Submission form for phytosanitary treatments

(Reviewed by TPPT March 2016)

Name of Country/RPPO: South Africa

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 following box

(Text in brackets given for explanatory purposes)

Name of treatment	Cold treatment of fruit and vegetables including citrus fruit *Citrus* spp. for *Thaumatotibia leucotreta.*

Submitted by: (Name of national or regional plant protection organization) South African National Plant Protection Organisation (NPPOZA), Department of Agriculture, Forestry and Fisheries
☐ 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: Vaughan Hattingh ..... Position and organization: Chief Executive Officer, Citrus Research International ..... Mailing address: PO Box 2201, Matieland 7602, South Africa .... Phone: +27-824167274..... Fax:..... E-mail: vh@cri.co.za .....

Treatment description

Active ingredient	Not applicable (temperature treatment)
Treatment type	Cold treatment

Target pest	*Thaumatotibia leucotreta* (Lepidoptera: Tortricidae)
Target regulated articles	Fruit and vegetable hosts of *T. leucotreta* including citrus fruit (*Citrus* spp.)
Treatment schedule	Cold treatment of: a) 19 days at or below 1.2°C; or b) 16 days at or below -0.1°C. Effective to at least Probit 9 level (99.9968% efficacy at 95% confidence level)
Other relevant information	(This should include any assumptions or extrapolations and the supporting evidence for these) 1. Fourth and fifth larval instars are the most cold-tolerant life stage of *T. leucotreta* associated with fruit. **Moore, S.D. et al. 2016. Partial cold treatment of citrus fruit for export risk mitigtion for *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae) as part of a systems approach. Journal of Economic Entomology 109(4) 1578-1585.** Myburgh A.C. 1963. Report on sterilization of false codling moth and fruit flies in packed citrus fruits. Fruit and Food Technology Research Institute, Department of Agricultural Technical Services, Stellenbosch, South Africa. 2. Cold treatment trials conducted with laboratory reared *T. Leucotreta* larvae in artificial diet represent the effect of cold on feral larvae in citrus fruit. **Moore S.D. et al. 2016. Comparing the use of laboratory-reared and field-collected *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae) larvae for demonstrating efficacy of postharvest cold treatments in citrus fruit. Journal of Economic Entomology 109(4) 1571-1577 – Erratum 2016 Journal of Economic Entomology doi: 10.1093/jee/tow270.** Moore S.D. et al. 2017. Development of an improved postharvest cold treatment for *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae). Postharvest Biology and Technology 125: 188-195. Myburgh A.C. 1963. Report on sterilization of false codling moth and fruit flies in packed citrus fruits. Fruit and Food Technology Research Institute, Department of Agricultural Technical Services, Stellenbosch, South Africa. Myburgh A.C. 1965. Low temperture sterilisation of false codling moth *Argyroploce leucotreta* Meyr., in export citrus. Journal of the Entomological Society of Southern Africa 28(2) 277-285. Hofmeyr, J.H., Hofmeyr, M. 2005. Assessment of a cold treatment for the disinfestation of export citrus from false codling moth, *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae): a report to the People's Republic of China. Citrus Research International. http://www.citrusres.com/market-access
References	A. Efficacy of the specified cold treatment **1. Moore S.D. et al. 2017. Development of an improved postharvest cold treatment for *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae). Postharvest Biology and Technology 125: 188-195.** B. Associated references 2. Ware A.B. & Du Toit C.L.N. 2016. False codling moth, *Thaumatotibia leucotreta* (Lepidoptera: Tortiricdae), cold disinfestation treatment using grapes as the test medium. Journal of Economic Entomology 109(5): 2238-2242. 3. Hofmeyr, J.H., Hofmeyr, M., Lee, M., Kong, H.S., Holtzhausen, M.A. 1998. Assessment of a cold treatment for the disinfestation of export citrus from false codling moth, *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae): a report to the Republic of Korea. Citrus Research

International. http://www.citrusres.com/market-access

4. Hofmeyr, J.H., Hofmeyr, M. 2005. Assessment of a cold treatment for the disinfestation of export citrus from false codling moth, *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae): a report to the People's Republic of China. Citrus Research International. http://www.citrusres.com/market-access
5. Myburgh A.C. 1963. Report on sterilization of false codling moth and fruit flies in packed citrus fruits. Fruit and Food Technology Research Institute, Department of Agricultural Technical Services, Stellenbosch, South Africa.
6. Myburgh A.C. 1965. Low temperture sterilisation of false codling moth *Argyroploce leucotreta* Meyr., in export citrus. Journal of the Entomological Society of Southern Africa 28(2) 277-285.
7. Moore, S.D. et al. 2016. Partial cold treatment of citrus fruit for export risk mitigtion for *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae) as part of a systems approach. Journal of Economic Entomology 109(4) 1578-1585.
8. Moore S.D. et al. 2016. Comparing the use of laboratory-reared and field-collected *Thaumatotibia leucotreta* (Lepidoptera: Tortricidae) larvae for demonstrating efficacy of postharvest cold treatments in citrus fruit. Journal of Economic Entomology 109(4) 1571-1577 – Erratum 2016 Journal of Economic Entomology doi: 10.1093/jee/tow270.

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
Thaumatotibia leucotreta. Fourth and fifth larval instar. Laboratory strain.
Conditions under which the pests are cultured, reared or grown
Laboratory culture maintained in culture medium. Culture established with field collected insects and periodically replenished with field collected insects.
Biological traits of the pest relevant to the treatment
Larvae may infest host commodities (fruit and vegetables) in international fresh produce trade.
Method of natural or artificial infestation
Larval mortality tested in culture rearing medium and in fruit. Larval sensitivity in culture medium determined to be equivalent to sensitivity in fresh fruit (citrus).
Determination of most resistant species/life stage (in the regulated article where appropriate)
Fourth and fifth instars established as the most cold tolerant life stages in multiple studies.
Regulated article information
Type of regulated article and intended use
Fresh fruit and vegetable hosts of *T. leucotreta* traded internationally, including fresh citrus fruit *Citrus* spp.
Botanical name for plant or plant product (where applicable)
Citrus spp.
Conditions of the plant or plant product
Fresh fruit and vegetables.
Experimental parameters
Level of confidence of laboratory tests provided by the method of statistical analysis and the data supporting that

calculation.
At least Probit 9 (99.9968% efficacy at 95% confidence level). Refer to Moore et al (2017).
Experimental facilities and equipment
Temperature controlled rooms, simulating commercial operating conditions.
Experimental design
Test populations of sufficient size to establish at least the Probit 9 level of efficacy, were exposed to the specified temperatures for specified durations and mortality levels of the most tolerant life stages were determined. Refer to Moore et al. (2017).
Experimental conditions
Mortality determined on exposure of most tolerant life stage to the specified cold treatment conditions, simulating commercial operating conditions. Refer to Moore et al. (2017).
Monitoring of critical parameters
Life stage of test insects, control mortality and mortality of test insects was determined. Temperature and duration of exposure was monitored. Refer to Moore et al. (2017).
Methodology to measure the effectiveness of the treatment
Mortality of sufficiently large test populations was measured to ensure efficacy demonstration at the Probit 9 level. Mortality of larvae determined through dissection on completion of treatment. Refer to Moore et al. (2017).
Determination of efficacy over a range of critical parameters, where appropriate
Time-temperature combinations required to achieve the targeted efficacy levels were evaluated and large scale efficacy trials conducted to verify the efficacy of the treatment conditions. Refer to Moore et al. (2017).
Methodology to measure phytotoxicity, when appropriate
Other cold treatments are widely used in commercial trade of fresh fruit and vegetables, including citrus.
Dosimetry system, calibration and accuracy of measurements,
Calibration was undertaken and accuracy determined. Refer to Moore et al. (2017).
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
Operational conditions were simulated in the laboratory / controlled condition trials reported above.
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
Fresh fruit and vegetables are routinely exported under strictly controlled cold chain management. Large scale cold rooms are routinely used to prepare product for commencement of treatment. Cold treatment protocols have been widely used in commercial fruit and vegetable exports for various pests for many years. Cold treatments are effectively and reliably applied during shipping in refrigerated reefer containers and specialised bulk reefer ships.
Cost of typical treatment facility and operational running costs if appropriate
Treatment facilities are expensive to establish, but once built, operational costs of use are a marginal cost additional to the standard cold chain management used for optimisation of fruit quality.
Commercial relevance, including affordability
Cold treatments are widely used, for example for fruit fly disinfestation, and economically viable.
Extent to which other NPPOs have approved the treatment as a phytosanitary measure
This particular treatment (time-temperature combination for this pest) has not as yet been included in bilateral trade protocols due to the recent nature of the publications reporting the efficacy demonstration of the treatment. The new treatment conditions represent valuable improvement on older cold treatment conditions used for the pest in previous (commercially used) cold treatments for this pest. Refer to Moore et al. (2017) for an explanation of the relevance of the new treatment conditions for the pest compared with older cold treatments used in trade.
Availability of expertise needed to apply the phytosanitary treatment
Expertise is widely available due to routine use of cold treatments in commercial trade.
Versatility of the phytosanitary treatment
This treatment has wide applicability for large volumes of fresh produce in international trade.
The degree to which the phytosanitary treatment complements other phytosanitary measures
This is a stand-alone treatment providing disinfestation efficacy of the target pest and simultaneously various fruit fly pest species.
Summary of available information of potential undesirable side-effects
Cold treatment has variably detrimental effects on various fresh fruits and vegetables, but is well tolerated by a wide range of products that are traded internationally. Refer to Moore et al. (2017) for context.
Applicability of treatment with respect to specific regulated article/pest combinations
Widely applicable in internationally traded host commodities that are hosts for the pest.
Technical viability
High. Other cold treatments are widely used in commercial international trade.
Phytotoxicity and other effects on the quality of regulated articles, when appropriate
Cold treatments have variably detrimental effects on various fresh fruits and vegetables, but are well tolerated by a wide range of products that are traded internationally.
Consideration of the risk of the target organism having or developing resistance to the treatment
None/ no risk.

Send submissions to:

E-mail: ippc@fao.org
(preferred)

Mail: IPPC Secretariat (AGPP)
Food and Agriculture Organization of the UN
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00153 Rome, Italy