results and discussion, however it should be considered with 'limited reliability' due to the following concerns: •A dilution series was not used in toxicity testing •Concentrations used were not determined by chemical analysis. •Study was not performed in line with a recognised guideline •No indication that the study was performed in line with GLP
ECO 30	Zebrafish developmental screening of the ToxCast™ Phase I chemical library	Reprod Toxicol	2012	Padilla, S., Corum, D., Padnos, B., Hunter, D.L., Beam, A., Houck, K.A., Sipes, N., Kleinstreuer, N., Knudsen, T., Dix, D.J., Reif, D.M.	Integrated Systems Toxicology Division (B105-03), U.S. Environmental Protection Agency, Research Triangle Park, NC 27712, USA. Tel.: +1 919 541 3956. Medical University of South Carolina, Department of Regener-ative Medicine and Cell Biology, 173 Ashley Ave, Charleston, SC 29425. Present Address: Department of Statistics, North Carolina State University, Raleigh, North Carolina.	Reprod Toxicol. (2012) Vol. 33(2), pp. 174-87	Effects on aquatic organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Zebrafish	-	NA	NA	NA	•Methodology, results and discussion are documented. •The statistical analysis used was described. •The study is considered reliable.
ECO 31	Toxicity of neonicotinoid insecticides to Neoseiulus californicus and Phytoseiulus macropilis (Acari: Phytoseiidae) and their impact on functional response to Tetranychus urticae (Acari: Tetranychidae)	Biological Control	2007	Poletti, M., Maia, A.H.N., Omoto, C.	Departamento de Entomologia, Fitopatologia e Zoologia Agrí´cola, Escola Superior de Agricultura “Luiz de Queiroz”. Universidade de Sa´o Paulo, 13418-900 Piracicaba-SP, Brazil Empresa Brasileira de Pesquisa Agropecua´ria, Embrapa Meio Ambiente, Caixa Postal 69, 13820-000 Jaguariu´na-SP, Brazil	Biological Control (2007) Vol. 40(1), pp. 30-36	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Predatory mites, Neoseiulus californicus and Phytoseiulus macropilis	-	NA	NA	NA	The article included detailed methods, results and discussion, however it should be considered with 'limited reliability' due to the following concerns: •A dilution series was not used in the experiments. The pesticides were only tested at manufacturers' recommended application rates for the control of certain pests. •Chemical analysis of the pesticides was not conducted to determine actual concentrations. •Study was not performed in line with a recognised guideline •No indication that the study was performed in line with GLP
ECO 32	Laboratory evaluation of the side effects of insecticides on Aphidius colemani (Hymenoptera: Aphidiidae), Aphidoletes aphidimyza (Diptera: Cecidomyiidae), and Neoseiulus cucumeris (Acari: Phytoseiidae)	Journal of Pest Science	2011	Stara, J., Ourednickova, J., Kocourek, F.	Crop Research Institute, Drnovska 507, Prague 6, Czech Republic. Czech University of Life Sciences Prague, Kamycka 129, Prague 6, Czech Republic	Journal of Pest Science (2011) Vol. 84(1), pp. 25-31	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Parasitic wasp Aphidius colemani, predatory gall midge Aphidoletes aphidimyza, predatory mite Neoseiulus cucumeris	-	NA	NA	NA	The article can be considered 'limited reliability' due to detailed methods, results and discussion with the exception of the following concerns: •A dilution series was not used testing the pesticides. They were tested at their recommended field application rates. •There is no analytical data to support the concentrations tested.
ECO 33	Plant protection product news, proof of toxicity in greenhouse bumblebees	Protected Cultivation	2004	Sterk, G., Benuzzi, M.	Intrachem Bio Italia s.p.a. – Technical Department, Cesena	Protected Cultivation Vol. 1, pp. 75-77	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Bumblebee, Bombus terrestris L.	-	NA	NA	NA	Due to key deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •Not complete reporting of crucial methods and data analysis •Study was not performed in line with a standardised guideline and there is no indication of GLP
ECO 34	Effect of insecticides on the mortalities of three whitefly parasitoid species, Eretmocerus mundus, Eretmocerus eremicus and Encarsia formosa (Hymenoptera: Aphelinidae)	Applied Entomology and Zoology	2011	Sugiyama, K., Katayama, H., Saito, T.	Shizuoka Prefectural Research Institute of Agriculture and Forestry, 678-1 Tomigaoka, Iwata, Shizuoka 438-0803, Japan. Faculty of Agriculture, Shizuoka University Suruga, Shizuoka 422-8529, Japan	Applied Entomology and Zoology (2011) Vol. 46(3), pp. 311-317	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Parasitoid species; Eretmocerus mundus, Eretmocerus eremicus and Encarsia formosa	-	NA	NA	NA	Due to key deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •The specific concentration range for each insecticide is not adequately reported •No complete reporting controls •Study was not performed in line with a standardised guideline and there is no indication of GLP
ECO 35	Toxicity of spirotetramat 150 OD to honeybees	Madras Agricultural Journal	2010	Vinothkumar, B., Kumaran, N., Boomathi, N., Saravanan, P.A., Kuttalan, S.	Department of Agricultural Entomology. Tamil Nadu Agricultural University, Coimbatore - 641 003	Madras Agricultural Journal (2010) Vol. 97(1/3), pp. 86-87	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Honeybee (Apis mellifera)	-	NA	NA	NA	The article can be considered 'limited reliability' due to detailed methods, results and discussion with the exception of the following concerns: •A dilution series was not used testing all the pesticides. They were tested at their recommended field application rates. •There is no analytical data to support the concentrations tested. •The article was not well detailed in the methods and data analysis of the research. •Study was not performed in line with a standardised guideline and there is no indication of GLP

No.	Title of literature	Journal name	Published on	Author	Author's Institution	Bibliographic information	Field of study	Original / /Review	Whether or not it is used in overseas evaluation reports	Presence or absence of citation in Dossier	in vivo (Animal species)/In vitro	dose (Mg / kg body weight or mg / kg body weight / day)	NOAEL／ NOEL	LOAEL／ LOEL	L(E)Cx/L(E)Dx	Notes
ECO 36	Comparative acute toxicity of twenty-four insecticides to earthworm, Eisenia fetida	Ecotoxicology and Environmental Safety	2012b	Wang, Y., Cang, T., Zhao, X., Yu, R., Chen, L., Wu, C., Wang, Q.	State Key Laboratory Breeding Base for Zhejiang Sustainable Pest and Disease Control/Key Laboratory for Pesticide Residue detection of Ministry of Agriculture, Institute of Quality and Standard for Agro-products, Zhejiang Academy of Agricultural Sciences, Zhejiang, Hangzhou 310021, China	Ecotoxicology and Environmental Safety (2012) Vol. 79, pp. 122-128	Effects on earthworms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Earthworm, Eisenia fetida	-	NA	NA	NA	Reliable study investigating earthworm toxicity performed in line with standardised guidelines.
ECO 37	Insecticide toxic effects on Trichogramma ostrinae (Hymenoptera: Trichogrammatidae)	Pest Manag Sci	2012c	Wang, Y., Chen, L., Yu, R., Zhao, X., Wu, C., Cang, T., Wang, Q.	State Key Laboratory Breeding Base for Zhejiang Sustainable Pest and Disease Control/Key Laboratory for Pesticide Residue Detection of Ministry of Agriculture, Institute of Quality and Standard for Agro-products, Zhejiang Academy of Agricultural Sciences, Hangzhou, Zhejiang, China	Pest Manag Sci. (2012) Vol. 68(12), pp. 1564-71	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Parasitic wasp, Trichogramma ostrinae	-	NA	NA	LC50 of 43.02 mg a.i./L	The article can be considered reliable due to detailed methods, results and discussion. However, due to the following deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •The specific concentration range for each insecticide is not reported. •Study was not performed in line with a standardised guideline and there is no indication of GLP
ECO 38	Susceptibility to selected insecticides and risk assessment in the insect egg parasitoid Trichogramma confusum (Hymenoptera: Trichogrammatidae)	J Econ Entomol	2013b	Wang, Y., Chen, L., An, X., Jiang, J., Wang, Q., Cai, L., Zhao, X.	State Key Laboratory Breeding Base for Zhejiang Sustainable Pest and Disease Control/Key Laboratory for Pesticide Residue Detection of Ministry of Agriculture, Institute of Quality and Standard for Agro-Products, Zhejiang Academy of Agricultural Sciences, Hangzhou 310021, Zhejiang, China	J Econ Entomol. (2013) Vol. 106(1), pp. 142-9	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Egg parasitoid , Trichogramma confusum	-	NA	NA	LC50 of 93.21 mg a.i./L	The article can be considered reliable due to detailed methods, results and discussion. However, due to the following deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •The specific concentration range for each insecticide is not reported. •Study was not performed in line with a standardised guideline and there is no indication of GLP
ECO 39	Sensitivities of three bumblebee species to four pesticides applied commonly in greenhouses in China	Insect Science	2010a	Wu, J., Li, J., Peng, W., Hu, F.	College of Animal Sciences, Zhejiang University, Hangzhou, China, 2 Key Laboratory of Pollinating Insect Biology of the Ministry of Agriculture, Institute of Apicultural Research, Chinese Academy of Agricultural Sciences, Beijing, China	Insect Science (2010) Vol. 17(1), pp. 67-72	effects on non-target organisms	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	Bumblebee, Bombus ignites, Bombus hypocrite, Bombus patagiatus	-	NA	NA	LD50 (Bombus ignites): 0.0023 μ g A.I./bee LD50 (Bombus hypocrite): 0.0028 μ g A.I./bee LD50 (Bombus patagiatus): 0.0021 μ g A.I./bee	The article can be considered reliable due to detailed methods, results and discussion. However, due to the following deficiencies, this article should be considered with 'limited reliability': •There is no analytical data to support the concentrations tested. •The specific concentration range for each insecticide is not reported. •Not complete reporting of some methods and data analysis •Study was not performed in line with a standardised guideline and there is no indication of GLP.
RES 1	Comparative metabolism and pharmacokinetics of seven neonicotinoid insecticides in spinach	J Agric Food Chem	2008	Ford, K.A., Casida, J.E.	Environmental Chemistry and Toxicology Laboratory, Department of Environmental Science, Policy and Management, University of California, Berkeley, California 94720-3112	J Agric Food Chem. (2008) Vol. 56(21), pp. 10168-75	Metabolism, distribution and expression of residues	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	-	-	NA	NA	NA	Study provides detailed information on the metabolic pathway of acetamiprid and six other neonicotinoid insecticides in spinach and a comparison with the metabolic pathway in mice.
RES 2	Effect of home processing on the distribution and reduction of pesticide residues in apples	Food Additives and Contaminants A	2012	Kong, Z., Shan, W., Dong, F., Liu, X., Xu, J., Li, M., Zheng, Y.	Institute of Plant Protection, Chinese Academy of Agricultural Sciences, Key Laboratory of Integrated Pest Management in Crops, Ministry of Agriculture , Beijing 100193 , China. Institute for the Control of Agrochemicals, Ministry of Agriculture , Beijing 100125 ,	Food Additives and Contaminants A (2012) Vol. 29(8), pp. 1280-1287	Effects of processing	Original work	EU renewal of acetamiprid	2014 AIR dossier, MCA9	-	-	NA	NA	NA	Study provides detailed information of the distribution of acetamiprid and four other plant protection products in apple peel, core, juice and pomace with the limitation of not presenting data according to an industrial process of juice production.