Submission form for phytosanitary treatments

(Reviewed by TPPT March 2016)

Name of Country/RPPO: Turkey

Click here to find the IPPC Procedure Manual for Standard Setting on the IPP (www.ippc.int), where you can download this form.

Submission number (Secretariat Use Only):

Complete the following form, preferably in electronic format, and submit by e-mail to the IPPC Secretariat (ippc@fao.org). The call will remain open, but if you wish your submission to be considered by the TPPT in their next meeting, please send it before the 5 June 2017.

Please use one form per phytosanitary treatment. An electronic version of this form is available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/en/publications/1089/. Incomplete submissions will be returned. Please save the completed submission form with the following file name: COUNTRY or RPPO NAME –Title of treatment.doc, prior to submitting to the IPPC Secretariat via e-mail. The words “Call for Phytosanitary Treatments” should be placed in the subject line of the email message.

Copies of all relevant supporting information and publications should be supplied with the treatment submission, preferably in PDF format, for ease of subsequent distribution.

Submitters are encouraged to make all supporting documentation available publicly. If you allow the public release of your submission and supporting documents, please check the relevant box below.

(Text in brackets given for explanatory purposes)

Name of treatment	Phytosanitary irradiation treatment of fresh commodities against *Liriomyza sativa* Blanchard, *L. trifolii* (Burgess) and *L. huidobrensis* (Blanchard)

Submitted by: Ministry of Food Agriculture and Livestock, General Directorate of Food and Control
□X I agree to the public release of the submission and supporting documents.
Contact: (Contact information of an individual able to clarify issues relating to this submission, including sources of efficacy data) Name: Ms. Berna ÖZYARDIMCI Position and organization: National Liaison Officer of the IAEA Mailing address:Mustafa Kemal Mah., Dumlupınar Blv., No:192 Cankaya, 06510 Ankara - TURKEY........................ Phone: +90 (312) 295 8880 Fax: +90 (312) 295 8958 E-mail: berna.ozyardimci@taek.gov.tr

Treatment description

Active ingredient	ionizing radiation
Treatment type	irradiation
Target pest	*Liriomyza sativa* Blanchard, *L. trifolii* (Burgess) and *L. huidobrensis* (Blanchard)
Target regulated articles	all fresh commodities that may be infested with these pests

Treatment schedule	The treatment consists of exposing the commodity to a minimum absorbed dose of 175 Gy.
Other relevant information	n/a
References	Berna Ozyardimci, Ayca Aylangan, Erhan Ic, and Talat Aydin. 2016.Phytosanitary irradiation against leafminers (Diptera: Agromyzidae) and radiotolerance of shelled peas, *Pisum sativum* (Fabales: Fabaceae). Florida Entomologist 99(2): 171-177.

The following form must be completed in accordance with ISPM 28 *Phytosanitary treatments for regulated pests*, the IPPC Strategic Framework and the *Procedure and criteria for identifying topics for inclusion in the IPPC standard setting work programme*.

The following form refers to the relevant sections of ISPM 28 and are numbered accordingly.

3.2 Efficacy data in support of the submission of a phytosanitary treatment

The source of all efficacy data (published or unpublished) should be provided in the submission. Supporting data should be presented clearly and systematically.

3.2.1 Efficacy data under laboratory/controlled conditions (Treatments may be considered without efficacy data under laboratory/controlled conditions if sufficient efficacy data is available from the operational application of the treatment (section 3.2.2) and if no data under laboratory/controlled conditions exists this section may be left blank.)

Pest information

Identity of the pest to the appropriate level, life stage, and if a laboratory or field strain was used

Liriomyza sativa Blanchard, *L. trifolii* (Burgess) and *L. huidobrensis* (Blanchard) at the most tolerant stage of late puparium within 48 h of adult emergence (pharate adult) from laboratory colonies established from recent field collections in Turkey.

Conditions under which the pests are cultured, reared or grown

They were reared on common bean, *Phaseolus vulgaris* L. (Fabales: Fabaceae), foliage in an insectary at 27 ± 1 °C, 70 ± 5% RH, and a photoperiod of 14:10 h L:D.

Biological traits of the pest relevant to the treatment

n/a

Method of natural or artificial infestation

Adults were allowed to oviposit on potted bean plant foliage, develop in the leaves and emerge as late larvae which pupariated on the leaf or soil surface.

Determination of most resistant species/life stage (in the regulated article where appropriate)

Yathom, S., R. Podava, S. Tal, and I. Ross. 1990. Effects of gamma radiation on the immature stages of *Liriomyza trifolii*. Phytoparasitica 18: 117-124 found that, like virtually all insects, radiotolerance for phytosanitary purposes increases as the leafminer develops. Therefore, the most developed stage that could occur on trade host commodities would be the most tolerant for phytosanitary concerns. That stage is the pharate adult, which is the last developmental stage within the puparium.

Regulated article information

Type of regulated article and intended use

All fresh hosts of the 3 leafminers for consumption or ornamentation.

Botanical name for plant or plant product (where applicable)

n/a

Conditions of the plant or plant product

Fresh as leafy vegetables, cut flowers, or other hosts of the leafminers.

Experimental parameters

Level of confidence of laboratory tests provided by the method of statistical analysis and the data supporting that calculation

A total of 31,282 pharate adults were irradiated with 150-175 Gy with no subsequent F1 mines observed. Approximately equal numbers of all 3 species were treated.

Experimental facilities and equipment

Insects were reared on common beans in an insectary at the Radiation Entomology Laboratory of Sarayköy Nuclear Research and Training Center in Ankara, Turkey. Irradiation treatments were conducted in a Co-60 gamma-cell irradiator (PX-γ-30 Issledovatelj model, Tenex mark, class 1, Russia) at the Sarayköy Nuclear Research and Training Center of the Turkish Atomic Energy Agency, which supplied ionizing radiation at a dose rate of 0.64 kGy/h. The irradiator exposure chamber was a cylinder with a 24-cm height and a 15-cm radius, and the product to be irradiated was lowered into the exposure area.

Experimental design

The confirmatory testing which validated efficacy was conducted in a series of 7 replicates for each of the 3 species.

Experimental conditions

After irradiation, the emerged adults were collected and transferred in well isolated, separate mating cages (35 × 27 × 27 cm) with abundantly leafed bean plants in pots. The mating cages were covered with chiffon netting. Diluted honey with water on a cotton pad was used as a food source. The cages were placed in the laboratory at 27 ± 1 °C, 70 ± 5% RH and a natural photoperiod light-darkness regime. The plants had not been previously exposed to oviposition by errant flies. The bean plants had been grown in a climatic test chamber without any insect contact. To demonstrate reproduction or failure thereof after irradiation, as measured by the formation of F1 mines in bean leaves, the adults that had emerged from the irradiated late puparia were kept alive under favorable conditions for reproduction until they eventually died.

Monitoring of critical parameters

Harwell Gammachrome YR Perspex dosimeters (range: 0.1–3 kGy) and alanine dosimeters in pellet form were used as routine dosimeters.

Methodology to measure the effectiveness of the treatment

After irradiation of the late puparia containing pharate adults, the emerged adults were allowed to oviposit on potted bean plants until they died of natural causes. Adult food (honey diluted with water) was provided. Efficacy was measured by the presence of F1 mines in leaves. If no mines resulted while abundant mines resulted in non-irradiated controls, then the dose was considered efficacious in preventing reproduction.

Determination of efficacy over a range of critical parameters, where appropriate

Efficacy was not tested under hypoxic conditions, which have been shown to reduce the efficacy of phytosanitary irradiation under some conditions. Therefore, the efficacy of the treatment when commodities are stored in low-oxygen (a common and increasing practise for maintaining commodity quality) and then irradiated cannot be confirmed.

Methodology to measure phytotoxicity, when appropriate

n/a

Dosimetry system, calibration and accuracy of measurements,

Fricke and alanine dosimetry systems, respectively, were used for calibration and measuring the dose. The dosimeters are certified annually by the National Physical Laboratory, England. The container with pharate adults was placed in the center of the cell platform of the gamma source. The routine Perspex dosimeters were placed at the bottom, left, and right of the dispenser of the pupal containers, and the alanine tablets were included within the samples of the puparia containing pharate adults. Three to 4 h after irradiation, the Perspex dosimeters were read in a spectrophotometer at 530 nm. Each alanine dosimeter was measured 3 times, and the mean was used for reporting the dosimetry results. The overall uncertainty of the dose measurements was calculated to be ~3% assuming a coverage factor of 2, which corresponds to a 95% confidence limit. Free radical Electron Paramagnetic Resonance (EPR) measurements were carried out using a Bruker e-scan X-band dosimeter reader spectrometer. ISO/ ASTM E1607 (ASTM 1999) was the measurement standard used. The least squares method was used to fit 3rd order polynomials for dose measurements. Dose measurements were performed and calculated automatically by using a Bruker e-scan X-band EPR spectrometer and transferred to an Excel spreadsheet.

3.2.2 Efficacy data using operational conditions (historical data, may in some cases substitute for the requested information below)
Pest information
Identity of the pest to the appropriate level, life stage, and if a laboratory or field strain was used
THIS SECTION IS NOT APPLICABLE, AS THE TREATMENT IS SUBSTANTIATED USING EXPERIMENTAL, NOT HISTORICAL, DATA.
Conditions under which the pests are cultured, reared or grown
Biological traits of the pest relevant to the treatment
Method of natural or artificial infestation
Determination of most resistant species/life stage (in the regulated article where appropriate)
Regulated article information
Type of regulated article and intended use
Botanical name for plant or plant product (where applicable)
Conditions of the plant or plant product
Experimental parameters
Level of confidence of laboratory tests provided by the method of statistical analysis and the data supporting that calculation
Experimental facilities and equipment
Experimental design
Experimental conditions

Monitoring of critical parameters
Methodology to measure the effectiveness of the treatment
Determination of efficacy over a range of critical parameters, where appropriate
Methodology to measure phytotoxicity, when appropriate
Dosimetry system, calibration and accuracy of measurements
Factors that affect the efficacy of the treatment
Special procedures that affect the success of the treatment, if applicable

3.3 Feasibility and applicability (Information should be provided where appropriate on the following items)
Procedure for carrying out the phytosanitary treatment
Commercial food irradiation facility.
Cost of typical treatment facility and operational running costs if appropriate
Food irradiation facilities typically cost from a few to several million dollars. Operational costs are within the norm for other phytosanitary treatments.
Commercial relevance, including affordability
Phytosanitary irradiation is increasing in use worldwide.
Extent to which other NPPOs have approved the treatment as a phytosanitary measure
About 15 countries are using the treatment currently with the number steadily growing.
Availability of expertise needed to apply the phytosanitary treatment
The expertise is available at food irradiation facilities and facilities that do irradiation for other purposes.
Versatility of the phytosanitary treatment
It is the most versatile of the commercially used phytosanitary treatments, being tolerated by more fresh commodities than any other treatment.
The degree to which the phytosanitary treatment complements other phytosanitary measures
It is used as any other postharvest treatment to reduce the risk of pest transfer remaining after all preharvest measures have been implemented.
Summary of available information of potential undesirable side-effects
Food irradiation has not been proven to have potentially undesirable side effects for human health.
Applicability of treatment with respect to specific regulated article/pest combinations
Leafminers are keys pests of many ornamental plants and leafy vegetables. This treatment may help alleviate the problem and allow for trade in these important commodities.
Technical viability
The techniques has proven technically viable since 1995 when it began to be sued on a continuing basis.
Phytotoxicity and other effects on the quality of regulated articles, when appropriate
Some fresh commodities may not tolerate irradiation, but in general more tolerate it than any alternative treatment.
Consideration of the risk of the target organism having or developing resistance to the treatment
Resistance is probably not likely as irradiated pests are exported, thus, removed from the local gene pool.

Send submissions to:
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(preferred)

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