



Food and Agriculture  
Organization of the  
United Nations



International  
Plant Protection  
Convention

INTERNATIONAL STANDARD FOR PHYTOSANITARY MEASURES 28

PHYTOSANITARY TREATMENT

ISPM 28  
ANNEX 39

ENG

# PT 39: Irradiation treatment for the genus *Anastrepha*

Produced by the Secretariat of the  
International Plant Protection Convention (IPPC)

This page is intentionally left blank

## ISPM 28

# Phytosanitary treatments for regulated pests

## PT 39: Irradiation treatment for the genus *Anastrepha*

Adopted 2021; published 2021

### Scope of the treatment

This treatment describes the irradiation of fruits and vegetables at 70 Gy minimum absorbed dose to prevent the emergence of adults of *Anastrepha* spp. at the stated efficacy.<sup>1</sup>

### Treatment description

<b>Name of treatment</b>	Irradiation treatment for the genus <i>Anastrepha</i>
<b>Active ingredient</b>	n/a
<b>Treatment type</b>	Irradiation
<b>Target pest</b>	Fruit flies of the genus <i>Anastrepha</i> Schiner, 1868 (Diptera: Tephritidae)
<b>Target regulated articles</b>	All fruits and vegetables that are hosts of the genus <i>Anastrepha</i>

### Treatment schedule

Minimum absorbed dose of 70 Gy to prevent the emergence of adults of *Anastrepha* spp.

There is 95% confidence that the treatment according to this schedule prevents the development to the adult stage of not less than 99.9968% of eggs and larvae of *Anastrepha* spp.

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

### Other relevant information

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

The Technical Panel on Phytosanitary Treatments based its evaluation of this treatment on the research reviewed in Hallman (2013), which determined the efficacy of irradiation as a treatment for this pest on *Citrus paradisi*. In addition, the research reported in FAO/IAEA (2017) supports this schedule.

---

<sup>1</sup> 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.

The efficacy of this schedule was calculated based on a total of 94 400 third-instar larvae of *Anastrepha ludens* treated with no adult emergence. The data for *A. ludens* were used as it is considered the most radio-tolerant of the economically important species studied in the genus.

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 pyriformis*, *Malus pumila* and *Mangifera indica*), *Anastrepha ludens* (*Citrus paradisi*, *Citrus sinensis*, *Mangifera indica* and artificial diet), *Anastrepha obliqua* (*Averrhoa carambola*, *C. sinensis* and *Psidium guajava*), *Anastrepha suspensa* (*Averrhoa carambola*, *C. paradisi* and *Mangifera indica*), *Bactrocera tryoni* (*C. sinensis*, *Solanum lycopersicum*, *Malus pumila*, *Mangifera indica*, *Persea americana* and *Prunus avium*), *Cydia pomonella* (*Malus pumila* and artificial diet), *Grapholita molesta* (*Malus pumila* and artificial diet), *Pseudococcus jackbeardsleyi* (*Cucurbita* sp. and *Solanum tuberosum*) and *Tribolium confusum* (*Triticum aestivum*, *Hordeum vulgare* and *Zea mays*) (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; Tunçbilek and Kansu, 1996; 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.

## References

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/ispm>.

- 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.
- FAO/IAEA** (Food and Agriculture Organization/International Atomic Energy Agency). 2017. Developments at the Insect Pest Control Laboratory (IPCL). *Insect & Pest Control Newsletter*, 88, January 2017.
- 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.
- 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.
- Hallman, G.J.** 2004b. Irradiation disinfestation of apple maggot (Diptera: Tephritidae) in hypoxic and low-temperature storage. *Journal of Economic Entomology*, 97: 1245–1248.
- Hallman G.J.** 2013. Rationale for a generic phytosanitary irradiation dose of 70 Gy for the genus *Anastrepha* (Diptera: Tephritidae). *Florida Entomologist*, 96(3): 983–990.
- 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.
- 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.
- 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.

- Mansour, M.** 2003. Gamma irradiation as a quarantine treatment for apples infested by codling moth (Lepidoptera: Tortricidae). *Journal of Applied Entomology*, 127: 137–141.
- Tunçbilek, A.Ş. & Kansu, I.A.** 1996. 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.
- von Windeguth, D.L.** 1986. Gamma irradiation as a quarantine treatment for Caribbean fruit fly infested mangos. *Proceedings of the Florida State Horticultural Society*, 99: 131–134.
- 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.
- Zhan, G., Shao, Y., Yu, Q., Xu, L., Liu, B., Wang, Y. & Wang, Q.** 2016. Phytosanitary irradiation of Jack Beardsley mealybug (Hemiptera: Pseudococcidae) females on rambutan (Sapindales: Sapindaceae) fruits. *Florida Entomologist*, 99 (Special Issue 2): 114–120.

#### Publication history

*This is not an official part of the standard*

2017-06 Treatment submitted in response to 2017-02 call for treatments.

2017-11 Technical Panel on Phytosanitary Treatments (TPPT) reviewed submission.

2018-05 Standards Committee (SC) added topic *Irradiation treatment for the genus Anastrepha* (2017-031) to the TPPT work programme.

2018-06 TPPT revised the draft and recommended it to SC for consultation.

2018-11 TPPT final review via e-forum (2018\_eTPPT\_Oct\_01).

2019-01 SC approved the draft for consultation via e-decision (2019\_eSC\_May\_03).

2019-07 First consultation.

2020-03 TPPT approved the responses to consultation comments and recommended the draft for approval for second consultation.

2020-06 SC approved for second consultation via e-decision (2020\_eSC\_May\_23).

2020-07 Second consultation.

2020-11 TPPT meeting reviewed and recommended to the SC for approval for adoption by the CPM.

2021-03 CPM-15 adopted the phytosanitary treatment.

**ISPM 28. Annex 39.** *Irradiation treatment for the genus Anastrepha* (2021). Rome, IPPC, FAO.

2021-04 IPPC Secretariat applied ink amendments as noted by CPM-15 (2021).

Publication history last updated: 2021-04

## IPPC

The International Plant Protection Convention (IPPC) is an international plant health agreement that aims to protect cultivated and wild plants by preventing the introduction and spread of pests. International travel and trade are greater than ever before. As people and commodities move around the world, organisms that present risks to plants travel with them.

### Organization

- ◆ There are over 180 contracting parties to the IPPC.
- ◆ Each contracting party has a national plant protection organization (NPPO) and an Official IPPC contact point.
- ◆ Nine regional plant protection organizations (RPPOs) work to facilitate the implementation of the IPPC in countries.
- ◆ IPPC liaises with relevant international organizations to help build regional and national capacities.
- ◆ The Secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO).

### Food and Agriculture Organization of the United Nations

#### IPPC Secretariat

Viale delle Terme di Caracalla, 00153 Rome, Italy

Tel: +39 06 5705 4812

Email: [ippc@fao.org](mailto:ippc@fao.org) | Web: [www.ippc.int](http://www.ippc.int)

