[PleaseReview document review. Review title: 2020 Second consultation Draft annex to ISPM 28: Irradiation treatment for Bactrocera dorsalis (2017-015). Document title: 2017-015_DraftPT_Ir_Bactrocera_dorsalis_2020-02-14.docx]

[1]DRAFT ANNEX TO ISPM 28: Irradiation treatment for *Bactrocera dorsalis* (2017-015)

[2]Status box

[3]This is not an official part of the annex to the standard and it will be modified by the IPPC Secretariat after adoption.	
[4]**Date of this document**	[5]2020-02-14
[6]**Document category**	[7]Draft annex to ISPM 28
[8]**Current document stage**	[9]*To* second consultation
[10]**Major stages**	[11]2017-06 Treatment submitted in response to 2017-02 Call for treatments. [12]2018-01 Technical Panel on Phytosanitary Treatments (TPPT) reviewed and requested further information from Submitter. [13]2018-04 Submitter supplied additional information. [14]2018-05 SC added the topic *Irradiation treatment for oriental fruit fly* Bactrocera dorsalis *on all fresh commodities* (2017-015) to the TPPT work programme with priority 3. [15]2018-06 TPPT revised the draft and recommended to SC for consultation. [16]2018-11 TPPT final review via e-forum (2018_eTPPT_Oct_02) [17]2019-01 SC approved the draft for consultation via e-decision (2019_eSC_May_06) [18]2019-07 first consultation [19]2020-02 TPPT reviewed and approved the compiled comments and recommended the draft for second consultation [20]2020-06 SC approved for second consultation vie e-decision (2020_eSC_May_22)
[21]**Treatment Lead**	[22]2019-07 Mr Peter LEACH (AU) [23]2017-07 Mr Andrew PARKER (IAEA)
[24]**Notes**	[25]2018-07 Edited

[26]Scope of the treatment

[27]This treatment describes the irradiation of fruits and vegetables at 116 Gy minimum absorbed dose to prevent the emergence of adults of *Bactrocera dorsalis* at the stated efficacy[1].

[29]Treatment description

[30]**Name of treatment** Irradiation treatment for *Bactrocera dorsalis*

[][]

[28][1] The scope of phytosanitary treatments does not include issues related to pesticide registration or other domestic requirements for contracting parties' approval of treatments. Treatments adopted by the Commission on Phytosanitary Measures may not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures before contracting parties approve a treatment. In addition, potential effects of treatments on product quality are considered for some host commodities before their international adoption. However, evaluation of any effects of a treatment on the quality of commodities may require additional consideration. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

[31]**Active ingredient** n/a

[32]**Treatment type** Irradiation

[33]**Target pest** *Bactrocera dorsalis* (Hendel, 1912) (Diptera: Tephritidae)

[34]**Target regulated articles** All fruits and vegetables that are hosts of *Bactrocera dorsalis*

[35]Treatment schedule

[36]Minimum absorbed dose of 116 Gy to prevent the emergence of adults of *Bactrocera dorsalis*.

[37]There is 95% confidence that the treatment according to this schedule prevents emergence of the adult stage of not less than 99.9963% of eggs and larvae of *Bactrocera dorsalis*.

[38]This treatment should be applied in accordance with the requirements of ISPM 18 (*Guidelines for the use of irradiation as a phytosanitary measure*).

[39]This treatment should not be applied to fruits and vegetables stored in modified atmospheres because modified atmospheres may affect the treatment efficacy.

[40]Other relevant information

[41]Because irradiation may not result in outright mortality, inspectors may encounter live but non-viable *Bactrocera dorsalis* (larvae or puparia) during the inspection process. This does not imply a failure of the treatment.

[42]The Technical Panel on Phytosanitary Treatments based its evaluation of this treatment on the research reported by Zhao *et al.* (2017), which determined the efficacy of irradiation as a treatment for this pest in *Psidium guajava.* In addition, the work of Follett and Armstrong (2004) supports this schedule.

[43]The efficacy of this schedule was calculated based on a total of 100 684 third-instar larvae treated with no adult emergence; the control emergence was 81%.

[44]Extrapolation of treatment efficacy to all fruits and vegetables was based on knowledge and experience that radiation dosimetry systems measure the actual radiation dose absorbed by the target pest independent of host commodity, and evidence from research studies on a variety of pests and commodities. These include studies on the following pests and hosts: *Anastrepha fraterculus* (*Eugenia uvalha, Malus pumila* and *Mangifera indica*); *A. ludens* (*Citrus paradisi, Citrus sinensis, M. indica* and artificial diet), *A. obliqua* (*Averrhoa carambola, C. sinensis* and *Psidium guajaba*); *A. suspensa* (*A. carambola, C. paradisi* and *M. indica*), *Bactrocera tryoni* (*C. sinensis, Solanum lycopersicum, M. pumila, M. indica, Persea americana* and *Prunus avium*), *Pseudococcus jackbeardsleyi* (*Cucurbita* sp. and *Solanum tuberosum*), *Tribolium confusum* (*Triticum aestivum, Hordeum vulgare* and *Zea mays*), *Cydia pomonella* (*M. domestica* and artificial diet) and *Grapholita molesta* (*M. pumila* and artificial diet) (Bustos *et al.*, 2004; Gould and von Windeguth, 1991; Hallman, 2004a, 2004b 2013; Hallman and Martinez, 2001; Hallman *et al*., 2010; Jessup *et al.*, 1992; Mansour, 2003; Tuncbilek and Kansu, 1966; von Windeguth, 1986; von Windeguth and Ismail, 1987; Zhan *et al*., 2016). It is recognized, however, that treatment efficacy has not been tested for all potential fruit and vegetable hosts of the target pest. If evidence becomes available to show that the extrapolation of the treatment to cover all hosts of this pest is incorrect, the treatment will be reviewed.

[45]References

[46]The present annex may refer to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

[47]**Bustos, M.E., Enkerlin, W., Reyes, J. & Toledo, J.** 2004. Irradiation of mangoes as a postharvest quarantine treatment for fruit flies (Diptera: Tephritidae). *Journal of Economic Entomology*, 97: 286−292.

[48]**Follett, P.A. & Armstrong, J.W.** 2004. Revised irradiation doses to control melon fly, Mediterranean fruit fly, and oriental fruit fly (Diptera: Tephritidae) and a generic dose for tephritid fruit flies. *Journal of Economic Entomology*, 97(4): 1254–1262.

[49]**Gould, W.P. & von Windeguth, D.L.** 1991. Gamma irradiation as a quarantine treatment for carambolas infested with Caribbean fruit flies. *Florida Entomologist*, 74: 297−300.

[50]**Hallman, G.J.** 2004a. Ionizing irradiation quarantine treatment against oriental fruit moth (Lepidoptera: Tortricidae) in ambient and hypoxic atmospheres. *Journal of Economic Entomology*, 97: 824−827.

[51]**Hallman, G.J.** 2004b. Irradiation disinfestation of apple maggot (Diptera: Tephritidae) in hypoxic and low-temperature storage. *Journal of Economic Entomology* 97: 1245–1248.

[52]**Hallman G.J.** 2013. Rationale for a generic phytosanitary irradiation dose of 70 Gy for the genus *Antastrepha* (Diptera: Tephritidae). *Florida Entomologist*, 96(3): 983–990.

[53]**Hallman, G.J., Levang-Brilz, N.M., Zettler, J.L. & Winborne, I.C.** 2010. Factors affecting ionizing radiation phytosanitary treatments, and implications for research and generic treatments. *Journal of Economic Entomology*, 103:1950−1963.

[54]**Hallman, G.J. & Martinez, L.R.** 2001. Ionizing irradiation quarantine treatment against Mexican fruit fly (Diptera: Tephritidae) in citrus fruits. *Postharvest Biology and Technology*, 23: 71−77.

[55]**Jessup, A.J., Rigney, C.J., Millar, A., Sloggett, R.F. & Quinn, N.M.** 1992. Gamma irradiation as a commodity treatment against the Queensland fruit fly in fresh fruit. In: *Use of irradiation as a quarantine treatment of food and agricultural commodities*. Proceedings of the Final Research Coordination Meeting on Use of Irradiation as a Quarantine Treatment of Food and Agricultural Commodities, Kuala Lumpur, August 1990, pp. 13−42. Vienna, International Atomic Energy Agency.

[56]**Mansour, M.** 2003. Gamma irradiation as a quarantine treatment for apples infested by codling moth (Lepidoptera: Tortricidae). *Journal of Applied Entomology*, 127: 137−141.

[57]**Tuncbilek, A.S. & Kansu, I.A.** 1966. The influence of rearing medium on the irradiation sensitivity of eggs and larvae of the flour beetle, *Tribolium confusum* J. du Val. *Journal of Stored Products Research* 32: 1−6.

[58]**von Windeguth, D.L.** 1986. Gamma irradiation as a quarantine treatment for Caribbean fruit fly infested mangoes. *Proceedings of the Florida State Horticultural Society*, 99: 131−134.

[59]**von Windeguth, D.L. & Ismail, M.A.** 1987. Gamma irradiation as a quarantine treatment for Florida grapefruit infested with Caribbean fruit fly, *Anastrepha suspensa* (Loew). *Proceedings of the Florida State Horticultural Society*, 100: 5−7.

[60]**Zhan, G.P., Shao, Y., Yu, Q., Xu, L., Liu, B., Wang, Y.J. & Wang, Q.L.** 2016. Phytosanitary irradiation of Jack Beardsley mealybug (Hemiptera: Pseudococcidae) females on rambutan (Sapindales: Sapindaceae) fruits. *Florida Entomologist*, 99 (SI2): 114-120.

[61]**Zhao, J., Ma, J., Wu, M., Jiao, X., Wang, Z., Liang, F. & Zhan, G.** 2017. Gamma radiation as a phytosanitary treatment against larvae and pupae of *Bactrocera dorsalis* (Diptera: Tephritidae) in guava fruits. *Food Control*, 72: 360–366.