Food and Agriculture Organization of the United Nations

International Plant Protection Convention

REPORT

Technical Panel on Phytosanitary Treatments

July, 2017

Vienna, Austria

17 – 21 July 2017

IPPC Secretariat

CONTENTS

1. Opening of the meeting

Opening Remarks by the Host Agency

[1] The meeting was hosted by the International Atomic Energy Agency (IAEA)/FAO Joint division and Mr Carl BLACKBURN (Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Food and Environmental Protection Section) and Mr Rui CARDOSO PEREIRA (Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, NAFA - Insect Pest Control Section) warmly welcomed all the participants. They highlighted that the IAEA has its 60th anniversary this year, and stressed the importance of the peaceful application of nuclear technology.

[2] The International Plant Protection Convention (IPPC) Secretariat (hereafter "Secretariat") thanked IAEA/FAO Joint division for hosting the meeting and welcomed the participants. The Secretariat noted that it is the 65th anniversary of the signing of the IPPC.

[3] The Secretariat welcomed Ms Marina ZLOTINA (USA), who also attended the meeting as the Steward of the draft ISPM on the Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006) that was discussed in the meeting. The Secretariat explained that Mr Ezequiel FERRO (Argentina), the former Technical Panel on Phytosanitary Treatments (TPPT) Steward was elected to be the Chairperson of the Standards Committee (SC). As he has to allocate his time in order to be able to look after his new role he resigned as the Steward of the TPPT. The Secretariat welcomed the new appointed TPPT Steward, Mr David OPATOWSKI (Israel).

[4] The Secretariat thanked the TPPT for their work, and congratulated the members for the high number of adopted phytosanitary treatments (PTs) emphasizing that the 183 IPPC contracting parties await the TPPT outcomes with great anticipation.

[5] The TPPT was informed of the status of the five ISPMs on treatment requirements on their work program and the recent discussion of the SC[1] about the need to align these standards as much as possible. It was explained, that only two phytosanitary treatments left on the TPPT work program. One awaited research results and one received objection before CPM-12 (2017).

[6] It was highlighted, that so far 25 submissions arrived in response to the call for phytosanitary treatments, and that it is still open[2]. At the CPM-12[3] (2017) the Chairperson of the CPM reminded contracting parties and RPPOs that they are invited to submit topics for phytosanitary treatments.

[7] It was noted that TPPT members were assigned as Leads to each one of the 25 submissions to evaluate them based on the guidance provided in ISPM 28. *Phytosanitary treatments for regulated pests*[4] and the IPPC Procedure Manual for Standard Setting[5]. The Leads also assigned priority scores[6] to each submission based on the "Criteria for justification and prioritization of proposed topics"[7]. Based on the evaluation, the seven submissions highest on the prioritized list was discussed on the 2017 July TPPT meeting. The remaining submissions will be discussed in virtual meetings and the next face-to-face meeting of the TPPT.

[8] One TPPT member suggested that additional to the Lead's "in depth evaluation", the priorities should be assigned by the whole TPPT. The Secretariat explained, that the priorities can be changed at the meetings, and agreed that the priority scores of any further submissions will be discussed by the whole TPPT prior to the meeting.

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[1] Link to the 2017 May SC report: https://www.ippc.int/en/publications/84388/

[2] Call for treatments: https://www.ippc.int/en/core-activities/standards-setting/calls-treatments/

[3] Link to the CMP-12 (2017) report: https://www.ippc.int/en/publications/84387/

[4] Link to ISPM 28.*Phytosanitary treatments for regulated pests*: https://www.ippc.int/en/publications/591/

[5] Link to the IPPC Procedure Manual for Standard Setting: https://www.ippc.int/en/publications/82931/

[6] 11_TPPT_2017_Jul

[7] Link to the Criteria for justification and prioritization of proposed topics: https://www.ippc.int/en/publications/2367/

[9] The Secretariat also suggested, that in case further information is required from the submitter, the TPPT should contact the Secretariat first, and they will reach out to the submitter.

[10] The submissions and all supporting data that is not confidential is posted publicly on the IPP[8]. The TPPT has access to all supporting information in a password protected, restricted page.

Election of the Chairperson

[11] The TPPT elected Mr Matthew SMYTH as Chairperson. He thanked the hosts and welcomed the TPPT Steward.

Election of the Rapporteur

[12] The TPPT elected Mr Michael ORMSBY as Rapporteur.

Adoption of the Agenda

[13] The TPPT reviewed and adopted the agenda (Appendix 1).

2.Administrative Matters

Documents List

[14] The TPPT reviewed the documents list (Appendix 2).

Participants List

[15] All 10 TPPT members attended the meeting as well as the new TPPT Steward Mr David OPATOWSKI (Appendix 3). The TPPT members reviewed their contact information and noted to update it on the International Phytosanitary Portal (IPP).

[16] Ms Marina ZLOTINA also attended the meeting as the Steward of the draft ISPM on the Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006). Mr Carl BLACKBURN and Mr Rui CARDOSO PEREIRA represented the host agency.

[17] The Secretariat supporting the meeting was represented by Mr Brent LARSON, Ms Adriana MOREIRA and Ms Janka KISS.

Local Information

[18] The representative of the host agency, Mr Carl BLACKBURN, provided further information regarding the local arrangements and logistics[9].

3. Drafting of ISPMs on requirements for phytosanitary treatment use

[19] The Secretariat informed the TPPT about the two draft ISPMs under consultation. The draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004), was approved for first consultation by the SC in 2017 May[10], and the draft ISPM for the Requirements for the use of temperature treatments as a phytosanitary measure (2014-005) was approved for second consultation by the Standards Committee working group (SC-7)[11] in 2017 May.

[20] The SC agreed at their 2017 May meeting to try to ensure consistency across the five requirement ISPMs when relevant, applying changes throughout the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004) that resulted from the consultation comments on the draft ISPM on Requirements for temperature treatments as a phytosanitary measures (2014-005).

[8] Link to the Standard setting Calls for treatments page: https://www.ippc.int/en/core-activities/standards-setting/calls-treatments/

[9] 04_TPPT_2017_Jul

[10] Link to the 2017 May SC report: https://www.ippc.int/en/publications/84388/

[11] Link to the 2017 SC-7 report: https://www.ippc.int/en/publications/84695/

[21] It was suggested that the remaining two ISPMs on the work program (Requirements for the use of chemical treatments as a phytosanitary measure (2014-003) and Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007))) are not discussed until the other three, including the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), progresses far enough in the standard setting process to enable the alignment.

[22] The Secretariat clarified that the reason for having SC members as Stewards to the ISPMs on the TPPT work program was to have someone represent and convey the explanations and expert input of the TPPT at the SC meeting. The TPPT is still the drafting group and is responsible for the technical content, and their work is much appreciated.

3.1 Draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), priority 2

[23] **Steward's summary & implementation issues**: The Steward of the draft ISPM introduced the document[12], and highlighted, that it was challenging to find information on this treatment type. The relative lack of information could be attributed to modified atmosphere treatments not being currently used in commercial phytosanitary treatments for fresh commodities while they are more broadly applied for pest management in stored commodities. However, specialized consumer markets demanding absence of chemical residues in fresh produce (e.g. pesticides and fumigants) could benefit significantly from developing and utilizing modified atmosphere as a phytosanitary treatment.

[24] The Steward suggested, that the relationship between temperature and efficacy of modified atmosphere treatments is also complex, particularly at the lower spectrum. Rising temperature increases efficacy of modified atmosphere treatment thus leading to more extensive research in this area. Treatments have been developed that might be ready for commercial implementation, even though physiological aspects on pests remain not well understood, as different insects groups respond differently to each treatment.

[25] Facilities using modified atmosphere in storage could be used, with adjustments for applying modified atmosphere treatments for phytosanitary purposes. Specific requirements for atmospheric gas ratios may need to be developed and the airtight capacity of the structure could be adjusted.

[26] **General comments**: The Assistant Steward recalled that a first draft was prepared two years ago and that it has been updated before the meeting and it was also revised to align with the other draft ISPMs on treatment requirements. It was suggested that there is still a need to better align with the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004), and the draft ISPM for the Requirements for the use of temperature treatments as a phytosanitary measure (2014-005) and that the best approach would be to wait until at least one draft ISPM is adopted.

[27] One TPPT member mentioned that the currently available research focuses on applying the combination of heat and modified atmosphere treatments. The TPPT discussed that modified atmosphere treatments are being used but not as "phytosanitary treatments". Contracting parties do recognize the use of modified atmosphere treatments to control pests.

[28] The TPPT debated if the standard should be put on hold until further research is available, and given that no treatment using modified atmosphere has been approved under ISPM 28 or is widely used in trade. The TPPT agreed to move forward as this new ISPM may stimulate the development and adoption of modified atmosphere treatments, and even though it is difficult to provide specific information, it is possible to draft a standard that incorporates the basic requirements of applying modified atmosphere as a phytosanitary treatment.

[12] 08_TPPT_2017_Jul

[29] The TPPT reviewed and revised the draft ISPM. A summary of the major issues discussed is presented below.

[30] **Outline of requirements:** The TPPT aligned the section with the other draft ISPMs on requirements for phytosanitary treatment.

[31] **Background:** The TPPT felt it was necessary to include a description of what a modified atmosphere treatment is and to distinguish it from fumigation treatments. The concept of modified atmosphere treatment is to alter the proportion of atmospheric gases, usually to achieve low oxygen concentration that results in a lethal environment for the pest. The distinction to fumigation is that no toxic agent is introduced.

[32] The TPPT also added explanations on the term "controlled atmosphere" as it is often confused with modified atmosphere. It was highlighted that "controlled atmosphere" is a subtype of modified atmosphere treatment, where the atmosphere is actively controlled. It was debated whether to move it to a footnote as it is just a clarification but it was kept as part of the background as this is useful background information.

[33] **Impacts on biodiversity and the environment**: The TPPT highlighted that modified atmosphere treatments are alternatives to the use of methyl bromide thus reducing harm to the environment. It was pointed out that carbon dioxide is also a greenhouse gas and the reduction of the oxygen in the treatment environment might sometimes be achieved by burning something, thus unlocking carbon sources. Hence modified atmosphere treatments alters carbon dioxide and oxygen contents in the treatment environment (usually increasing the carbon dioxide content (hypercarbia) and/or reducing oxygen content (hypoxia or anoxia)), the TPPT agreed adding some wording to clarify that "in this application" the carbon dioxide has negligible impacts on the environment.

[34] **Treatment objective:** the section was simplified to enhance clarity on the expected outcome of the treatment, which is mortality of the pests. The TPPT agreed that as mortality is the expected outcome, inactivation should be removed from the draft. The TPPT noted, that mortality is still a vague term, and the TPPT should decide on a case by case basis (for each treatment schedules) what the expected outcome is (e.g. failure to pupariate or prevent F_1 development).

[35] **Treatments efficacy:** One member suggested to remove the reference to Probit 9 as specific level of efficacy, as this is not a requirement in ISPM 28. Another member suggested removing the entire section on treatment efficacy as this is generic to all treatments and is not specified in the other ISPMs on treatment requirements. The TPPT agreed and suggested to the Steward and Assistant Steward that guidance could be added on the establishment of the efficacy in the research guidelines as an appendix of the draft ISPM.

[36] **Treatment application**: The TPPT changed the title of the section from "treatment specifics" to "treatment application" in line with the other ISPMs on treatment requirements. The content of the subsection "3.2 Application" was deleted and moved over to the "Treatment application" section.

[37] Two paragraphs were moved to this section from other parts of the draft. One to specify the locations and the stages of the supply chain where treatments may be applied, consistent with the other ISPMs on treatment requirements. The other paragraph, about the gas loss from the structure of the fumigation enclosure, was relocated from the "Methods for modifying atmospheres" as it is better suited to this section.

[38] One member highlighted, that the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004) determines the maximum degree of gas loss. It was agreed that even though there is no established degree of gas loss allowed for modified atmosphere treatment structures, the draft covers the concept of having to compensate for any loss of pressure.

[39] **Types of enclosures**: One member noted that modified atmosphere application could be done in a plastic wrapping, and that the ISPM should be applicable for that too. The TPPT agreed that

"enclosure" covers the plastic wrapping and it could mean storage, designated treatment facility, container, and sealed plastic bag as well. It was suggested to make sure the draft ISPM is written in a way that it applies to modified atmosphere packaging as well, and indicates when something is not applicable.

[40] **Parameters of the treatment application**: The TPPT discussed the importance of humidity as a parameter for the application of modified atmosphere treatments. The Steward clarified that it might influence the respiration rate of the target organism, and thus may affect the efficacy of the modified atmosphere treatment. The TPPT agreed to retain humidity as a variable to consider when conducting the treatment.

[41] The TPPT discussed other parameters to be considered and agreed that the air and commodity temperatures, and the pressure under which the treatment is applied, were important parameters and consequently these were included in the text. It was explained that sometimes the low oxygen level of the enclosure is achieved by creating partial vacuum or applying positive pressure to keep oxygen out.

[42] Other parameters such as respiration or sorption were also included in the draft as they influence the efficacy. It was outlined that in some cases the lethal atmospheric gas composition can be achieved in a gas tight storage place by just allowing the stored commodity to alter the gas composition by its respiration.

[43] One member suggested to include that the distribution of the gases throughout the enclosure and the commodity might be influenced by absorptive materials, and packaging. Therefore, the packaging (including the material and structure) might impede the gases reaching the pest. The TPPT agreed and these concepts were included in the draft.

[44] **Methods for modifying atmospheres:** This section was revised to ensure that the possible ways to achieve the required modification of the atmosphere of the treatment enclosure were described.

[45] It was mentioned that one possibility is to create a low pressure environment by removing air from the chamber resulting in reduced amount of available oxygen, therefore causing mortality of the target pest. The TPPT debated if this low pressure environment can be called vacuum, and although vacuum might be easier to understand by NPPOs it was argued that it is incorrect, as total vacuum cannot be achieved. The draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004) uses the term "partial atmospheric vacuum". The TPPT decided to use the term "partial vacuum" to have clear wording but be accurate and consistent across the ISPMs.

[46] **Treatment monitoring:** The TPPT decided to move all mention of inspection, measurements and monitoring from the previous sections to the designated part of the draft ISPM on treatment monitoring.

[47] The TPPT agreed that the most critical parameters to monitor are the oxygen and carbon dioxide levels, the temperature, and the duration of the treatment. It was discussed if the first three parameters should be monitored in the "headspace" (air surrounding the commodity) or within the commodity itself. The TPPT agreed not to use "headspace" being uncertain where theses parameters are best to monitor, and because it can be misinterpreted and hard to translate. The TPPT agreed to the concept, that it is a requirement to monitor oxygen and carbon dioxide levels, however monitoring the concentration of another inert gas used is not required, as it might not be used in all cases, thus the use of the wording "typically" was included to outline that the O_2 and CO_2 concentrations were typically the gas concentrations to be monitored.

[48] **Gas monitoring:** The TPPT agreed to use the term "sensor" throughout the draft for the instruments and measuring equipment that monitors the temperature and the gas concentration.

[49] Regarding the frequency of the calibration of the sensors the TPPT agreed that the calibration should be done according to the manufacturer's instructions. It was noted that it is not necessary to calibrate each sensors before each treatment, but to verify before each treatment that they are calibrated.

[50] **Temperature monitoring and mapping:** The TPPT agreed that as efficacy is strongly related to temperature, this should be explained in an introductory chapeau. The concept added was that the lower the temperature, the longer exposure might be needed to achieve the required efficacy.

[51] The TPPT felt it was important and agreed to highlight the importance of achieving temperature uniformity (and gas concentration uniformity) throughout the enclosure. The temperature mapping should identify temperature variation and this should provide guidance on the placement of the temperature sensors. Temperature mapping is only needed once for each enclosure configuration. One member outlined that in some cases the sensors cannot be placed inside the commodity and some other sensor equipment may need to be used such as a thermal camera.

[52] The TPPT Steward highlighted, that thermal mapping is not used in the fumigation draft, and one member suggested that the fumigation draft should probably include this as well.

[53] It was pointed out that, in the case of modified atmosphere treatments, the initial temperature of the commodity might need to be considered (e.g. in case of frozen products). The TPPT agreed that both the atmosphere and the commodity should be at the target temperature that is specified in the treatment schedule, and that the schedule might offer tolerance limit, but it cannot be specified in a general standard (thus the initial statement, that the treatment should not be conducted if there is more than 5% difference between the temperature of the chamber and commodity, was deleted).

[54] The TPPT agreed that both temperatures, of the commodity and the atmosphere within the enclosure, should be monitored to ensure the treatment parameters are achieved.

[55] **Treatment enclosures:** The TPPT discussed the types of enclosures that are suitable to conduct modified atmosphere treatments. An introductory sentence was added to explain that treatment enclosures might include modified atmosphere packaging, portable and fixed structures. The TPPT discussed that modified atmosphere treatments might be conducted during transportation, such as in freight containers or cargo ship holds (see also paragraph on "Types of enclosures").

[56] In this section, the TPPT provided a list of special equipment that might be part of fixed structure enclosures (excluding the modified atmosphere packaging).

[57] The TPPT also discussed the possibility of using enclosures for modified atmosphere treatments that are not specifically designed for this purpose and established that "bubbles" or pressure tight bags could be used as well. The TPPT discussed whether to include this along with the fixed structures and packaging but agreed that, as they could not find an easily translatable term for these portable structures (silo bag came into consideration but was rejected), detailed explanation was not provided because portable structure covers these too.

[58] Positive pressure can be used to maintain the required gas concentration (e.g. low oxygen levels), and guidance on how to conduct treatment this way was included.

[59] **Phytosanitary System Security:** The TPPT discussed if this section should be replaced with the approved wording from the other ISPMs on treatment requirements. It was agreed that there shouldn't be differences between the ISPMs on treatment requirements except if there is a specific issue that would only applicable to modified atmosphere treatments. As the other ISPMs on treatment requirements use different titles for this section, it was also agreed that further alignment will be needed.

[60] **Approval of facilities and authorization of operators/entities:** One member suggested that the standard should not refer to the NPPO's approved guidelines in relation to the treatment facilities as not all NPPOs might have approved procedures for modified atmosphere treatments. Another member suggested that as NPPOs are responsible for conducting the treatment correctly, and that mention of this is needed in the standard. The TPPT agreed that in principle, the procedures with which the approved treatment provider applies the treatment have to be approved by the NPPO, and the entities should follow the requirements of the treatment schedule and other guidelines (e.g. load factor).

[61] One member suggested that NPPOs should approve treatment providers to conduct modified atmosphere treatment. It was also pointed out, that the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004) talks about "authorized fumigation entities".

[62] It was discussed whether to use the same terminology as in the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004). In that case, NPPOs have to approve the facility, and authorize the person or the company applying the treatment. The steward of the ISPM queried if this applies to modified atmosphere treatment as well.

[63] The TPPT agreed with the concept, that the responsibility in verifying that the treatment has been conducted appropriately has to be placed with the NPPO of the country where the treatment is concluded. Where the treatment occurs during transportation, the importing NPPO has to verify if the treatment was applied properly.

[64] The TPPT agreed that it is not yet possible to align the draft ISPMs on requirements for phytosanitary treatment as the draft ISPM for the Requirements for the use of fumigation as a phytosanitary measure (2014-004)define everything as an entity, but the draft ISPM for the Requirements for the use of temperature treatments as a phytosanitary measure (2014-005) does not apply this terminology. As both of these ISPMs are still under consultation, the TPPT will wait for the decision of the SC after the consultation comments have been incorporated to decide which terminology to use.

[65] **Environment, health and safety:** The TPPT Steward suggested that a standard is not suited to address the human health effects fully, but the general approach is similar to the one in the draft ISPM for Requirements for the use of fumigation as a phytosanitary measure (2014-004). The TPPT revised this section as for modified atmosphere treatments.

[66] The TPPT discussed if evacuation of an enclosure full of carbon dioxide could pose a health risk or not to the inhabitants of the area. Heavy gasses like carbon dioxide might pose a risk, as they stay close to the ground. The TPPT agreed that the safety hazard is most pronounced in case of the applicators of the treatment, not those living in proximity to the site where the treatment is applied, thus this was included in the draft.

[67] **Alignment:** The rest of the body text of the draft ISPM contains general concepts and the TPPT agreed to align with the other ISPMs on treatment requirements after the revision by the SC in November 2017.

[68] **Research guidelines (Appendix 1):** The Assistant Steward drafted the appendix as a conference room paper[13] and presented it to the TPPT. The TPPT discussed and revised the appendix and the main points of discussion were as follow:

[69] **Title of the appendix:** In the title "studies" was changed to "research" as the appendix gives guidelines to research, not to studies. The steward of the ISPM informed the TPPT that the titles of both the other ISPMs on treatment requirements have "study" in their title rather than "research". The TPPT agreed that the tittle remains as "research" as they though it better reflects the content of the appendix.

[70] **Natural vs artificial infestation:** The TPPT discussed the section of the appendix on the *in vitro* studies. It was agreed that in case natural infestation is not possible, and *in vitro* techniques is used (e.g. artificial infestation), the study has to provide justification and demonstrate how the results are consistent with those obtained with natural infestation. One member highlighted that it is difficult to create the natural conditions in experiments (e.g. natural infestation), and that it could be very expensive as well. The TPPT clarified that using natural infestation is the best option if possible, but artificial infestation is accepted as well if proper justification is provided. The submitter has to demonstrate that the artificial methods are not affecting the efficacy of the treatment. Furthermore it has to be justified why it is representative of the natural conditions and how is it sufficient to

[13] CRP_01_TPPT_2017_Jul

demonstrate the efficacy in commercial conditions (e.g. that the commodity is penetrated by the gas in the same way as the artificial media used). The TPPT pointed out that this type of information will be checked when the TPPT reviews treatment submissions.

[71] **Variation in commodity properties**: The TPPT discussed the selection of the commodity to be used to demonstrate efficacy, and agreed not to require a test for each variety individually (in line with previous discussion on cultivars and varieties[14]). However, the TPPT noted that the ranges of shapes, sizes, and other physical qualities of the commodity have to be considered if they influence the efficacy of the treatment. One member suggested that in some trade situations, or in case something suggests that there is difference, further studies may be needed to prove that the different varieties are equivalent. The TPPT agreed and adjusted the draft accordingly.

[72] **Parameters:** In case the treatment is to be applied under a range of conditions (e.g. different temperatures) the effect of each treatment parameter on the efficacy has to be determined experimentally. In this section the appendix states that for each treatment level it is recommended to conduct a minimum of three replicates with a minimum total of 120 individuals. It was clarified that it was intended to mean 120 individuals in all replicates (e.g. 40 per replicate). The TPPT reworded the point and clarified that this is not mandatory, only recommended. One member queried whether a reference could be added to justify the required number of treated individual, and the TPPT agreed to add a reference.

[73] **The determination of the most tolerant life stage:** The TPPT clarified that the most resistant life stage of the insect should be tested but only if it is associated with the commodity. The TPPT discussed that it might be complicated to determine the most tolerant life stage (e.g. in case of nematodes, where all life stages are present in the commodity). The TPPT included the option to test all life stages associated with the commodity in case the most resisted life stage cannot be determined.

[74] **Sequence of steps**: The TPPT discussed if there were a sequence of steps to be followed in the efficacy studies, and weather the most tolerant life stage of the pest or the variation in commodity properties should be established first. The TPPT agreed that for preliminary tests there is no established sequence of steps and thus, the draft text was worded in a logical manner.

[75] **Mortality of the pests in the experiments control**: The guideline suggested that that mortality in the control should be less than10 %. The TPPT discussed that this is not applicable in all cases. The concept is that the mortality in the control should not exceed normal proportions, i.e. some species might produce high mortalities in normal circumstances, and some much lower than 10%. One member added that there are treatments approved based on trials with higher control mortality rates. The TPPT modified the text accordingly and agreed to determine case by case the normal mortality rates in the controls.

[76] **Survivals**: One member pointed out that for large-scale or extrapolation (confirmatory) tests, one of the methods in the draft text suggested that there is a need to treat a large number of individuals with no (or nearly no) survivors and queried if any treatment is acceptable with survivors. The TPPT agreed that a small amount of survival might still produce statistically acceptable treatments.

[77] The TPPT concluded to include the Appendix to the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006) as revised in the meeting.

[78] **Implementation issues:** The TPPT identified the following points, that could affect negatively or positively the implementation of this draft ISPM:

- Lack of information: scientific research on modified atmosphere treatments are conducted, but information on actual commercial application is still lacking.

[14] Link to the 2016-09 TPPT meeting report, section 5.1: https://www.ippc.int/en/publications/83489/

- Cost effectiveness: Although fairly sophisticated instruments are needed - this could be an impediment even if there were available schedules – however there are existing examples of storage places that are already equipped (e.g. for apples) to modify the atmosphere of the enclosure so in this application, adapting the existing enclosure would be possible.
- In case of certain sensitive commodity-pest combinations, this treatment type could be preferable to others as it is most likely to not cause damage to the commodity. Additionally, if there is no other option, the cost would be justifiable. If the technology and capacity is developed, it will become less costly for other commodities as well.
- If methyl bromide became unavailable, modified atmosphere treatment could be a widely applied substitute treatment.
- Nontoxic material is used in modified atmosphere treatments and no residues remain on the commodity – this makes it preferable to consumers.
- Dual purpose: Modified atmosphere treatments may increases the commodity shelf life while killing pests at the same time (as it is known for apples and other fruits).
- Modified atmosphere treatments might be part of systems approaches as a combination treatment (e.g. with heat) or by itself.

[79] The TPPT

(1) *agreed* to recommend the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), as modified in this meeting, to the SC for their consideration to recommend it for first consultation, pending further alignment with the draft ISPM for the Requirements for temperature treatments as a phytosanitary measures (2014-005) and the draft ISPM for Requirements for the use of fumigation as a phytosanitary measure (2014-004).

(2) *asked* the Steward and Assistant Steward to align the draft with the other draft ISPMs on requirements for phytosanitary treatment use after the SC November 2017 meeting (after the consultation period) and send the draft ISPM to the Secretariat by 15 December 2017.

(3) *asked* the Secretariat to open a TPPT eForum in January 2018 for a final review of the draft ISPM prior submission to the SC.

(4) *invited* the SC to consider the potential implementation issues identified by the TPPT on the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006).

4. Treatments submissions from the 2017 call for treatments

[80] The Secretariat explained that a call was opened in 2017 February, to solicit treatment submissions. A total of 25 submissions arrived (cut-off date 05 June 2017) from Australia, Belgium, China, Czech Republic, Mexico, South Africa, USA, and New Zealand. TPPT members were assigned as Leads for the submissions, and they were evaluated in terms of suitability to become international standards and also given prioritization scores based on the Criteria for justification and prioritization of proposed topics[15]. The list and the scores were presented to the TPPT in the Prioritized list of submitted treatments[16]. The Secretariat informed the TPPT that the call is still open, and the next cutoff date is the 30 January 2018.

[15] Link to the Criteria for justification and prioritization of proposed topics https://www.ippc.int/en/publications/2367/

[16] 11_TPPT_2017_Jul

[81] The submissions were all posted publicly on the calls for treatments page[17] along with the supporting documentation that were not confidential. The full supporting documentation was available on the restricted work area of the TPPT[18].

[82] The Secretariat informed the TPPT of the next steps of the phytosanitary treatment submissions in the standard setting process: The TPPT should review the treatment submissions and decide whether to recommend it to the SC to include on TPPT work programme. The TPPT can also recommend a priority for the treatment (1-4) that the SC either accepts or modifies. The TPPT can also request the submitter to provide further information to enable the development of the treatment. Once the SC adds the treatment to the TPPT work programme, the TPPT develops the treatment schedule.

[83] The submissions were shortlisted based on the prioritization scores and are going to be discussed by the TPPT in order of priority and pending availability of resources. The maximum score is 25, and the ones scoring 20 and above are discussed by the TPPT at this TPPT meeting.

[84] Some TPPT members expressed concerns with the process used to prioritize the submissions and suggested that even though a thorough evaluation should be done by the Lead, more than one reviewer should look at the subject of the submission and give it a priority. The Secretariat pointed out that this was indeed already in the process and that the meeting is the time for the entire TPPT to review the submissions and propose recommendations to the SC.

[85] The TPPT agreed that the Leads for the evaluation become the proposed Treatment Leads for the treatments to be added to the work program. The TPPT also recommended priorities for the treatments to be added to the List of Topics of IPPC Standards[19] (Appendix 6). It was noted that this differs to the prioritization scores given during the evaluation of the submission[20].

[86] **Estimating Treated Numbers from Control Emergence**: Mr Michael ORMSBY introduced the paper[21] on the calculation of the treatment efficacy from control emergence. It was noted that this subject was presented in previous TPPT meetings and the TPPT could not reach consensus as estimations can be done in more than one way. One member informed the TPPT that this subject was discussed in the recent Phytosanitary Measures Research Group (PMRG)[22] meeting and that the PMRG was to work to develop a way to estimate the efficacy from the control emergence.

[87] The TPPT encouraged the PMRG to continue their discussion on this subject and present their findings once they concluded. The TPPT agreed that they will wait for these considerations for further discussion by the panel.

4.1 Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities (2017-017)

[88] Mr Matthew SMYTH introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[23] for the Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities (2017-017).

[89] He outlined that *D. suzukii* is an important emerging economical pest and that there are several countries that are still free of this pest. The trial supporting the submission was conducted with

[17] Link to the Calls for treatments page: https://www.ippc.int/en/core-activities/standards-setting/calls-treatments/

[18] Link to the full submissions on the TPPT work area: https://www.ippc.int/en/work-area-publications/84471/

[19] Link to the LoT: https://www.ippc.int/en/publications/84405/

[20] 11_TPPT_2017_Jul

[21] 09_TPPT_2017_Jul

[22]Phytosanitary Measures Research Group (PMRG): https://www.ippc.int/en/external-cooperation/organizations-page-in-ipp/phytosanitarymeasuresresearchgroup/

[23] 24_TPPT_2017_Jul

naturally infested fruits. It was established, that the most tolerant life stage of the pest is the pupae, and that the pest pupariates in the fruit - as opposed to most of the fruit fly species, where the live larvae may be detected in the fruit after the treatment but not the pupae and the subsequently emerging sterile adult. He mentioned that 23 000 late-stage pupae were treated with 70-78 gray in the trials.

[90] The TPPT reviewed the submission and discussed the following issues.

[91] **Possible regulatory issues ("live adults"):** It was noted that this submission records that live but sterile pests may emerge from the treated commodity (see discussions below about "treatment end-point").

[92] The Secretariat recalled that ISPM 18 (*Guidelines for the use of irradiation as a phytosanitary measure*) states that "*Live target pests may be found after treatment but should not result in the certification being refused except when mortality is the required response*". The TPPT noted that even though some of the approved phytosanitary treatments may also result in the emergence of live pests, in this cases the numbers of emerging pests are low and unlikely to be detected (e.g. PT 13: Irradiation treatment for *Euscepes postfasciatus*).

[93] The outcome of this proposed schedule is sterility of the target pest. However, unlike tephritid fruit flies that do not pupate in host fruit, *D. suzukii* does pupate at high levels in fruit and the proposed schedule would allow for high numbers of sterile adult flies to emerge. The detection of a sterile adult may result in regulatory action, if detected in a new region and therefore have to be considered. One member pointed out, that there was a need to better clarify the endpoint for regulatory agencies. It was explained that currently, there is no method to determine if a pest was irradiated earlier or not, thus it is hard to determine at the detection stage if the quarantine pest poses a risk or not.

[94] **Dose:** The TPPT discussed the possibility to raise the dose to a level that the pest is not only sterilized but killed. It was clarified that the late stage of the *D. suzukii* pupae is the most tolerant life stage and that it is very difficult to kill with doses that are acceptable to treat food commodities. The TPPT was also informed that Australia accepts trade based on a similar treatment in which it requires 150 gray. The TPPT noted that there is no commercial treatment used in international trade with the proposed dose of 100 gray.

[95] One member explained, that by the time the pupae develop in the infested fruit, the signs of rotting is visible and are easy to pick up in sorting lines. This could allow for some complementary measures to be applied along with the treatment integrated into systems approaches. The eggs and larvae are less easy to detect, but they are less likely to survive the treatment.

[96] The submission proposed the irradiation dose of 100 gray, giving a security buffer as the study supporting the treatment submission was conducted with a lower irradiation dose of 70-78 gray. The TPPT agreed that to recommend any other dose than in the supporting study, a justification have to be added and additional studies to enable the efficacy to be calculated. It was explained that the Australian regulations do not allow irradiation treatment below 150 gray, but the Australian schedule was also based on the same study in the submission.

[97] Regarding strategic issues on irradiation treatments, it was pointed out that there are still concerns about consumer acceptance of irradiated fresh fruits. However, it was noted that several countries accept irradiated fresh fruits.

[98] **Treatment end-point**: One member queried if the end-point was indeed "sterilization" or "failure to produce F1 adults".

[99] The supporting reference (Follet *et al*. 2014[24]) states that "the late-stage pupae is the most radiation-tolerant stage that may occur in fruit. Because prevention of adult emergence is not easily achieved in late-stage pupae, the appropriate required response for radiation treatment in *D. suzukii* is sterility or prevention of F1 adults. Mortality in immature life stages (eggs, larvae, and pupae) of *D. suzukii* is difficult to measure as individuals are hidden inside fruit. With diet, eggs are easily detected but emerging larvae burrow into the media and become cryptic. Therefore, the desired response criterion in large-scale validation tests was failure to produce F1 adults in irradiated late-stage pupae."

[100] The TPPT noted that according to the paper, the end-point is "failure to produce F1 adults". The TPPT pointed out that it would be important to know if the sterile adults emerging from the treated fruit mate, and lay eggs or not, how long they survive and whether the emerging adults have reduced functions (e.g. if they are able to fly long distances or if they have any development deficiencies). It was also queried what percentage of the treated pupae develop to adults.

[101] The Lead explained, that the reference paper states that sterility is achieved as there were no eggs and larval development observed. The eggs are difficult to find and the emerging larvae burrow into the media, and becomes cryptic. The paper establishes that there are no F1 adult emerging but, the TPPT queried weather this means that there were no eggs laid and larva emerging or just that it was not possible to find them.

[102] The TPPT agreed to proceed with the evaluation of this submission, noting that there is a need to clarify the end point of the treatment and that the resulting phytosanitary treatment schedule should specify the same end point as the research paper.

[103] **Appropriate efficacy:** The TPPT agreed that 99.99% efficacy at 78 gray is appropriate, as shown in the confirmatory trials. In case the efficacy has to be adjusted based on the submitters information, the TPPT has to consider again if the treatment is sufficiently efficacious.

[104] **Dosimetry:** One member inquired whether more information on dosimetry data is needed. In the reference paper by Follet *et al*. (2014), Table 3 gives a range of the measured doses, but there is no chart of the actual distributions measured in the sample. The TPPT agreed to request more information on the dose distribution in the irradiation chamber, and the dose mapping.

[105] **Estimation of the number of pupae and the percentage of adult emergence:** The TPPT also requested more information on the method to estimate the number of pupae and emerging adults in the samples as these factors affect the calculation of efficacy. The TPPT discussed that as a 10% subsample was used for the estimation, and the study used the "dunking method" to extract the insects from the fruit (that may not result in 100% recovery of the life stages), the number of emerging pests after the treatment might be underestimated. The TPPT requested the submitter to provide the actual numbers recorded and the calculations used to estimate the total treated and control numbers of pupae, and the percentage of adult emergence.

[106] The TPPT:

(5) *asked* for further information (or research data) from the submitter on:

- Dosage: The reasoning for recommending a dose of 100 gray if in the supporting study the pest was treated with 78 gray.
- Life cycle after treatment: Whether the adult *Drosophila suzukii* emerging from a pupae after a treated with 78 gray are able to lay eggs.
- Dosimetry: More information needed on the maximum and minimum doses reported (to be able to get the dose uniformity).

[24] Follett, P. A., A Swedman, and D. K. Price. 2014. Postharvest irradiation treatment for quarantine control of *Drosophila suzukii* (Diptera: Drosophilidae) in fresh commodities. J. Econ. Entomol. 107 (3): 964-969.

- Estimation of the number of treated pests: the data requested is related to the estimation of the number of pupae and the percentage of adult emergence.

(6) *recommended* the "Irradiation treatment for *Drosophila suzukii* on all fresh commodities (2017-017)" to the SC for inclusion into the TPPT work programme, with priority 1, and Mr Matthew SMYTH as the Treatment Lead, so the TPPT can assess better the information from the submitter.

4.2 Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028)

[107] The Lead for the submission, Mr Eduardo WILLINK, introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[25] for the Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028).

[108] The *C. annularis* (bamboo borer) is originally from Asia but it established in India and Australia, and it is a potential threat in many countries. The submission for bamboo articles (bamboo poles and articles from bamboo materials) proposed three different schedules.

[109] The TPPT discussed and considered the submission and the following main issues.

[110] **The most tolerant life stage**: The Lead noted that the reference Soma *et al*. 2006[26] states that eggs are the most tolerant life stage, but he queried if eggs are associated with the commodity, as the eggs are placed on the surface of the live bamboo and are likely to be removed in the handling of the commodity. A TPPT member clarified that, in China, bamboo is harvested twice per year, from March to April and form October to November. The pest usually has only one generation per year and it overwinters as a larvae or pupae. The eggs are laid in June or July, thus at the time of harvest, it is most likely that no viable eggs are found on bamboo. Another TPPT member queried if egg laying can occur on dried bamboo as well thus the TPPT decided to request more information on this.

[111] **Number of treated pests and the efficacy level**: The Lead pointed out that, according to the references provided (Yu *et al*., 2010[27]), "During the course of these tests, 2424 larvae, 90 pupae, and 23 adults were killed, with no survivors." He queried if the number of individuals treated in this confirmatory trial were sufficient. He also pointed out that the efficacy of the treatment (99.882 %) is calculated by adding up all the individuals treated (larvae, egg and adult) in all trials.

[112] The panel queried if the efficacy provided will appropriately support the phytosanitary treatment. One member said that about 450 larvae were treated at each dose, and this is considered appropriate in case of wood boring insects, however the TPPT agreed, that more justification is needed on the low numbers of treated pests to establish a robust efficacy and explain how the treatment will indeed mitigate the phytosanitary risk.

[113] **Commodity parameters**: According to the submission in the trials the treated bamboo was 8 cm in diameter and had 18% moisture content, one member stressed that this needs to be included in the treatment schedule. TPPT agreed, as these conditions would apply to most bamboo poles.

[114] One member queried if the moisture content was measured during the trial, as fumigation penetration depends on moisture content. It was clarified that the same bamboo articles were used in the trial

[25] 15_TPPT_2017_Jul

[26] Soma, Y., S. Yabuta, M. Mizoguti, H. Kishino, I. Matsuoka, M. Goto, T. Akagawa, T.Ikeda, and F. Kawakami. 1996. Susceptibility of forest insect pests to sulfuryl fluoride. 1. Wood borers and bark beetles. Res. Bull. Pl. Prot. Japan. 32:69-76.

[27] Yu D., Barak A.V., Jiao Y., Chen Z.N., Zhang G.M., Chen Z.L., Kang L., Yang W.D. 2010.Sulfuryl fluoride as a quarantine treatment for *Chlorophorus annularis* (Coleoptera: Cerambycidae) in Chinese bamboo poles. Journal of Economic Entomology, 103(2):277-283.

supporting the submission as in another trial on methyl bromide fumigation (Barack *et al*., 2009)[28] and the 18% moisture content included in the submission was the average of the measured moisture contents in this trial.

[115] The TPPT agreed that in order to establish the requirement on the moisture content of the commodity in the treatment schedule, more information was needed from the submitter on the establishment of a maximum acceptable moisture content and to provide further reference supporting this requirement.

[116] **Treated commodity:** One member queried if this treatment could be extrapolated to other bamboo articles, as the trials were performed only with bamboos poles (structural bamboo). One member suggested that as the study was done on poles, the scope of the schedule should be limited to those. The TPPT will assess this again at later opportunity.

[117] The TPPT:

(7) *asked* for further information from the submitter:
- Clarify if eggs found on the harvested bamboo can develop to adult, as it is known that fumigants are difficult to penetrate eggs.
- To further support, that the demonstrated efficacy will indeed manage the phytosanitary risk and to justify the number of treated pests.
- Information on the moisture content of the treated bamboo measured, and what is the acceptable maximum moisture content

(8) *recommend* the "Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028)" to the SC for inclusion into the TPPT work programme with priority 2, and Mr Eduardo WILLINK as the Treatment Lead, so the TPPT can assess better the information from the submitter.

4.3 Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012)

[118] The Lead for the submission, Mr Daojian YU, introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[29] for the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012). He highlighted that the submission contained 16 references and noted that to establish a generic dose for a group of pests can be challenging. He pointed out that the suggested dose is 250 gray.

[119] The TPPT discussed and considered the submission and the following issues.

[120] **Major pests of economic importance within the Pseudococcidae family:** One member pointed out that for the adopted generic treatment for fruit flies PT 7 (Irradiation treatment for fruit flies of the family Tephritidae (generic)) the dose was established based on research conducted on the most resistant pests of the Tephritidae family. It was suggested to approach the development of a generic irradiation treatment for Pseudococcidae in a similar way; gather the major pests of economic importance within the Pseudococcidae and to compare the effective doses to select the most resistant species. The TPPT agreed to request the submitter to gather this information, including the treatment end-point for each species and the tested life stages (see below). It was also requested to gather the reference papers for the effective dose for each of the economically important species listed.

[121] It was highlighted that this may help increase clarity and transparency for contracting parties on how the evaluation of the treatments submissions are conducted.

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[28] Barak A. V., Weidong Y., Yu D., Yi J., Lin K., Zhilin C., Xingyuan L., and Guoping Z. 2009 Methyl Bromide as a Quarantine Treatment for *Chlorophorus annularis* (Coleoptera: Cerambycidae) in Raw Bamboo Poles, Journal of Economic Entomology, 102(3):913-920.

[29] 16_TPPT_2017_Jul

[122] **Treatment end-point:** It was not clear whether the treatment end point was for F1 or F2 sterility. Some of the references indicated F2 sterility, and the submission refers to "the prevention of development of F1 1st instar". As this is a critical information to assess the treatment efficacy, the TPPT agreed to request the submitter further explain the treatment end-point for each species and the tested life stages.

[123] The TPPT:

(9) *asked* the submitter:

- To provide a list of major pests of economic importance within the Pseudococcidae family with information on the treatment end-point, the tested life stage, the effective dose and the source of the information (reference) for each species.
- To provide more information on the treatment end-point (if F1 or F2 sterility).

(10) *recommended* the "Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012)" to the SC for inclusion into the TPPT work programme with priority 1, and Mr Daojian YU as the Treatment Lead, so the TPPT can assess better the information from the submitter.

4.4 Cold disinfestation of Australian Table grapes against Mediterranean fruit fly and Queensland fruit fly (2017-023)

[124] The Lead for the submission, Mr Toshiyuki DOHINO, introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[30] for the Cold disinfestation of Australian table grapes against Mediterranean fruit fly and Queensland fruit fly (2017-023).

[125] He clarified that the submission contains three different schedules for each of *Bactrocera tryoni* and *Ceratitis capitata* (Mediterranean fruit fly and Queensland fruit fly, respectively). In the experiments supporting the efficacy of the treatments, artificial inoculation was used for both species. The research established that the most resistant life stage to cold treatments was the 2nd instar of *C. capitata* and the 1st instar for *B. tryoni*.

[126] It was noted that the supporting data was not made publically available, and the TPPT strongly encouraged that this information be made available.

[127] The TPPT discussed and considered the submission and the following issues.

[128] **Treatment end point:** The TPPT already agreed that failure to pupariate is an appropriate measure of mortality, and has already been approved in other treatments.

[129] **Dividing the treatment submission into two separate treatments:** The TPPT agreed to split the submission into two separate treatments hence each treatment is for a different target pest, to be consistent with other adopted treatments.

[130] **Title:** The title of the treatments was revised to read as follows: "Cold treatment of *Ceratitis capitata* on table grapes*"* and "Cold treatment of *Bactrocera tryoni* on table grapes*"*

[131] The TPPT:

(11) *recommended* splitting the submitted treatments into two different subject: "Cold treatment of *Ceratitis capitata* on table grapes (2017-023A)*"* and "Cold treatment of *Bactrocera tryoni* on table grapes (2017-023B)*"*

(12) *recommended* the "Cold treatment of *Ceratitis capitata* on table grapes (2017-023A)*"* and "Cold treatment of *Bactrocera tryoni* on table grapes (2017-023B)*"* to the SC for inclusion into the TPPT work programme both with priority 1, and Mr Toshiyuki DOHINO as the Treatment Lead, so the TPPT can assess better the information from the submitter.

[30] 17_TPPT_2017_Jul

4.5 Heat treatment of wood chips (2017-024)

[132] The Lead for the submission Mr Michael ORMSBY introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[31] for the Heat treatment of wood chips (2017-024), and two additional references[32,33]. He pointed out that the submission was not focused on a treatment schedule, but rather on a heat treatment method and the equipment to conduct it with.

[133] He mentioned that the submission described equipment that mixes the chips to achieve a homogenous heat distribution during the treatment. The evaluation of such equipment is outside the scope of the TPPT. However, he pointed out that the submission described a schedule of 56ºC for 30 minutes, which is the same as the treatment option for wood packaging material in ISPM 15 (*Regulation of wood packaging material in international trade*). It was stressed that wood chip is not a wood packaging material but a raw wood commodity resulting from the mechanical processing of wood as described in ISPM 39 (*International movement of wood*).

[134] The Lead suggested that the TPPT may consider the treatment schedule to be included as an annex to ISPM 28 based on additional supporting data that were presented in this meeting by the Lead. It was clarified that the required temperature can be achieved without using the equipment described in the submission. One member felt that wood chips is an economically important commodity and IPPC contracting parties would benefit from having an internationally adopted treatment on it.

[135] The TPPT discussed and considered the submission and the following issues.

[136] **Commodity and target pest**: The TPPT discussed that the treatment targets all pests potentially hosted in wood chips, but that chips can be varied in sizes thus the wood chip sizes may limit the number of possible pests present.

[137] It was noted that there was data to support the efficacy of the treatment against insects and nematodes, however not for all fungi. The Lead informed the TPPT that one of the reference papers provided contained information on the efficacy of the treatment against fungi, but not against all species. The TPPT agreed that fungi can only be included as a target pest if appropriate additional supporting information is provided. The Lead explained that some fungi species may not pose a risk in wood chips and that he could provide references to establish which fungi species have to be considered.

[138] It was pointed out that wood chips often end up as ground cover, this means nematodes are an important risk. The TPPT felt that this treatment would be very useful even if validated only against insects and nematodes.

[139] The TPPT agreed to postpone the decision whether to limit the scope of the treatment to insects and nematodes until the submission is updated by the Lead and the new references on fungi species are available for their review.

[140] **Efficacy:** As efficacy data was not presented clearly in the submission, the TPPT decided to add references to establish the efficacy information. One member informed the TPPT that some efficacy data may be available from the Technical Panel on Forest Quarantine (TPFQ) and International Forestry Quarantine Research Group (IFQRG). They suggested asking the SC to permit the TPFQ to

[31] 18_TPPT_2017_Jul

[32] NAPPO Science and Technology Documents: ST 05: Review of heat treatment of wood and wood packaging, Prepared by the members of the NAPPO Forestry Panel (Lead author: Dr. Eric Allen, Research Scientist, Natural Resources Canada, Canadian Forestry Service) (22_TPPT_2017_Jul)

[33] EPPO (2015) EPPO Technical Document No. 1071, EPPO Study on wood commodities other than round wood, sawn wood and manufactured items. EPPO Paris (23_TPPT_2017_Jul)

provide the information (permission is needed to release the underlying data for the two additional references provided by the Lead that support the efficacy of this schedule).

[141] **Treatment submission and evaluation procedure:** The TPPT agreed in asking the Lead to put together additional information on the treatment efficacy once the SC allows the TPFQ to release the mentioned supporting information. The TPPT stressed that the evaluation of the equipment to heat wood chips is outside the scope of the TPPT but the treatment schedule in the submission is being considered to be recommended for inclusion in the work program.

[142] This TPPT noted that the same documents are also submitted for the Phytosanitary resources page, but as the supporting documentation covers the use of equipment, it is not recommended for posting as it doesn't comply with the criteria[34].

[143] The TPPT:

(13) *recommended* the "Heat treatment of wood chips (2017-024)" to the SC for inclusion into the TPPT work programme, with priority 3, and Mr Michael ORMSBY as the Treatment Lead, noting that further assessment on the efficacy data is needed.

(14) *asked* the Secretariat to endeavor to get permission to obtain the research data supporting the above two references that may be available from the Technical Panel on Forest Quarantine (TPFQ) or International Forestry Quarantine Research Group (IFQRG) to support the efficacy of the submission, Heat treatment of wood chips (2017-024).

(15) *noted* that the submission for the Heat treatment of wood chips (2017-024) under ISPM 28 is only considered for the treatment schedule and not for the equipment.

(16) *did not recommend* the submission for the Heat treatment of wood chips (2017-024) to be posted on the Phytosanitary resources page as a contributed resource.

4.6 Cold treatment of fruit and vegetables including citrus fruit (*Citrus* spp.) for *Thaumatotibia leucotreta* (2017-029)

[144] The Lead for the submission, Mr Yuejin WANG, introduced the Checklist for evaluating treatment submissions and the Prioritization score sheet[35] for the Cold treatment of fruit and vegetables including citrus fruit (*Citrus* spp.) for *Thaumatotibia leucotreta* (2017-029). He highlighted that the insects, in the confirmatory trials (Moore *et al*. (2017[36]), were reared in artificial diet under different temperature and treatment duration combinations.

[145] He explained that the efficacy of the treatments proposed is 99.9968 at the 95 % confidence level. The most resistant life stage is the pupae, but it does not occur in the fruit, so the efficacy studies were conducted on 4-5th stage instars. The Lead mentioned that the submission suggested two cold treatment schedules: i) 1.2ºC or below for 19 days or, ii) -0.1ºC or below for16 days.

[146] The TPPT noted that the treatment schedules proposed are shorter than the one currently being used in trade (i.e. -0.55ºC or below for 22 days).

[147] The TPPT discussed and considered the submission and the following issues.

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[34] Review of the compiled and other phytosanitary technical resources to be considered as candidates to be included in the resources page: http://www.phytosanitary.info/sites/phytosanitary.info/files/Appendix5_of_3rd_meetingEWGCD_2012_May.pdf

[35] 19_TPPT_2017_Jul

[36] Moore S. D, Kirkman W., Stephen P. R., Albertyn S., Love C. N., Grout T. G., Hattingh V., 2017 Development of an improved postharvest cold treatment for *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) published in the journal of Postharvest Biology and Technology by Moore S.D. et al. (2017, 125: 188-195)

[148] **Commodity:** the panel expressed concerns on having a broad range of commodities ("fruit and vegetables including citrus fruits"), as the data does not support this. It was acknowledged that the efficacy trials were only done on citrus, and not on a wide range of commodities.

[149] The TPPT decided to restrict the scope of the treatment to citrus species (*Citrus* spp.) as there are no information on other commodities. The TPPT agreed to ask the submitter if there is any other information on how the target pest responds to other diets (different commodities). The TPPT also suggested that a small comparative study may be conducted to assess the effect of different diets to the efficacy.

[150] **Diet:** One TPPT member queried if the supporting information addressed the issue of the insect in the trial being raised on artificial diet. It was explained that some supporting data was provided on the comparison of cold tolerance on diet to cold tolerance on oranges (field collected) but no other fruit types. The TPPT noted, that the information provided showed that insects reared on natural diet generally were more tolerant to cold treatments than the ones reared on artificial diet, however artificial diet reared insects showed higher tolerance to sub-lethal temperatures, thus being sufficient to conduct the efficacy trials[37].

The TPPT agreed to ask SC to include this treatment on the work programme, however additional information from the submitted was required. The TPPT decided to request the submitter provide more information on the environmental conditions (e.g. climate and temperature) where the naturally infested fruits came from, to supply the actual data supporting the analysis of the tolerance of insects reared on natural or artificial diet, and to explain better what might have caused the difference in the insect survival rate.

[151] The TPPT:

(17) *Recommended* the "Cold treatment for *Thaumatotibia leucotreta* on Citrus *spp*. (2017-029)" to the SC for inclusion into the TPPT work programme with priority 2 and Mr Yuejin WANG as the Treatment Lead, so the TPPT can assess better the information of the submitter, noting that for now the treatment is restricted to citrus species only.

(18) *Asked* the submitter to provide additional information on:

- how the efficacy changes (or not) if the treatment is conducted with different types of commodities
- the environment (climate, temperature) where the naturally infested fruit came from, to supply the actual data supporting the analysis of the tolerance of insects reared on natural or artificial diet and to explain better what might have caused the difference in the survival rate

4.7 Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011)

[152] The Lead for the submission Mr Glenn BOWMAN introduced the Checklist for evaluating treatment submissions and Prioritization score sheet[38] for the Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011).

[153] The Lead explained, that the submission prescribes 250 gray to prevent up to 99.9978% of the emergence of normal-appearing adults of all species of the Tortricidae family, at a 95% level of confidence.

[154] The TPPT discussed the following issues:

[37] Moore, S. D., Kirkman, W., Albertyn, S., and Hattingh, V. 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.

[38] 20_TPPT_2017_Jul

[155] **Treatment end-point:** Pupae is the most resistant life stage of the target pests, but normally members of the Tortricidae family do not pupate in or on the commodity. Irradiated larvae that are in the last stage (L5) might pupate, but will not emerge as normal adults. The expected outcome of the treatment is preventing adult emergence.

[156] **Dose:** One member explained that the dose of 250 gray was established based on efficacy against *Grapholita molesta*. He explained that the aim in the trial was to achieve 150 gray, the measured dose was 200 gray, thus the actual lethal dose might be even lower. It was mentioned that the dose of 250 gray contains a significant safety margin.

[157] The approach to develop a generic treatment should be the same as in case of the submission for the Pseudococcidae family (see section 4.3 of this report). The TPPT would benefit from looking at an analysis of all of the species in the group of economic importance, and a compiled list of the efficacy data that is available. This information will be requested from the submitter.

[158] The TPPT agreed to recommend to the SC that the submission to be included in their work programme.

[159] **Extending beyond genus to family**: The TPPT noted that Section 8.8 of the Procedure Manual for Standard Setting[39] contains a note that in case of insect families other than Tephritidae, it is not likely to be possible to establish generic treatments at the family level or above. This statement was based on the discussions on the 2006-12 meeting[40] of the TPPT.

[160] The TPPT revised the text in the Standard Setting Procedure Manual as research has advanced a lot since 2006 and a large amount of new information has become available. Thus, extrapolation of treatments across species to family level may have become possible.

[161] The TPPT

(19) *Recommended* the "Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011)" to the SC for inclusion into the TPPT work programme with priority 1, and Mr Glenn BOWMAN as the Treatment Lead, so the TPPT can assess better the information of the submitter.

(20) *Asked* the submitter to provide a list of major pests of economic importance within the Tortricidae family with information on the treatment end-point, the tested life stage, the effective dose and the source of the information (reference) for each species.

5. Draft phytosanitary treatments (PTs) in the work program

[162] The Secretariat recalled that the draft phytosanitary treatment presented under this agenda item have been pending research results on possible differences between different *Bactrocera dorsalis* (Oriental fruit fly) populations to vapour heat treatment. The Secretariat informed the TPPT, that supporting research data has been released by Japan, as approved by the Philippines where the studies were conducted (BPI-PQS/JPQO/JICA cooperative study. 1988)[41].

5.1 Draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109)

[163] The Treatment Lead, Mr Guy HALLMAN, explained that a consultation comment from the 2014 consultation period suggested differences in the responses of different populations of *Bactrocera*

[39] Link to the IPPC Procedure Manual for Standard Setting (2016-2017): https://www.ippc.int/en/publications/82931/

[40] Link to the 2006-12 TPPT Meeting Report https://www.ippc.int/en/publications/1204/

[41] BPI-PQS/JPQO/JICA cooperative study. 1988: https://www.ippc.int/static/media/files/publication/2016/11/29/VHT_Papaya_forOrientalFruitFlyBPI-JICA_2016-11-16.pdf

cucurbitae (not *Bactrocera dorsalis*) to vapour heat treatment. The TPPT discussed the consultation comments on their 2016 September meeting[42], and encouraged the contracting party that had suggested possible population differences to submit a full report. Meanwhile additional research was carried out in the Insect Pest Control laboratories of FAO/IAEA on the comparison of three populations of *B. dorsalis* for tolerance to vapour heat treatment in mangoes (Austria) [43].

[164] The Treatment Lead, presented the draft and the consultation comments[44] with responses. He also introduced the paper on the preliminary research results from the recent research carried out at the Insect Pest Control laboratories of FAO/IAEA. It was noted that partial results had been previously presented to the TPPT at their 2017 April virtual meeting[45].

[165] The objective of the study was to determine if populations of *B. dorsalis* vary significantly in tolerance to vapour heart treatment. *B. dorsalis* populations from China (Fujian Province), Kenya, and Thailand were used to naturally infest mangoes. Mangoes were used instead of papayas because papayas were not available locally. It is assumed that significant differences among populations of *B. dorsalis* identified in any given commercially-treated fruit would mean that they could differ for other fruits as well. The research concluded, that close to the lethal dose, differences seem to disappear and the mortality rates of the populations converge.

[166] Mr Toshiyuki DOHINO presented a paper on the preliminary research results on the comparison of two populations of *B. dorsalis* for tolerance to vapour heat treatment in mangoes (Japan)[46]. He reported similar results in the study conducted with other 2 populations of *B. dorsalis* from Japan (Okinawa) and Thailand.

[167] The TPPT concluded based on the two studies that were conducted in Austria and in Japan on 5 different populations of *B. dorsalis* that the results satisfactorily show that at close to lethal temperatures, any differences disappear between different fruit fly populations. Both of the research papers are attached to the report as Appendix 4 and 5.

[168] The TPPT reviewed and revised the draft phytosanitary treatment, and modified the text for clarity.

[169] **References:** The TPPT discussed the efficacy data supporting the schedule. One member clarified that the treatment schedule was based on the paper by Santos (1996)[47] and the efficacy calculation in this paper were based on the data that was recently released by Japan approved by Philippines (BPI-PQS/JPQO/JICA cooperative study 1988). The other references were removed, because they were only needed to support that the eggs are the most tolerant life stage but this is shown in the 1988 study, thus the indirect references are not needed.

[170] The BPI-PQS/JPQO/JICA cooperative study (1988) also gives a better picture on how the experiments were conducted and the TPPT reviewed the treatment schedule to reflect these better. The text was amended to reflect the experimental conditions e.g. humidity limits, and to clarify other aspects of the schedule.

[171] **Ramp up time**: the TPPT revised the wording to express that the ramp up time should be at least 3 hours and that the temperature should reach 47ºC before the start of the next stage of the treatment (holding the fruit core temperature minimum of 46ºC for 70 minutes at 90 % relative humidity).

[42] Link to the 2016-09 TPPT meeting report (section 5.2): https://www.ippc.int/en/publications/83489/

[43] 06_TPPT_2017_Jul

[44] 14_TPPT_2017_Jul

[45] TPPT April 2017 virtual meeting report: https://www.ippc.int/en/publications/84539/

[46] 07_TPPT_2017_Jul

[47] Santos, W. 1996. Confirmatory test of vapour heat treatment of Solo papaya against oriental fruitfly (Dacus dorsalis Hendel). Pampanga Agricultural College, Manila. (Master's thesis)

[172] **Relative humidity:** The BPI-PQS/JPQO/JICA cooperative study (1988) also describes a method of fast heating time with low humidity, to avoid fruit injury. Accordingly the schedule was revised to prescribe keeping the relative humidity below 80 % during the ramp up time and increase it during the treatment to 90 %. This avoids condensation forming on the fruit as condensation releases heat and would injure the peel of the fruit. Under the section "Other relevant information" the TPPT added some explanation for the required low humidity during the ramp up time.

[173] **Cooling:** The schedule prescribed that the fruit may be air-cooled. The TPPT discussed weather this means that water cooling is not an option. They agreed that as it may risk the efficacy of the treatment if the commodity is cooled too fast, and the study supporting the treatment was done with air-cooling (the fruit was left to cool down by itself at room temperature), thus only this should be allowed and water cooling should not be applied.

[174] The TPPT noted that the responses to comments have to be adjusted based on the discussion. The TPPT agreed to the changes, and recommended to the SC that the PT be recommended for adoption.

[175] The TPPT:

(21) *agreed* that, based on the studies undertaken by Mr Guy HALLMAN and Mr Toshiyuki DOHINO there is no evidence that different populations of *Bactrocera dorsalis* respond differently to vapour heat treatments.

(22) *thanked* Mr Guy HALLMAN and Mr Toshiyuki DOHINO for undertaking the experiments to compare the populations of *Bactrocera dorsalis* for tolerance to vapour heat treatments and for actively helping in progressing the development of international standards.

(23) *recommended* the Draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) as modified in this meeting to the SC for their consideration to recommend it to the CPM for adoption.

(24) *agreed* to submit the responses to comments on the draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) to the SC for approval.

6. Review of draft Phytosanitary Treatments (PTs) after objections received

[176] The draft PT under this agenda item received objection[48] before the CPM-12 (2017) that suggested that research results indicated the treatment schedule was not reaching the prescribed efficacy in killing *Bursaphelenchus xylophilus*.

[177] The Secretariat informed the TPPT, that the submitter of the objection, China, supplied additional information on the trials that the objection was based on.

6.1 Draft annex to ISPM 28: Heat treatment of wood using dielectric heating (2007-114)

[178] The Treatment Lead, Mr Mike ORMSBY presented the TPPT lead's notes[49] on the objection. He explained that the treatment schedule (60°C for 1 minute) is approved for ISPM 15 for wood packaging material. The schedule is based on the paper by Hoover *et al*. 2010[50].

[179] The TPPT reviewed and revised the draft phytosanitary treatment, and discussed the following issues in relation to the objection.

[48] Link to objections received before the CPM-12 (2017); https://www.ippc.int/static/media/files/publications/en/1331048945_CPM_2012_INF08_FormalObjections__1.pdf

[49] 05_TPPT_2017_Jul

[50] 13_TPPT_2017_Jul (Hoover, K., Uzunovic, A., Gething, B., Dale, A., Leung, K., Ostiguy, N. & Janowiak, J.J. 2010. Lethal temperature for pinewood nematode, Bursaphelenchus xylophilus, in infested wood using microwave energy. Journal of Nematology, 42: 101–110.)

[180] **Heat distribution**: The Treatment Lead outlined that microwave starts to raise the temperature of the commodity from the inside and the heat distribution can be fairly uneven. The surface of the wood is observed to exhibit significant heat loss, so the outside might have cold spots. *Bursaphelenchus xylophilus* is a resistant pest, and is present in wood commodities in high numbers, thus has a higher chance of occurring at the colder areas than for example insect pests that are present in lower numbers. This means that particular attention has to be paid to thoroughly measure the temperature at the surface of the wood and also that in some locations the wood might be much higher temperatures by the time the coldest part reaches the prescribed minimum temperature (60ºC).

[181] The submitter of the objection provided additional information to the IPPC Secretariat that is presented as Appendix 2 to the TPPT lead's notes. The Treatment Lead reviewed the provided information and conducted an analysis of the supplementary probe temperature records and probe placement. The temperature records are presented in a graph form in the Appendix 3 to TPPT lead's notes document.

[182] The Treatment Lead explained, that the research was thorough, and that the required temperature was reached at the points measured but just barely. However, it could not be excluded that there might have been cold spots left.

[183] The TPPT agreed to ask the Secretariat to request the submitter of the objection to provide color pictures of all of the thermal images taken of the replicates for each probe of the treated logs so as to exclude the possibility of an area that did not reach the prescribed temperature.

[184] One TPPT member explained, that China has recently established a commercial dielectric heating facility, and they would be pleased to have an international standard that they can apply. He is in contact with the researchers conducting the study that the objection was based upon. He pointed out, that in each replicate three thermal probes were used in the surface, and eight in different depth in the logs. He queried how to find a cold spot in the commercial application as the temperature in different parts of the log varied, and that in some places over 110ºC by the time the 60ºC was achieved elsewhere.

[185] **Heat penetration:** The Treatment Lead explained that commercial logs of 35 cm in diameter were used to test the schedule.

[186] It was clarified that in this application both radio and microwaves could be used, and that both start to heat the inside of the wood first, but microwaves do not penetrate very far (<10cm). Radio waves penetrate further but take longer to heat the wood.

[187] The TPPT agreed that it is a new treatment method, and noted that it is only used commercially in Italy in a mobile facility. One member highlighted, that even if the additional information arrives the question remains how to propose a schedule that functions in commercial application and how to measure if the prescribed treatment parameters have been achieved (e.g. give instructions on where to place the temperature probes, to use thermal images or to establish a criteria for the surface temperature that ensures that the minimum temperature is achieved throughout the wood). The TPPT agreed to further discuss the issue based on the thermal images.

[188] The TPPT:

(25) *agreed* to request the submitter of the objection to the draft annex to ISPM 28: Heat treatment of wood using dielectric heating (2007-114) to provide color pictures of all of the thermal images taken of the replicates for each probe of the treated logs in the research supporting the objection, to exclude the possibility of an area failing to reach the prescribed temperature.

7. Follow-up actions from IPPC bodies

7.1 Follow-up actions from CPM-12 and Standards Committee

Availability of TPPT documents and supporting information for phytosanitary treatments

[189] The TPPT Steward introduced the paper on the availability of TPPT documents and supporting information for phytosanitary treatments[51]. He explained that a consultation comment[52] in the 2015 consultation period sparked the discussion on the availability of the TPPT documents.

[190] The issue was raised again in the CPM-12 (2017) and one contracting party expressed concern that contracting parties have limited access to technical documents used by the technical panels, which provide the scientific data used as the basis for standards and technical recommendations.

[191] The Bureau also discussed this issue at its 2017-06 meeting[53]. In general the Bureau felt that it is necessary to put trust in the TPPT experts and the SC, to carry out an impartial analysis of the data, but in case of any doubt, a contracting party can contact a SC member from their region and request more detailed information on each case.

[192] **Supporting information to the treatment efficacy**: The TPPT discussed whether it should only develop treatments based on published data and considered how often unpublished data and information is used in the development of phytosanitary treatments.

[193] Ms Marina ZLOTINA informed the TPPT that in 2016 when 12 phytosanitary treatments were presented at once to the SC for recommendation for adoption via e-decisions, some countries found it difficult to evaluate them and consult the national experts in time.

[194] One TPPT member noted that data supporting treatment submissions is often confidential, as in some of the previous phytosanitary treatment submissions. The TPPT noted that for most of the submissions that arrived this year, the supporting information is publicly available, except in a few cases (7 out of the 25 submissions contain confidential information).

[195] The Secretariat informed the TPPT that a note had been added to the "Submission form for phytosanitary treatments" to encourage the submitter to agree to the release the supporting information.

[196] The TPPT Steward also clarified, that if contracting parties want access to the supporting information for a particular draft phytosanitary treatment, they may request further information via their regional SC member who in turn could seek clarity from the TPPT. It was recalled that ISPM 28 states that "*where confidential information is essential for the adoption of the treatment, the submitter will be requested to release the information. If the release of the information is not granted, the adoption of the treatment may be affected*".

[197] **TPPT meeting documents:** The meeting documents of the TPPT are posted in a restricted work area and are only available to the meeting participants. Ms Marina ZLOTINA suggested to only release the TPPT documents to the SC or official NPPOs contact points. The Secretariat clarified, that all the TPPT meeting reports are public, discussions and decisions are recorded in them and the important papers are attached to it once agreed by the TPPT members.

[198] One member mentioned that opening up the meeting documents to the public or SC, before these documents are discussed, is very problematic as these meeting documents contains personal expert's

[51] 10_TPPT_2017_Jul

[52] Link to the compiled comments on 2007-101A: Draft Annex to ISPM 28 - Sulphuryl fluoride fumigation of insects in debarked wood, comment (66): https://www.ippc.int/en/publications/84169/

[53] Link to the 2017-06 CPM Bureau report: https://www.ippc.int/en/publications/84687/

views and not a final consensus by the panel – thus, it can be misinterpreted as the position of the TPPT.

[199] It was recalled that the SC has full oversight of the technical panels, and the standard setting procedure allows for rounds of consultations and the responses to comments are now endorsed by the SC and made available publically. It was also reiterated that the TPPT Steward provides a direct link between the SC and the TPPT, and even though the Steward might not be able to answer all the technical questions they can refer back to the TPPT.

[200] The Chairperson noted that the meeting reports have become more comprehensive, and the TPPT is willing to improve the clarity and transparency of the process and decisions taken by the panel. It was stressed that the TPPT reviews submissions of contracting parties and it is their task to thoroughly discuss and investigate the supporting information from a technical point of view. It was suggested that some contracting parties might feel ambivalent to have their adopted treatments scrutinized publicly and this would result in a decrease in submissions and eventually would cripple the ability of the panel to fulfill its function.

[201] The panel agreed that the best case scenario is if the treatment is based on a peer reviewed, published paper. However one member highlighted that the TPPT might receive the actual data and tables supporting the published paper, and that this is often not publicly available. One member expressed concerns that if scientific papers that are available after subscription to a journal are made available by the IPPC, it could raise legal issues concerning copyrights.

[202] The TPPT agreed to encourage submitters to release supporting information for the submissions, and noted that in certain circumstances the submitter might not allow for that, and as it is outlined in ISPM 28, this might affect the adoption of the treatment. The TPPT Steward suggested to clarify again, that in case contracting parties are concerned about a phytosanitary treatment, they can request the release of the supporting data. The Secretariat would ask the submitter of the topic to allow the release of the supporting data and if granted would release it.

[203] The TPPT agreed that to increase transparency and avoid the delaying of the adoption, they would automatically request the submitter to allow the release of any confidential data if it is essential for the evaluation of the treatment once the submission is approved for consultation.

[204] One member expressed concern on how the TPPT would determine which data is “essential” for the evaluation for the treatment. It was explained that “essential” information will vary from treatment to treatment and that the TPPT will assess this case by case.

[205] The Chairperson expressed hope that the discussions above will increase clarity and understanding of the TPPT evaluation processes and build confidence in the thoroughness and dedication of the TPPTs scrutiny of all submissions.

[206] The TPPT:

(26) *noted* that the Secretariat included a note on the submission form for phytosanitary treatments to encourage submitters to make all supporting documentation publicly available and add an option for the submitter to allow for public release of their submission and supporting documents.

(27) *agreed* to scrutinize the need to release essential information before the consultation period when recommending a draft phytosanitary treatment to the SC.

(28) *recommend* maintaining the current policy of allowing access to meeting documents to only meeting participants.

8. Liaison

8.1 Phytosanitary Measures Research Group (PMRG)

[207] Mr Guy Hallman, former PMRG chairperson, provided an update of the PMRG[54], outlining the Terms of Reference of the group. He highlighted the mission and the main functions of the PMRG, including:

- liaise with the TPPT to support the development of international phytosanitary treatments to be considered and approved by the Standards Committee.
- serve as a forum for discussion, information exchange, and clarification of key scientific issues related to phytosanitary treatment application in global trade.
- provide scientific analysis and review of global phytosanitary treatment issues and new information.
- identify and undertake collaborative scientific research aimed at high priority phytosanitary treatments.

[208] He updated the TPPT on the last meeting of the PMRG that was held in Wageningen, The Netherlands on the 10-14 July 2017. Thirty four people attended the meeting from 14 countries.

[209] Points discussed at the PMRG meeting included:

- Cold treatments research guidelines to be finalized soon.
- Possibility of "generic" cold treatments: to be discussed further
- Other research guidelines: Controlled atmosphere / Heat treatment
- Modelling: the group will work on that, starting with methyl bromide and probably later on to work on cold treatments.
- Treatment of mixed loads, for cold treatments: to be discussed further
- Heat treatment and non-target organisms: to be discussed further with some efficacy data

[210] **New issues identified by the PMRG:**

- Quarantine metrics and estimated number of treated insects in confirmatory tests: as mentioned before (section 04 of this report), the PMRG identified this and the TPPT has asked the PMRG to further assess and discuss
- How does the interruption of temperature treatments effects the efficacy of the treatment
- Necessity of Replenishment of colonies for phytosanitary treatments research

[211] The PMRG also elected their new Executive Committee members to serve a term of next two face to face meetings. Mr Scott MEYERS, TPPT member, was elected to stay on as the research coordinator and to provide the link between the PMRG and the TPPT.

[212] The next meeting of the PMRG will be held tentatively in Cairns, Australia in June, July or August 2019.

[213] The TPPT

(29) *noted* the update of the PMRG activities and acknowledged the importance of this group to the work of the TPPT and thus the benefit of this group.

[54] Phytosanitary Measures Research Group: https://www.ippc.int/en/external-cooperation/organizations-page-in-ipp/phytosanitarymeasuresresearchgroup/

8.2 Ozone Secretariat (Vienna Convention and Montreal Protocol / United Nations Environment Programme (UNEP))

[214] The Secretariat introduced the document[55] which was submitted by the Ozone Secretariat and the Methyl Bromide Technical Options Committee (MBTOC) co-chairs. The IPPC Secretariat recalled that Mr Eduardo WILLINK was part of the MBTOC and thanked him for his work.

[215] The Secretariat mentioned that all uses of methyl bromide are presently banned under the Montreal Protocol except for some specific critical uses, chemical feedstock uses, laboratory and analytical uses as well as emergency uses. Quarantine and Pre-shipment (QPS) uses are excluded from the Montreal Protocol. With respect to critical uses, methyl bromide can only be used by nominating parties if those parties are granted critical use exemptions by the Meeting of the Parties to the Montreal Protocol (MOP). Nominations submitted by parties are assessed by the MBTOC of the Protocol's Technology and Economic Assessment Panel (TEAP) on an annual basis.

[216] The Secretariat informed the TPPT members that to strengthen collaboration, the MBTOC seeks nomination from the TPPT members to become members of the MBTOC.

[217] It was explained, that the MBTOC via the Ozone Secretariat is one of the international organizations that are allowed to comment during the consultation period for the draft ISPM for the Requirements for the use of temperature treatments as a phytosanitary measure (2014-005), the Requirements for the use of fumigation as a phytosanitary measure (2014-004), Inclusion of the Phytosanitary treatment Sulphuryl fluoride fumigation of wood packaging material (2006-010A) in annexes 1 and 2 of ISPM 15 and Revision of dielectric heating section (Annex 1 (Approved treatments associated with wood packaging material) to ISPM 15 (Regulation of wood packaging material in international trade) (2006-010B).

[218] The MBTOC met from 3 to 7 April 2017 in Durban, South Africa. The meeting had two main objectives: i) to assess eight Critical Use Nominations submitted by five Parties to the Montreal Protocol for 2018 and 2019, and ii) to prepare MBTOC's annual Progress Report. It was highlighted that although that although 99% of the controlled use of methyl bromide have been phased out, the emission data show that consumption/production for controlled uses of methyl bromide may be substantially higher than that reported. Also some parties have indicated difficulties in interpreting methyl bromide use categories.

[219] The MBTOC invited the TPPT to provide their input on the alternative control measures for drywood termite (*Cryptotermes brevis*). The TPPT discussed the issue and suggested that sulfuryl fluoride can be used to control termites. It was highlighted, that a recently adopted PT 22: Sulfuryl fluoride fumigation treatment for insects in debarked wood might provide alternative but noted that sulfuryl fluoride is not registered for use in the Republic of South Africa.

[220] The TPPT

(30) *noted* the update of the recent meeting of the Methyl Bromide Technical Options Committee (MBTOC)

(31) *provided* input regarding the alternative control measures for drywood termite (*Cryptotermes brevis*)

9. Overview of the TPPT work programme

[221] The TPPT agreed to the priorities given to the 8 submissions that are recommended for the SC that were given based on their impact on managing the pests in international trade. The TPPT also agreed

[55] 12_TPPT_2017_Jul

to add the remaining 17 submissions to the agendas of future meetings in order of the newly assigned priority. It was clarified that these are preliminary priorities only, and the final priorities for the remaining 17 submissions will be assigned when they are discussed in detail and recommended to the SC. The revised list of submissions and the assigned priorities are presented in Appendix 6.

[222] The Steward of the TPPT noted that some countries do not use irradiation, and expressed concerns on having the irradiation as priorities. The TPPT noted the concerns and also noted that these were outside the scope of the TPPT, but on the hands of the SC to decide on the priorities. One TPPT member pointed out that not only irradiation treatments are being recommended with priority 1, but also cold treatments.

[223] The Secretariat reiterated that the call for phytosanitary treatments is still open, and the next cutoff date is the 30 January 2018.

[224] The TPPT discussed the scheduled meetings. The Secretariat proposed the possibility of having two face to face meetings of the TPPT in 2018 to be able to process all the treatment submissions, however pending Secretariat resources. The TPPT members agreed with the concept of having two meeting pending on the approval of their managers. They agreed to provide a response before 1 September 2017.

[225] The TPPT noted that the next meeting is going to be held in Shenzhen, China, 25-29 June 2018. The second face to face meeting is tentatively scheduled for the 3-7 December, 2018 in Rome, Italy.

[226] The next virtual meetings are scheduled for 4 October 2017, 1 November 2017, and 12 December 2017.

[227] The list of actions that arise from this meeting is presented in Appendix 7.

9.1 Phytosanitary treatments search tool – review of the categorized treatments

[228] The Secretariat explained that the Phytosanitary treatments search tool is currently being developed and will soon be operational. The adopted phytosanitary treatments need to be categorized to include them in the data source of the search tool. As the TPPT is tasked with helping to categorize and tag phytosanitary treatments (adopted or included to the Phytosanitary Resources page) identifying target pest, commodity and treatment type, a compiled list[56] was presented to the TPPT for review.

[229] The TPPT suggested minor editorial modifications and the revision of the schedules for the fumigation treatments and the vapour heat treatments to simplify the information on the treatment schedule. With these modifications, the TPPT approved the document as presented in Appendix 8

[230] The TPPT:

(32) *approved* the list of categorized treatment with the proposed modifications to be included into the Phytosanitary treatments online search tool.

10. Recommendations to the SC

[231] The following summarizes the TPPT recommendations to the SC from this meeting.

[232] The TPPT invited the SC to

- *conisder* the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006) as modified in this meeting for first consultation, pending further alignment with the draft ISPM for the Requirements for temperature treatments as a phytosanitary measures (2014-005) and the draft ISPM for Requirements for the use of fumigation as a phytosanitary measure (2014-004)

[56] 21_TPPT_2017_Jul

- *consider* the potential implementation issues identified by the TPPT on the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006).
- *approve* the draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) and the responses to consultation comments as modified in this meeting for adoption
- *consider* giving permission to TPFQ to obtain the research data supporting the two references that may be available from either the TPFQ or International Forestry Quarantine Research Group (IFQRG) to support the efficacy studies of the submission "Heat treatment of wood chips (2017-024)".
- *consider* the discussions on the public availability of TPPT documents and maintain the current policy of allowing access to meeting documents to only meeting participants.

[233] The TPPT invited the SC to consider to include into their work program the following treatments so the TPPT can assess better the information from the submitter.

- Irradiation treatment for *Drosophila suzukii* on all fresh commodities (2017-017), with priority 1, and Mr Matthew SMYTH as the Treatment Lead.
- Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) with priority 2, and Mr Eduardo WILLINK as the Treatment Lead.
- Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012)" with priority 1, and Mr Daojian YU as the Treatment Lead.
- Cold treatment of *Ceratitis capitata* on table grapes (2017-023A) with priority 1, and Mr Toshiyuki DOHINO as the Treatment Lead.
- Cold treatment of *Bactrocera tryoni* on table grapes (2017-023B) with priority 1, and Mr Toshiyuki DOHINO as the Treatment Lead.
- Heat treatment of wood chips (2017-024) with priority 3, and Mr Michael ORMSBY as the Treatment Lead, noting that further assessment on the efficacy data is needed
- Cold treatment *Thaumatotibia leucotreta* on Citrus spp. (2017-029) with priority 2 and Mr Yuejin WANG as the Treatemn Lead, noting that for now the treatment is restricted to citrus species only.
- Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) with priority 1, and Mr Glenn BOWMAN as the Treatment Lead.

11. Other business

[234] No other business.

12. Close of the meeting

[235] The TPPT was asked to provide feedback on the meeting process. The Secretariat provided a link to the online survey to receive feedback and suggestions to improve the meeting.

[236] The Secretariat thanked the IAEA for hosting and financially supporting this meeting, also for the interesting field trip to the Seibersdorf Insect Pest Control Laboratory and the excellent organization of the local arrangements.

[237] The Secretariat also thanked all the TPPT members for their essential contributions, the Steward of the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), the former Steward of the TPPT, Mr Ezequiel FERRO and the new Steward, Mr David OPATOWSKI.

[238] Mr Carl BLACKBURN on behalf of the host agency expressed appreciation for the work of the TPPT and said that he hoped to host the TPPT meeting again someday.

[239] Ms Marina ZLOTINA thanked the all the meeting participants and gave special recognition to the Chairperson and Rapporteur.

[240] The Chairperson expressed his appreciation to the TPPT, thanked the Secretariat for their support. He also thanked Mr Guy HALLMAN for his dedicated work, as his term will expire after this meeting.

[241] The meeting was closed.

Appendix 01: Agenda

2017 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

17 July – 21 July 2017

Vienna, Austria (IAEA HQ)

Meeting Schedule:
Monday: 09:30 am to 5:00 pm
Tuesday through Friday: 9:00 am to 5:00 pm

AGENDA

AGENDA ITEM	DOCUMENT NO.	PRESENTER
1. Opening of the meeting		IPPC SECRETARIAT
- Opening Remarks by the Host Agency		Host
- Election of the Chairperson		MOREIRA
- Election of the Rapporteur		CHAIRPERSON
- Adoption of the Agenda	01_TPPT_2017_Jul	CHAIRPERSON
2. Administrative Matters		CHAIRPERSON
- Documents List	02_TPPT_2017_Jul	MOREIRA
- Participants List	03_TPPT_2017_Jul	MOREIRA
- Local Information	04_TPPT_2017_Jul	
3. Drafting of ISPMs on requirements for phytosanitary treatment use		CHAIRPERSON
3.1 Draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), priority 2	2014-006 CRP_01_TPPT_2017_Jul	ZLOTINA/ MYERS
Steward's summary & implementation issues	08_TPPT_2017_Jul	
References - IPPC Style guide - 2016 SC Nov report - 2017 SC May report	Link to IPPC Style Guide Link to SC Nov report Link to SC May report	
4. Treatments submissions from the 2017 call for treatments	Link to Call for treatments page	CHAIRPERSON / IPPC Secretariat
- List of treatments	11_TPPT_2017_Jul	
- Link to the treatments submission forms and supporting data	Link to the treatments submission forms and supporting data	
- Estimating Treated Numbers from Control Emergence	09_TPPT_2017_Jul	
- Reference: IPPC Manual for Standard Setting 2016-2017	Link to IPPC Manual for Standard Setting 2016-2017	

AGENDA ITEM	DOCUMENT NO.	PRESENTER
4.1 Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities (2017-017) - Checklist for evaluating treatment submissions and Prioritization score sheet	24_TPPT_2017_Jul	SMYTH
4.2 Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) - Checklist for evaluating treatment submissions and Prioritization score sheet	15_TPPT_2017_Jul	WILLINK
4.3 Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) - Checklist for evaluating treatment submissions and Prioritization score sheet	16_TPPT_2017_Jul	YU
4.4 Cold treatment of table grapes against *Ceratitis capitata and Bactrocera tryoni* (2017-023) - Checklist for evaluating treatment submissions and Prioritization score sheet	17_TPPT_2017_Jul	DOHINO
4.5 Heat treatment of wood chips (2017-024) - Checklist for evaluating treatment submissions and Prioritization score sheet - Reference: NAPPO ST 05 Review of heat treatment of wood and wood packaging - Reference: EPPO Study on wood commodities (other than round wood, sawn wood and manufactured items)	18_TPPT_2017_Jul 22_TPPT_2017_Jul 23_TPPT_2017_Jul	ORMSBY
4.6 Cold treatment of fruit and vegetables including citrus fruit Citrus spp. for *Thaumatotibia leucotreta* (2017-029) - Checklist for evaluating treatment submissions and Prioritization score sheet	19_TPPT_2017_Jul	WANG
4.7 Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) - Checklist for evaluating treatment submissions and Prioritization score sheet	20_TPPT_2017_Jul	BOWMAN
5. Draft phytosanitary treatments (PTs) in the work program		CHAIRPERSON
5.1 Draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) Stewards responses to consultation comments	2009-109 14_TPPT_2017_Jul	HALLMAN DOHINO
Review of the preliminary research results - Comparison of Three Populations of *Bactrocera dorsalis* for Tolerance to Vapour Heat Treatment in Mangoes (Austria) - Comparison of Two Populations of *Bactrocera dorsalis* for Tolerance to Vapour Heat Treatment in Mangoes (Japan) Supporting research requested from the Philippines and Japan	06_TPPT_2017_Jul 07_TPPT_2017_Jul Research data from JIICA and Philippines - link	

AGENDA ITEM	DOCUMENT NO.	PRESENTER
6. Review of draft Phytosanitary Treatments (PTs) after objections received	Link to objections received: - CPM-12 (2017)	CHAIRPERSON / Steward / IPPC Secretariat
6.1 Draft annex to ISPM 28: Heat treatment of wood using dielectric heating (2007-114) - TPPT lead's notes on the objection - Reference: Hoover at al 2010	2007-114 05_TPPT_2017_Jul 13_TPPT_2017_Jul	ORMSBY
7. Follow-up actions from IPPC bodies		CHAIRPERSON
7.1 Follow-up actions from CPM-12 and Standards Committee - Availability of TPPT documents and supporting information for phytosanitary treatments	10_TPPT_2017_Jul	OPATOWSKI / MOREIRA
8. Liaison		
8.1 Phytosanitary Measures Research Group (PMRG)	Link to PMRG page	HALLMAN
8.2 Ozone Secretariat (Vienna Convention and Montreal Protocol / United Nations Environment Programme (UNEP)) - Summary of the meeting of the Methyl Bromide Technical Options Committee	Link to Ozone Secretariat website MBTOC meeting report 12_TPPT_2017_Jul	KISS/ MOREIRA
9. Overview of the TPPT work programme	Link to 2017-06 List of topics for IPPC standards	CHAIRPERSON
9.1 Phytosanitary treatments search tool – review of the categorized treatments	21_TPPT_2017_Jul	KISS
10. Recommendations to the SC		CHAIRPERSON
11. Other business		CHAIRPERSON
12. Close of the meeting		CHAIRPERSON
- Evaluation of the meeting process - Close		MOREIRA CHAIRPERSON

Appendix 02: Documents List

2017 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

12 July – 17 July 2017

Vienna, Austria

DOCUMENTS LIST

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
DRAFT PHYTOSANITARY TREATMENTS (PTs) AND DRAFT INTERNATIONAL STANDARDS FOR PHYTOSANITARY MEASURES (ISPMs)			
2007-114	6.1	Heat treatment of wood using dielectric heating (2007-114), priority 1	2017-06-30
2009-109	5.1	Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109), Priority 2	2017-06-30
2014-006	3.1	Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), priority 2	2017-06-30
MEETING DOCUMENTS			
01_TPPT_2017_Jul	01.	Agenda	2017-06-30 Rev 2017-06-06
02_TPPT_2017_Jul_Rev	02	Document List	2017-06-30 Rev 2017-06-06
03_TPPT_2017_Jul	02	Participants List	2017-06-30
04_TPPT_2017_Jul	02	Local Information	2017-06-30
05_TPPT_2017_Jul	6.1	TPPT lead's notes on the objection for the Heat treatment of wood using dielectric heating (2007-114)	2017-06-30
06_TPPT_2017_Jul	5.1	Comparison of three populations of *B. dorsalis* for tolerance to VHT treatment in mangoes (Austria)	2017-06-30
07_TPPT_2017_Jul	5.1	Comparison of two populations of *B. dorsalis* for tolerance to VHT treatment in mangoes (Japan)	2017-06-30
08_TPPT_2017_Jul	3.1	Steward's notes and potential implementation issues on draft ISPM: Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006)	2017-06-30
09_TPPT_2017_Jul	04	Estimating Treated Numbers from Control Emergence	2017-06-30
10_TPPT_2017_Jul	7.1	Availability of TPPT documents and supporting information for phytosanitary treatments	2017-06-30
11_TPPT_2017_Jul_Rev	04	Prioritized list of submitted treatments in response to the call for phytosanitary treatments in response to the call for treatments before the 05 June	2017-06-30 Rev 2017-06-06
12_TPPT_2017_Jul	8.2	Summary of the meeting of the Methyl Bromide Technical Options Committee	2017-06-30

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
13_TPPT_2017_Jul	6.1	Reference: Hoover at al 2010 - Draft annex to ISPM 28: Heat treatment of wood using dielectric heating (2007-114)	2017-06-30
14_TPPT_2017_Jul	5.1	Stewards responses to consultation comments - Draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109)	2017-06-30
15_TPPT_2017_Jul	4.2	Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-06-30
16_TPPT_2017_Jul	4.3	Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-06-30
17_TPPT_2017_Jul	4.4	Cold treatment of table grapes against *Ceratitis capitata and Bactrocera tryoni* (2017-023) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-06-30
18_TPPT_2017_Jul	4.5	Heat treatment of wood chips (2017-024) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-06-30
19_TPPT_2017_Jul	4.6	Cold treatment of fruit and vegetables including citrus fruit Citrus spp. for *Thaumatotibia leucotreta* (2017-029) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-06-30
20_TPPT_2017_Jul	4.7	Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-07-06
21_TPPT_2017_Jul	9.1	Phytosanitary treatments search tool – review of the categorized treatments	2017-07-06
22_TPPT_2017_Jul	4.5	Reference: NAPPO ST 05 Review of heat treatment of wood and wood packaging	2017-06-30
23_TPPT_2017_Jul	4.5	Reference: EPPO Study on wood commodities (other than round wood, sawn wood and manufactured items)	2017-06-30
24_TPPT_2017_Jul	4.1	Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities (2017-017) - Checklist for evaluating treatment submissions and Prioritization score sheet	2017-07-03
CRP_01_TPPT_2017_Jul	3.1	Research guidelines for the requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006)	2017-07-18

Links:

CONTENT	AGENDA ITEM	LINKS:
IPPC Style Guide	3.1	Link to IPPC Style Guide
Standards Committee (SC) Nov 2016 meeting report	3.1	SC Nov report
Standards Committee (SC) May 2017 meeting report	3.1	SC May meeting report
Standard Setting Call for treatments page	04	Link to Call for treatments
Treatments submissions and supporting data submitted before 2017-06-05	04	Link to the treatments submission forms and supporting data
Reference: IPPC Manual for Standard Setting 2016-2017	04	Link to IPPC Manual for Standard Setting 2016-2017
Supporting research requested from the Philippines and Japan	5.1	Research data from JIICA and Philippines - link
Review of the draft Phytosanitary Treatments (PTs) after Objections	06	Link to objections received CPM-12 (2017)
Liaisons: • Phytosanitary Measures Research Group (PMRG)	8.1	Link to PMRG page (see also report of the PTTEG: click here)
Liaisons: • Ozone Secretariat (Vienna Convention and Montreal Protocol / United Nations Environment Programme (UNEP))	8.2	Link to Ozone Secretariat website (see also the report of the MBTOC: click here)
Overview of the TPPT work programme	09	Link to 2017-06 List of topics for IPPC standards
TPPT public page (meeting reports and others)	-	Technical Panel on Phytosanitary Treatments (TPPT)
ISPM 28 (*Phytosanitary treatments for regulated pests*)	-	ISPM 28
Specification TP3: TPPT	-	Specification TP3
Adopted ISPMS	-	Adopted standards

Appendix 03: Participants list

2017 MEETING FOR THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

17 July-21 July 2017

Vienna, AUSTRIA

PARTICIPANTS LIST

A check (✓) in column 1 indicates confirmed attendance at the meeting.

	Participant role	Name, mailing, address, telephone	Email address	Term expires
✓	**Steward**	Mr David **OPATOWSKI** 1-3 avenue de la Paix 1202 Geneva, Switzerland **ISRAEL** Tel: (+41) 79945 7344	dopatowski@yahoo.com; agriculture@geneva.mfa.gov.il	N/A
✓	**Member**	Mr Guy **HALLMAN** Research Entomologist Insect Pest Control Laboratory Reaktorstrasse 1 A-2444 Seibersdorf AUSTRIA **IAEA**	G.Hallman@iaea.org N5551212@yahoo.com	2017 – 1st Term
✓	**Member**	Mr Michael **ORMSBY** Senior Adviser, Plant Risk Analysis Ministry for Primary Industries P.O Box 2526, Wellington, **NEW ZEALAND** Tel: +64 4 8940486	Michael.Ormsby@mpi.govt.nz;	2020 – 3rd Term
✓	**Member**	Mr Eduardo **WILLINK** Estación Experimental Agroindustrial Obispo Colombres, P.O.Box 9, Las Talitas (4101) Tucumán **ARGENTINA** Tel: +54 381-4521010 +54-381 154692512	ewillink@eeaoc.org.ar ewillink@arnet.com.ar	2020 – 3rd Term
✓	**Member**	Mr Yuejin **WANG** Institute of Inspection Technology and Equipment Chinese Academy of Inspection and Quarantine No. 241 Huixinli, Chaoyang District, Beijing 100029 **CHINA** Tel: +86 10 64934647	wangyj@caiq.gov.cn wangyj1961@hotmail.com	2020 – 3rd Term

	Participant role	Name, mailing, address, telephone	Email address	Term expires
✓	**Member**	Mr Scott **MYERS** USDA APHIS 1398 W Truck Rd., Buzzards Bay, MA, **USA** Tel: 508-563-0959	scott.w.myers@aphis.usda.gov	2018– 1st Term
✓	**Member**	Mr Matthew **SMYTH** Australian Department of Agriculture & Water Resources 7 London Circuit, Canberra ACT 2601 **AUSTRALIA** Tel: +61 2 6272 5662	matthew.smyth@agriculture.gov.au	2019– 1st Term
✓	**Member**	Mr Glenn **BOWMAN** Australian Department of Agriculture & Water Resources 7 London Circuit Canberra City ACT 2601 **AUSTRALIA** Tel: +61 2 6272 3071 Fax: +61 2 6272 3307	glenn.bowman@agriculture.gov.au	2019– 1st Term
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✓	**Member**	Mr Toshiyuki **DOHINO** Disinfestation Technology Section, Research Center Yokohama Plant Protection Station Ministry of Agriculture, Forestry and Fisheries (MAFF) 1-16-10, Shin-yamashita, Naka-ku, Yokohama 231-0801 **JAPAN** Tel: +81 45 622 8893 Fax: +81 45 621 7560	dohinot@pps.maff.go.jp	2020– 1st Term
✓	**Member**	Mr Andrew **PARKER** Insect Pest Control Laboratory FAO/IAEA Agriculture and Biotechnology Laboratories Agency's Laboratories Seibersdorf IAEA A-2444 Seibersdorf **AUSTRIA** Tel: +43 1 2600 28408	a.parker@iaea.org	N/A

	Participant role	Name, mailing, address, telephone	Email address	Term expires
✓	**Steward of the draft ISPM: Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006)**	Ms Marina **ZLOTINA** IPPC Technical Director USDA-APHIS, Plant Protection and Quarantine (PPQ) 4700 River Rd, 5c-03.37 Riverdale, MD 20737 **USA** Phone: 1-301-851-2200 Cell: 1 -301-832-0611	Marina.A.Zlotina@aphis.usda.gov	N/A
✓	**IPPC Secretariat Senior Standards Officer**	Mr Brent **LARSON** International Plant Protection Convention Food and Agriculture Organization of the United Nations Viale delle Terme di Caracalla 00153 Rome ITALY Tel: + 39 06 570 54915	Brent.Larson@fao.org	N/A
✓	**IPPC Secretariat Lead**	Ms Adriana **MOREIRA** International Plant Protection Convention Food and Agriculture Organization of the United Nations Viale delle Terme di Caracalla 00153 Rome ITALY Tel: + 39 06 570 55809	adriana.moreira@fao.org	N/A
✓	**IPPC Secretariat Support**	Ms Janka **KISS** International Plant Protection Convention Food and Agriculture Organization of the United Nations Viale delle Terme di Caracalla 00153 Rome ITALY Tel: +39 06 570 52454	Janka.kiss@fao.org	N/A
✓	**Host representative**	Mr Rui **CARDOSO PEREIRA** International Atomic Energy Agency Department of Nuclear Sciences and Applications Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture NAFA - Insect Pest Control Section P.O. Box 100, Vienna International Centre Wagramer Straße 5 1400 Vienna AUSTRIA Tel.: 0043 1 2600 26077 Fax: 0043 1 26007	R.Cardoso-Pereira@iaea.org	N/A

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Appendix 04: Research results (Austria)

COMPARISON OF THREE POPULATIONS OF BACTROCERA DORSALIS FOR TOLERANCE TO VAPOUR HEAT TREATMENT IN MANGOES

(Prepared by Mr Guy HALLMAN)

Background

[242] For phytosanitary treatment schedules to be broadly applicable geographically there cannot be significant differences in efficacy among populations of the same species from different areas. The phytosanitary treatment literature and treatment schedules indicate possible differences in efficacy among populations of the same species of tephritids. For example, Dohino et al. (2016) note that vapour heat treatment (VHT) schedules for mangoes against *Bactrocera dorsalis* differ in severity from a low of seed surface temperature ≥ 46°C for 10 min in the Philippines to a high of seed surface temperature ≥ 48°C for 20 min in India. Reasons why these schedules are different might include differences in susceptibility to heat among populations, the confirmatory testing was simply done at those different values, different ways of measuring efficacy were used, results were interpreted differently, and importing plant protection organizations required different levels of efficacy.

[243] In this particular case the VHT for *Bactrocera dorsalis* on *Carica papaya* (2009-109) has been delayed because the data supporting it are not extensive enough to ignore speculative differences in heat tolerance among populations. As with the situation with cold treatment for *Ceratitis capitata*, fruit fly resources at the IAEA laboratories at Seibersdorf can be used to explore the possibility of variation in heat tolerance among fly populations.

Objective

[244] Determine if populations of *Bactrocera dorsalis* vary significantly in tolerance to the VHT.

Methods and Materials

[245] *Bactrocera dorsalis* populations from China (Fujian Province), Kenya, and Thailand (Saraburi Province), 45, 48, and 60 generations, respectively, at Seibersdorf were used to infest mangoes (weight ~620 g) by placing 12 fruits each in cages containing ovipositing flies. Mangoes were used instead of papayas because useful examples of the former and not the latter were available locally in Austria. It is assumed that significant differences among populations of *B. dorsalis* identified in any given commercially-treated fruit would mean that they could differ for other fruits as well.

[246] A previous review of the literature done by the TPPT (*Most Thermotolerant Stage of Tephritidae*) found that eggs ~1 d old were the most tolerant stage (among eggs and instars) to the VHT. After oviposition, mangoes were held for 1 day at ~25°C and then 6 mangoes infested with each population were placed in an environmental chamber (Pol-Eko Aparatura, Model KK 700 TOP+, Warsaw, Poland, ~1 m^3 volume) at 47°C and 95% RH for ~3 h. Mangoes infested with the 3 populations were randomly mixed together in the treatment chamber. The other 6 mangoes from each population were kept untreated to allow larvae to develop to the size where they could be counted (late larvae) and used to estimate egg population sizes in the treated mangoes.

[247] Temperatures at the seed surface in 3 mangoes (one from each population) were recorded with thermocouples that were calibrated at 46.0°C with a certified thermometer (H-B Instrument-SP Scienceware, Trappe, PA, USA) traceable to the US National Institute of Standards and Technology. The goal was to vapour heat treat the infested mangoes long enough to kill almost all of them, but leaving a few survivors so that differences in tolerance would be measurable.

[248] *Data analysis*: The data is expressed as percentage survival. Proportional data like these should be transformed before analysis if the data is close to one extreme, as is the objective of this research (near 0% survival). There are two transformations recommended for proportional data: logit and

arcsine. For regression analysis logit is preferred, while for multivariate analysis (such as ANOVA) arcsine is preferred (http://strata.uga.edu/8370/rtips/proportions.html). As ANOVA is used to compare the 3 populations, arcsine was used to transform the data prior to analysis.

Results

[249] In four of 11 replicates the VHT resulted in no survivors for any of the populations, leaving 7 replicates for analysis (Table 1). ANOVA of the 7 replicates and 3 populations found that they were not significantly different at the 95% level of confidence (P = 0.076) although means were superficially different: The arcsine transformed means ± SEM for Thailand, Fujian (China), and Kenya populations were 7.45 ± 4.00, 1.70 ± 1.28, and 0.79 ± 0.65%, respectively.

[250] Seed surface temperatures varied from 43.0 to 45.4°C during the study and 45.4°C resulted in 100% mortality of all populations. However, the Kenyan population was killed at 45.3°C.

Table 1. Arcsine transformed percentage survival of *Bactrocera dorsalis* from 3 locations subjected to vapour heat treatment at 47°C for ~3 h as 1 day-old eggs laid in mangoes.

Replicate	Origin of *B. dorsalis*		
	Thailand	Fujian Province, China	Kenya
1	24.3	9.3	0.65
2	20.7	1.7	4.6
3	0.46	0	0
4	0	0.74	0
5	6.5	0	0
6	0.21	0	0.24
7	0	0.15	0

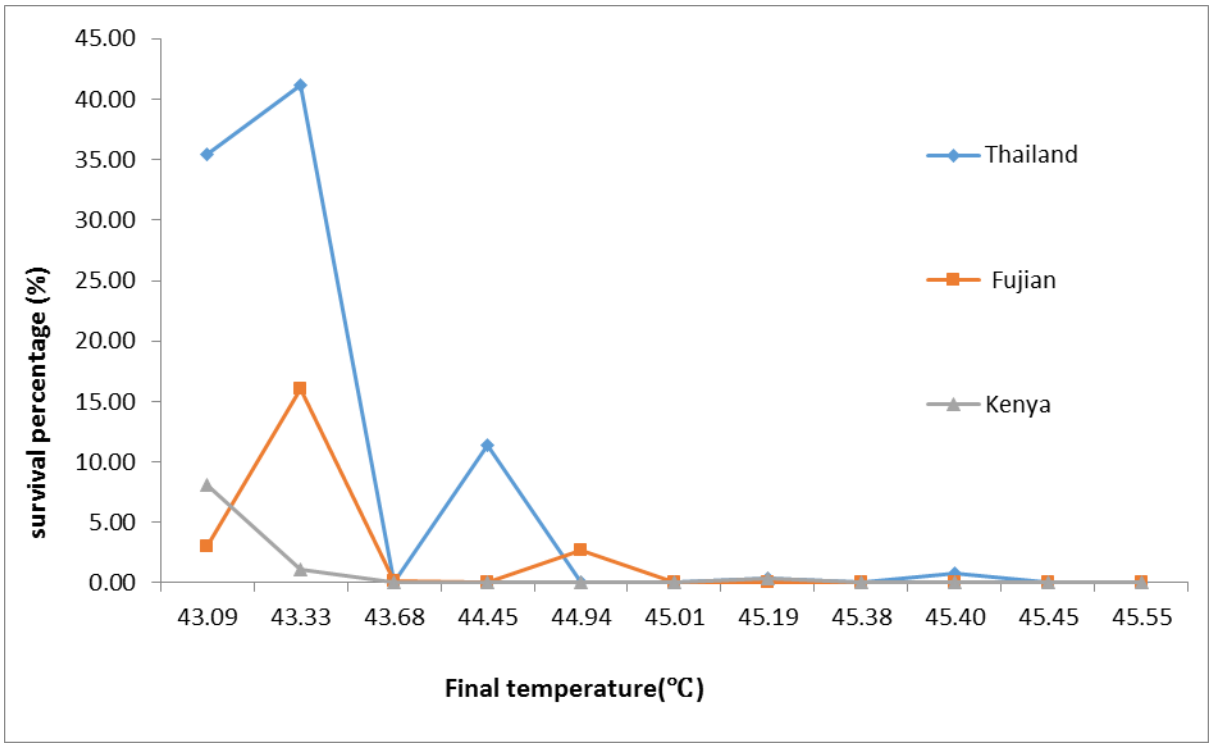

Figure 1. Final mean seed surface temperature versus percentage survival of *Bactrocera dorsalis* from 3 locations subjected to vapour heat treatment at 47°C for ~3 h as 1 day-old eggs laid in mangoes.

Discussion

[251] Although differences in survival after VHT among the 3 populations were not significant at the 95% confidence level, they would be at a modestly lower value, 92 %. It is therefore difficult to conclude robustly that the 3 populations do not differ in tolerance to VHT. The population from Thailand appears to be superficially more tolerant. In any case the apparently most susceptible population (Kenya) still required a seed surface temperature of 45.3°C to kill 100%, which was only 0.1°C lower than the Thai population (Fig. 1). VHT of *B. dorsalis* infested mangoes in the Philippines found a similar result: at a temperature between 45-46°C all eggs were killed (Merino et al. 1985).

[252] Apparently larger differences in survival among the three populations at lower temperatures (Figure 1) may be largely due to the increased error in estimating populations from non-treated fruit as the proportion surviving increases.

[253] Because the number of generations of each population in colony at Seibersdorf was 45-60, it could be argued that they may not reflect the heat tolerance of the original field populations from which they were collected.

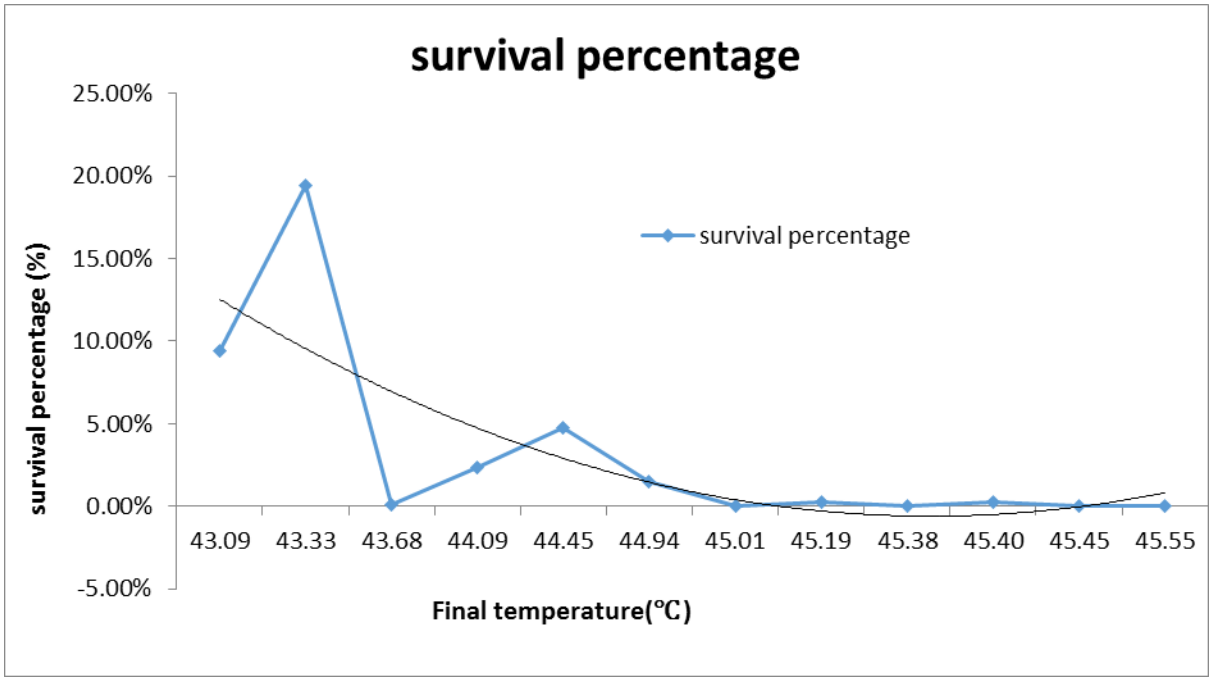

Figure 2. Final mean seed surface temperature versus mean percentage survival of Bactrocera dorsalis subjected to vapour heat treatment at 47°C for ~3 h as 1 day-old eggs laid in mangoes.

[254] This research indicates that a VHT treatment schedule against *B. dorsalis* in mangoes could be: exposure in a VHT chamber:

- at a minimum RH of 95%
- at an air temperature of 47°C or above
- for a minimum of 3 h and until the seed surface temperature of the mangoes reaches some point > 45.4°C

[255] Because large-scale confirmatory testing was not conducted it is not possible to accurately predict what would be the minimum prescribed seed surface temperature to achieve a reasonably secure level of efficacy.

References Cited

Dohino, T., G.J. Hallman, T.G. Grout, A.R. Clarke, P.A. Follett, D.R. Cugala, D.M. Tu, W. Murdita, E. Hernandez, R. Pereira, and S.W. Myers. 2017. Phytosanitary treatments against

Bactrocera dorsalis (Diptera: Tephritidae): Current situation and future prospects. J. Econ. Entomol. 110: 67-79.

Merino, S.R., M.M. Eugenio, A.U. Ramos, and S.T. Hernandez. 1985. Fruit fly disinfestation of mangoes (*Mangifera indica* Linn. Var. "Manila Super") by vapour heat treatment. Ministry of Agriculture and Food, Bureau of Plant Industry, Manila.

Appendix 05: Research results (Japan)

COMPARISON OF TWO POPULATIONS OF BACTROCERA DORSALIS FOR TOLERANCE TO VAPOUR HEAT TREATMENT IN MANGOES

(Prepared by Mr Toshiyuki DOHINO)

Background

[256] Analogous to the previous issue about the possibility of variation in tolerance among populations of *Ceratitis capitata* to phytosanitary cold treatment, the same issue arises regarding vapour heat treatment (VHT). In this particular case the VHT for *Bactrocera dorsalis* on *Carica papaya* (2009-109) has been delayed because the data supporting it are not extensive enough to ignore speculative differences in heat tolerance among populations. As with the situation with cold treatment for *Ceratitis capitata*, fruit fly resources at the IAEA laboratories at Seibersdorf can be used to explore the possibility of variation in heat tolerance among fly populations.

[257] **Objective**: Determine if populations of *Bactrocera dorsalis* vary significantly in tolerance to the VHT.

Methods and Materials

[258] *Bactrocera dorsalis* populations from Japan (the laboratory colony was obtained from Okinawa prefecture and has been maintained in Yokohama Plant Protection Station (YPPS) after its eradication from Japan in 1989) and Thailand (the laboratory colony was introduced into YPPS in 2002 and has been maintained) at Research Division, YPPS were used to infest mangoes ("Tommy Atkins" mangoes from Brazil, weight 304-319 g) by placing 5-7 fruits each on cages containing ovipositing flies under the rearing condition (27°C, 65% RH, 13L:11D). Mangoes were used instead of papayas because enough numbers and similar weights of fruit were prepared in Japan. It is assumed that significant differences among populations of *B. dorsalis* identified in any given commercially-treated fruit would mean that they could differ for other fruits as well.

[259] A previous review of the literature done by the TPPT found that eggs ~1 d old were the most tolerant stage (among eggs and instars) to the VHT. After oviposition mangoes were held for 1 day at ~27°C and then 20 mangoes (5 fruits per experimental lot ×4 experimental lots) infested with 24hr-old eggs of each population were placed in a VHT chamber (FTH Co. Ltd., Model VHC-10TM, Kagoshima, Japan, ~1 m^3 volume). Ten mangoes infested with the 2 populations (5 fruits per population) were mixed together in the same shelf for the target temperature in the treatment chamber. Infested mangoes were heated from 30°C to 48°C for 120 min and 95%RH, and kept at 48°C inside the VHT chamber. Five mangoes in each population were kept untreated to allow larvae to develop to the size where they could be counted (late larvae) and used to estimate egg population sizes in the treated mangoes.

[260] Three sensors (CHINO Co. Ltd., Pt100) were used for the measurement of temperatures at seed surface in 3 un-infested mangoes during VHT and they were calibrated at 46.0°C with a certified thermometer (TOAKEIKI MFG Co. Ltd., Model no.1) before VHT. When 2 of the 3 sensors reached 44.0, 45.0, 46.0, 47.0°C or more, the shelf containing 10 infested mangoes with 2 populations of each target temperature lot was removed from the VHT chamber.

[261] The aim was to compare the corrected mortality between 2 populations and see if there was a significant difference between themResults

[262] Table 1 shows the survival ratio of each population at each target temperature in 2 replicates. The VHT resulted in no survivors at 47.0°C for both populations (Table 1).

Table 1. Percentage survival of *Bactrocera dorsalis* from 2 locations subjected to vapour heat treatment at 44-47°C as 24hr-old eggs laid in mangoes.

Replicate	Temperature (°C)	Origin of *B. dorsalis*	
		Okinawa (Japan) (%)	Thailand (%)
1	44	60.8	55.5
	45	39.2	32.0
	46	6.3	11.1
	47	0	0
2	44	86.0	79.7
	45	50.8	100
	46	15.0	43.1
	47	0	0

Discussion

[263] The survival rate of Thailand at 46°C of seed surface was likely to be higher than that of Okinawa in both replications although both colonies were reared for more than 10 years under the same conditions. No survivors were obtained from both populations at 47°C.

[264] It was suggested that in order to make the results more clear, 1) further replications such as 46.5, 46.8°C treatment lots, or 2) further experiments with artificial inoculation method in which the number of eggs is clear will be needed.

Appendix 06: List of submitted treatments

LIST OF SUBMITTED TREATMENTS IN RESPONSE TO THE CALL FOR PHYTOSNITARY TREATMENTS BEFORE THE 5 JUNE

No.	Topic No.	Title (coloured according to the type of treatment)	Submitted by	TPPT Lead	The supporting documents are public	Recommended priority for the LoT *
1	2017-017	Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities	USA	Smyth	Yes	1
2	2017-028	Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles	China	Willink	Yes	2
3	2017-011	Irradiation treatment for eggs and larvae of the family Tortricidae (generic)	USA	Bowman	Yes	1
4	2017-012	Irradiation treatment for all stages of the family Pseudococcidae (generic)	USA	Yu	Yes	1
5a	2017-023A	Cold treatment of *Ceratitis capitata* on table grapes	Australia	Dohino	No	1
5b	2017-023B	Cold treatment of *Bactrocera tryoni* on table grapes	Australia	Dohino	No	1
6	2017-024	Heat treatment of wood chips	Belgium	Ormsby	Yes	3
7	2017-029	Cold treatment of fruit and vegetables including citrus fruit Citrus spp. for *Thaumatotibia leucotreta.*	South Africa	Wang	No	2
8	2017-030	Generic irradiation treatment against insects, except Lepidoptera larvae and pupae.	Mexico	Hallman	No	1
9	2017-016	Generic irradiation treatment for Curculionidae (Coleoptera)	USA	Yu	Yes	1
10	2017-022	Cold treatment of Australian Stone fruit against Mediterranean fruit fly and Queensland fruit fly	Australia	Dohino	No	2
11	2017-013	Cold treatment for the peach fruit fly, *Bactrocera zonata* on oranges *Citrus* x *sinensis*	USA	Dohino	Yes	2
12	2017-018	Irradiation treatment for light brown apple moth *Epiphyas postvittana* on all fresh commodities	USA	Yu	Yes	2
13	2017-031	Irradiation Treatment against fruit flies of the family Anastrepha spp. (Dose Modification)	Mexico	Hallman	No	2
14	2017-021	Irradiation treatment for European grapevine moth *Lobesia botrana* eggs and larvae on all fresh commodities	USA	Bowman	Yes	2
15	2017-026	Irradiation treatment for *Carposina sasakii*	China	Parker	Yes	2

No.	Topic No.	Title (coloured according to the type of treatment)	Submitted by	TPPT Lead	The supporting documents are public	Recommended priority for the LoT *
16	2017-015	Irradiation treatment for oriental fruit fly *Bactrocera dorsalis* on all fresh commodities	USA	Parker	Yes	2
17	2017-014	Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities	USA	Myers	Yes	3
18	2017-025	Irradiation treatment for *Bactrocera tau*	China	Parker	Yes	3
19	2017-027	Irradiation treatment for *Pseudococcus jackbeardsleyi*	China	Parker	Yes	3
20	2017-020	Irradiation treatment for coffee berry borer *Hypothenemus hampei* on coffee berries	USA	Bowman	Yes	3
21	2017-019	Irradiation treatment for western flower thrips *Frankliniella occidentalis* on all fresh commodities	USA	Dohino	Yes	3
22	2017-034	Hydrogen cyanide fumigation treatment for pine wood nematode and wood boring beetles in debarked wood	Czech Republic	Smyth	Only public: "File DOC IV B_PT8"	3
23	2017-035	Ethanedinitrile (EDN) treatment of wood for insect pests	New Zealand	Myers	Yes	3
24	2017-033	Hydrogen cyanide fumigation treatment for *Ditylenchus dipsaci* in seed bulbs of garlic	Czech Republic	Smyth	Yes	3
25	2017-032	Hydrogen cyanide fumigation treatment for rodents, insects and mites in containers	Czech Republic	Smyth	No	4

* The recommended priority for the LoT vary from 1 to 4, where 1 is the highest priority, and 4 is the lowest. The TPPT assigned priorities to the treatments submissions based impact on managing the pests in international trade on their 2017-07 meeting.

═ The 7 submissions in the list above the double line were discussed in the 2017-07 TPPT meeting based on the priorities assigned at the evaluation of the treatment by the Lead. On the meeting the TPPT rediscussed priorities, and assigned a new priority as presented in this list. The remaining submissions will be discussed in order of the new priority.

Appendix 07: Action points arising from the July 2017 TPPT meeting

	Action	Agenda Item	Responsible	Deadline
1.	Consider including thermal mapping into the draft ISPM for Requirements for the use of fumigation as a phytosanitary measure (2014-004)	3.1 [52]	OPATOWSKI	2017-12-15
2.	Align the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006) (especially sections "Phytosanitary System Security" (excluding the subsection "Environment, health and safety"), "Documentation" and "Inspection and Phytosanitary Certification") with the other draft ISPMs on requirements for phytosanitary treatments after the SC November 2017 meeting (after the consultation period) and send the draft ISPM to the Secretariat by 15 December 2017.	3.1 [59][67][79]	ZLOTINA, MYERS	15-12-2017
3.	Recommend the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006), as modified in the 2017-07 TPPT meeting, to the SC for their consideration to recommend it for first consultation, pending further alignment with the draft ISPM for the Requirements for temperature treatments as a phytosanitary measures (2014-005) and the draft ISPM for Requirements for the use of fumigation as a phytosanitary measure (2014-004).	3.1 [59] [67] [79]	TPPT (ZLOTINA, MYERS)	22-01-2018
4.	Open a TPPT e-Forum in January 2018 for a final review of the draft ISPM on the Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006) prior submission to the SC.	3.1 [59] [67] [79]	Secretariat	15-01-2018
5.	Add reference to Appendix 1 on the minimum treated number of individuals in the efficacy studies in the "Preliminary tests" section	3.1 [72]	ORMSBY	15-12-2017
6.	Invite the SC to consider the potential implementation issues identified by the TPPT on the draft ISPM on Requirements for the use of modified atmosphere treatments as a phytosanitary measure (2014-006)	3.1 [78]	Secretariat	14-05-2018
7.	Invite the PMRG to present the results of their consideration on the calculation of the treatment efficacy from control emergence to the TPPT once they concluded.	04 [87]	Secretariat	30-08-2019

	Action	Agenda Item	Responsible	Deadline
8.	Ask for further information (or research data) from the submitter on Irradiation treatment for spotted wing drosophila *Drosophila suzukii* on all fresh commodities (2017-017): - Dosage: The reasoning for recommending a dose of 100 gray if in the supporting study the pest was treated with 78 gray. - Life cycle after treatment: Whether the adult *Drosophila suzukii* emerging from a pupae after a treated with 78 gray are able to lay eggs. - Dosimetry: More information needed on the maximum and minimum doses reported (to be able to get the dose uniformity). - Estimation of the number of treated pests: the data requested is related to the estimation of the number of pupae and the percentage of adult emergence.	4.1 [106]	Secretariat	30-11-2017
9.	Invite the SC to consider the "Irradiation treatment for *Drosophila suzukii* on all fresh commodities (2017-017)" for inclusion into the TPPT work programme, with priority 1, and Mr Matthew SMYTH as the Treatment Lead, so the TPPT can assess better the information from the submitter.	4.1 [106]	Secretariat	14-05-2018
10.	Ask for further information from the submitter on Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028): - Clarify if eggs found on the harvested bamboo can develop to adult, as it is known that fumigants are difficult to penetrate eggs. - To further support, that the demonstrated efficacy will indeed manage the phytosanitary risk and to justify the number of treated pests. - Information on the moisture content of the treated bamboo measured, and what is the acceptable maximum moisture content	4.2 [117]	Secretariat	30-11-2017
11.	Invite the SC to consider the "Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028)" for inclusion into the TPPT work programme with priority 2, and Mr Eduardo WILLINK as the Treatment Lead, so the TPPT can assess better the information from the submitter.	4.2 [117]	Secretariat	14-05-2018

	Action	Agenda Item	Responsible	Deadline
12.	Ask for further information from the submitter on Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012): - To provide a list of major pests of economic importance within the Pseudococcidae family with information on the treatment end-point, the tested life stage, the effective dose and the source of the information (reference) for each species. - To provide more information on the treatment end-point (if F1 or F2 sterility).	4.3 [123]	Secretariat	30-11-2017
13.	Invite the SC to consider the "Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012)" for inclusion into the TPPT work programme with priority 1, and Mr Daojian YU as the Treatment Lead, so the TPPT can assess better the information from the submitter	4.3 [123]	Secretariat	27-10-2018
14.	Invite the SC to consider the "Cold treatment of *Ceratitis capitata* on table grapes (2017-023A)*"* for inclusion into the TPPT work programme with priority 1, and Mr Toshiyuki DOHINO as the Treatment Lead, so the TPPT can assess better the information of the submitter.	4.4 [131]	Secretariat	14-05-2018
15.	Invite the SC to consider the "Cold treatment of *Bactrocera tryoni* on table grapes (2017-023B)*"* for inclusion into the TPPT work programme with priority 1, and Mr Toshiyuki DOHINO as the Treatment Lead, so the TPPT can assess better the information of the submitter.	4.4 [131]	Secretariat	14-05-2018
16.	Invite the SC to consider the "Heat treatment of wood chips (2017-024)" for inclusion into the TPPT work programme, with priority 3, and Mr Michael ORMSBY as the Treatment Lead, noting that further assessment on the efficacy data is needed.	4.5 [143]	Secretariat	14-05-2018
17.	Ask the SC to consider giving permission to TPFQ to obtain the research data supporting the two references that may be available from either the TPFQ or International Forestry Quarantine Research Group (IFQRG) to support the efficacy studies of the submission "Heat treatment of wood chips (2017-024)".	4.5 [143]	Secretariat	14-05-2018
18.	Inform the Implementation and Capacity Development Committee that the submission for the Heat treatment of wood chips (2017-024) is *not* recommended to the Phytosanitary resources page as contributed resource as it does not meet the criteria	4.5 [143]	Secretariat	11-12-2017

	Action	Agenda Item	Responsible	Deadline
19.	Invite the SC to consider the "Cold treatment *Thaumatotibia leucotreta* on Citrus spp. (2017-029)" for inclusion into the TPPT work programme with priority 2 and Mr Yuejin WANG as the Treatment Lead, so the TPPT can assess better the information from the submitter, noting that for now the treatment is restricted to citrus species only.	4.6 [151]	Secretariat	14-05-2018
20.	Ask the submitter to provide additional information on Cold treatment for *Thaumatotibia leucotreta* on Citrus spp. (2017-029) on: - how the efficacy changes (or not) if the treatment is conducted with different types of commodities - the environment (climate, temperature) where the naturally infested fruit came from, to supply the actual data supporting the analysis of the tolerance of insects reared on natural or artificial diet and to explain better what might have caused the difference in the survival rate	4.6 [151]	Secretariat	30-11-2017
21.	Revise the section on the General Considerations for Irradiation Treatments in the Procedure Manual as the research has since been advanced and a large amount of new information become available, and the extrapolation of treatments across species become possible.	4.7 [159]	Secretariat	30-08-2017
22.	Invite the SC to consider the "Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011)" for inclusion into the TPPT work programme with priority 1, and Mr Glenn BOWMAN as the Treatment Lead, so the TPPT can assess better the information from the submitter.	4.7 [161]	Secretariat	14-05-2018
23.	Ask the submitter to provide additional information on the Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) - to provide a list of major pests of economic importance within the Tortricidae family with information on the treatment end-point, the tested life stage, the effective dose and the source of the information (reference) for each species.	4.7 [161]	Secretariat	30-11-2017
24.	Invite the SC to consider the draft annex to ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) and the TPPT responses to comments, as modified in this meeting, to recommend to the CPM for adoption	5.1 [175]	Secretariat	04-10-2017
25.	Request the submitter of the objection to the draft annex to ISPM 28: Heat treatment of wood using dielectric heating (2007-114) to provide color pictures of all of the thermal images taken of the replicates for each probe of the treated logs in the research supporting the objection to exclude the possibility of an area failing to reach the prescribed temperature.	6.1 [188]	Secretariat	30-09-2017

	Action	Agenda Item	Responsible	Deadline
26.	Invite the SC to consider the discussions on the public availability of TPPT documents and maintain the current policy of allowing access to meeting documents to only meeting participants.	7.1 [206]	Secretariat / TPPT Steward	18-11-2017
27.	Inform the MBTOC (via the Ozone Secretariat) of the discussion of the TPPT regarding the alternative control measures for drywood termite (*Cryptotermes brevis*)	8.2 [219]	Secretariat	30-09-2017
28.	Include the approved the list of categorized treatment with the proposed modifications to be included into the Phytosanitary treatments online search tool.	09 [230]	Secretariat	01-09-2017
29.	Provide responses to the online survey to evaluate the meeting process	12 [265]	TPPT members	07-08-2017

Appendix 08: List of categorized treatments for the Phytosanitary treatment search tool

PHYTOSANITARY TREATMENTS SEARCH TOOL –CATEGORIZED TREATMENTS

[265] The TPPT were tasked[57] to provide expertise in extracting data from phytosanitary treatments and categorize them in order to facilitate the creation of the IPPC Phytosanitary treatments search tool. The framework of the tool is ready, the treatment will be sortable based on the 6 categories below. The adopted PTs are categorized and listed below.

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
ISPM 28 - PT 01	RAT Irradiation	*Anastrepha ludens* Diptera: Tephritidae Mexican fruit fly ANSTLU	All fruits and vegetables, that are hosts of *Anastrepha ludens*	Minimum absorbed dose of 70 Gy to prevent the emergence of adults of *Anastrepha ludens*.	Internationally approved	https://www.ippc.int/en/publications/627/
ISPM 28 - PT 02	RAT Irradiation	*Anastrepha obliqua* Diptera: Tephritidae West Indian fruit fly ANSTOB	All fruits and vegetables that are hosts of *Anastrepha obliqua*	Minimum absorbed dose of 70 Gy to prevent the emergence of adults of *Anastrepha obliqua*.	Internationally approved	https://www.ippc.int/en/publications/628/
ISPM 28 - PT 03	RAT Irradiation	*Anastrepha serpentina* Diptera: Tephritidae Sapote fruit fly ANSTSE	All fruits and vegetables that are hosts of *Anastrepha serpentina*	Minimum absorbed dose of 100 Gy to prevent the emergence of adults of *Anastrepha serpentina*.	Internationally approved	https://www.ippc.int/en/publications/629/
ISPM 28 - PT 04	RAT Irradiation	*Bactrocera jarvisi* Diptera: Tephritidae Jarvis fruit fly BCTRJA	All fruits and vegetables that are hosts of *Bactrocera jarvisi*	Minimum absorbed dose of 100 Gy to prevent the emergence of adults of *Bactrocera jarvisi*.	Internationally approved	https://www.ippc.int/en/publications/630/
ISPM 28 - PT 05	RAT Irradiation	*Bactrocera tryoni* Diptera: Tephritidae	All fruits and vegetables that are	Minimum absorbed dose of 100 Gy to prevent the emergence of adults of *Bactrocera tryoni*.	Internationally approved	https://www.ippc.int/en/publications/631/

[57] Specification TP 3 - Technical Panel on Phytosanitary Treatments: https://www.ippc.int/en/publications/1308/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
		Queensland fruit fly DACUTR	hosts of *Bactrocera tryoni*			
ISPM 28 - PT 06	RAT Irradiation	*Cydia pomonella* Lepidoptera: Tortricidae Codling moth CARPPO	All fruits and vegetables that are hosts of *Cydia pomonella*	Minimum absorbed dose of 200 Gy to prevent the emergence of adults of *Cydia pomonella*.	Internationally approved	https://www.ippc.int/en/publications/632/
ISPM 28 - PT 07	RAT Irradiation	Diptera: Tephritidae 1TEPHF	All fruits and vegetables that are hosts of fruit flies of the family Tephritidae	Minimum absorbed dose of 150 Gy to prevent the emergence of adults of fruit flies.	Internationally approved	https://www.ippc.int/en/publications/633/
ISPM 28 - PT 08	RAT Irradiation	*Rhagoletis pomonella* Diptera: Tephritidae Apple fruit fly RHAGPO	All fruits and vegetables that are hosts of *Rhagoletis pomonella*	Minimum absorbed dose of 60 Gy to prevent the development of phanerocephalic pupae of *Rhagoletis pomonella*.	Internationally approved	https://www.ippc.int/en/publications/634/
ISPM 28 - PT 09	RAT Irradiation	*Conotrachelus nenuphar* Coleoptera: Curculionidae Plum curculio CONHNE	All fruits and vegetables that are hosts of *Conotrachelus nenuphar*	Minimum absorbed dose of 92 Gy to prevent the reproduction in adults of *Conotrachelus nenuphar*.	Internationally approved	https://www.ippc.int/en/publications/618/
ISPM 28 - PT 10	RAT Irradiation	*Grapholita molesta* Lepidoptera: Tortricidae Oriental fruit moth LASPMO	All fruits and vegetables that are hosts of *Grapholita molesta*	Minimum absorbed dose of 232 Gy to prevent the emergence of adults of *Grapholita molesta*.	Internationally approved	https://www.ippc.int/en/publications/619/
ISPM 28 - PT 11	RAT Irradiation	*Grapholita molesta* Lepidoptera: Tortricidae	All fruits and vegetables that are hosts of *Grapholita molesta* under hypoxia	Minimum absorbed dose of 232 Gy to prevent oviposition of *Grapholita molesta*.	Internationally approved	https://www.ippc.int/en/publications/620/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
		Oriental fruit moth LASPMO				
ISPM 28 - PT 12	RAT Irradiation	*Cylas formicarius* Coleoptera: Apionidae Sweet-potato weevil CYLAFO	All fruits and vegetables that are hosts of *Cylas formicarius*	Minimum absorbed dose of 165 Gy to prevent the development of F1 adults of *Cylas formicarius*.	Internationally approved	https://www.ippc.int/en/publications/623/
ISPM 28 - PT 13	RAT Irradiation	*Euscepes postfasciatus* Coleoptera: Curculionidae West Indian sweet potato weevil EUSPPO	All fruits and vegetables that are hosts of *Euscepes postfasciatus.*	Minimum absorbed dose of 150 Gy to prevent the development of F1 adults of *Euscepes postfasciatus*.	Internationally approved	https://www.ippc.int/en/publications/624/
ISPM 28 - PT 14	RAT Irradiation	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	All fruits and vegetables that are hosts of *Ceratitis capitata*	Minimum absorbed dose of 100 Gy to prevent the emergence of adults of *Ceratitis capitata*.	Internationally approved	https://www.ippc.int/en/publications/625/
ISPM 28 - PT 15	TPT-VH Vapour heat	*Bactrocera cucurbitae* Diptera: Tephritidae Melon fly DACUCU	*Cucumis melo* var. *reticulatus* (netted melon)	Fruit core temperature raised to a minimum of 45 °C in a vapour heat chamber and maintained for 30 minutes.	Internationally approved	https://www.ippc.int/en/publications/2501/
ISPM 28 - PT 16	TPT-CT Cold treatment	*Bactrocera tryoni* Diptera: Tephritidae Queensland fruit fly DACUTR	*Citrus sinensis* (orange)	Maximum fruit core temperature kept at 3 °C or below for 16 continuous days	Internationally approved	https://www.ippc.int/en/publications/80921/
ISPM 28 - PT 17	TPT-CT Cold treatment	*Bactrocera tryoni* Diptera: Tephritidae	*Citrus reticulata x C. sinensis* (tangor)	Maximum fruit core temperature kept at 3 °C or below for 16 continuous days	Internationally approved	https://www.ippc.int/en/publications/80922/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
		Queensland fruit fly DACUTR				
ISPM 28 - PT 18/1	TPT-CT Cold treatment	*Bactrocera tryoni* Diptera: Tephritidae Queensland fruit fly DACUTR	*Citrus limon* (lemon)	Maximum fruit core temperature kept at 2 °C or below for 14 continuous days	Internationally approved	https://www.ippc.int/en/publications/80923/
ISPM 28 - PT 18/2	TPT-CT Cold treatment	*Bactrocera tryoni* Diptera: Tephritidae Queensland fruit fly DACUTR	*Citrus limon* (lemon)	Maximum fruit core temperature kept at 3 °C or below for 14 continuous days	Internationally approved	https://www.ippc.int/en/publications/80923/
ISPM 28 - PT 19	RAT Irradiation	*Dysmicoccus neobrevipes,* *Planococcus lilacinus*, *Planococcus minor* Hemiptera: Pseudococcidae Gray pineapple mealybug, Cacao mealybug, Pacific mealybug, respectively DYSMNE PLANLI PLANMI	All fruits and vegetables that are hosts of the above mealybugs	Minimum absorbed dose of 231 Gy to prevent the reproduction of adult females of *Dysmicoccus neobrevipes, Planococcus lilacinus and Planococcus minor*.	Internationally approved	https://www.ippc.int/en/publications/80924/
ISPM 28 - PT 20/1	RAT Irradiation	*Ostrinia nubilalis* Lepidoptera: Pyralidae European corn borer PYRUNU	All fruits and vegetables that are hosts of *Ostrinia nubilalis*	Minimum absorbed dose of 289 Gy to prevent F1 development of *O. nubilalis.*	Internationally approved	https://www.ippc.int/en/publications/82518/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
ISPM 28 - PT 20/2	RAT Irradiation	*Ostrinia nubilalis* Lepidoptera: Pyralidae European corn borer PYRUNU	All fruits and vegetables that are hosts of *Ostrinia nubilalis*	Minimum absorbed dose of 343 Gy to prevent F1 egg hatching of *O. nubilalis*.	Internationally approved	https://www.ippc.int/en/publications/82518/
ISPM 28 - PT 21	TPT-VH Vapour heat	*Bactrocera melanotus,* Bactrocera xanthodes Diptera: Tephritidae BCTRME BCTRXA	*Carica papaya* (papaya)	Fruit core temperature raised to a minimum of 47.5 °C in a forced hot air chamber and maintained for 20 minutes.	Internationally approved	https://www.ippc.int/en/publications/82519/
ISPM 28 - PT 22/1	CHT-FU Fumigation	Wood-borne life stages of insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera: Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 3200 g·h/m3 and minimum concentration of 93 g/m3 at ≥15 °C over 24 hours.	Internationally approved	https://www.ippc.int/en/publications/84348/
ISPM 28 - PT 22/2	CHT-FU Fumigation	Wood-borne life stages of insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera:	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 2300 g·h/m3 and minimum concentration of 67 g/m3 at ≥20 °C over 24 hours.	Internationally approved	https://www.ippc.int/en/publications/84348/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
		Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)				
ISPM 28 - PT 22/3	CHT-FU Fumigation	Wood-borne life stages of insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera: Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 1500 g·h/m3 and minimum concentration of 44 g/m3 at ≥25 °C over 24 hours.	Internationally approved	https://www.ippc.int/en/publications/84348/
ISPM 28 - PT 22/4	CHT-FU Fumigation	Wood-borne life stages of insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera: Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 1400 g·h/m3 and minimum concentration of 41 g/m3 at ≥30 °C over 24 hours.	Internationally approved	https://www.ippc.int/en/publications/84348/
ISPM 28 - PT 23/1	CHT-FU Fumigation	Wood-borne life stages of *Bursaphelenchus xylophilus* (Nematoda: Aphelenchoididae)	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 3000 g·h/m3 and minimum concentration of 29 g/m3 at ≥20 °C over 48 hours.	Internationally approved	https://www.ippc.int/en/publications/84349/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
		and insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera: Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)	content (dry basis)			
ISPM 28 - PT 23/2	CHT-FU Fumigation	Wood-borne life stages of *Bursaphelenchus xylophilus* (Nematoda: Aphelenchoididae) and insects, including *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Anobium punctatum* (Coleoptera: Anobiidae) and *Arhopalus tristis* (Coleoptera: Cerambycidae)	Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)	Sulphuryl fluoride fumigation to achieve a minimum concentration time product (CT) of 1400 g·h/m3 and minimum concentration of 41 g/m3 at ≥30 °C over 24 hours.	Internationally approved	https://www.ippc.int/en/publications/84349/
ISPM 28 - PT 24/1	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus sinensis* (orange)	Maximum fruit core temperature kept at 2 °C or below for 16 continuous days	Internationally approved	https://www.ippc.int/en/publications/84350/
ISPM 28 - PT 24/2	TPT-CT Cold	*Ceratitis capitata* Diptera: Tephritidae	*Citrus sinensis* (orange)	Maximum fruit core temperature kept at 2 °C or below for 18 continuous days	Internationally approved	https://www.ippc.int/en/publications/8435

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
	treatment	Mediterranean fruit fly CERTCA				0/
ISPM 28 - PT 24/3	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus sinensis* (orange)	Maximum fruit core temperature kept at 3 °C or below for 20 continuous days	Internationally approved	https://www.ippc.int/en/publications/84350/
ISPM 28 - PT 25/1	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus reticulata* × *Citrus sinensis* (tangerine)	Maximum fruit core temperature kept at 2 °C or below for 18 continuous days	Internationally approved	https://www.ippc.int/en/publications/84351/
ISPM 28 - PT 25/2	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus reticulata* × *Citrus sinensis* (tangerine)	Maximum fruit core temperature kept at 3 °C or below for 20 continuous days	Internationally approved	https://www.ippc.int/en/publications/84351/
ISPM 28 - PT 26/1	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus limon* (lemon)	Maximum fruit core temperature kept at 2 °C or below for 16 continuous days	Internationally approved	https://www.ippc.int/en/publications/84352/
ISPM 28 - PT 26/2	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus limon* (lemon)	Maximum fruit core temperature kept at 3 °C or below for 18 continuous days	Internationally approved	https://www.ippc.int/en/publications/84352/
ISPM 28 - PT 27/1	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus paradisi* (grapefruit)	Maximum fruit core temperature kept at 2 °C or below for 19 continuous days	Internationally approved	https://www.ippc.int/en/publications/84353/
ISPM 28	TPT-CT	*Ceratitis capitata*	*Citrus paradisi*	Maximum fruit core temperature kept at 3 °C or below	Internationally	https://www.ippc.int/

Treatment No	Treatment type	Target pest	Product / commodity	Treatment schedule	Country that accepts trade based on the treatment	Link
- PT 27/2	Cold treatment	Diptera: Tephritidae Mediterranean fruit fly CERTCA	(grapefruit)	for 23 continuous days	approved	en/publications/84353/
ISPM 28 - PT 28	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus reticulata* (mandarin)	Maximum fruit core temperature kept at 2 °C or below for 23 continuous days.	Internationally approved	https://www.ippc.int/en/publications/84354/
ISPM 28 - PT 29	TPT-CT Cold treatment	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Citrus clementina* (clementine)	Maximum fruit core temperature kept at 2 °C or below for 16 continuous days.	Internationally approved	https://www.ippc.int/en/publications/84355/
ISPM 28 - PT 30	TPT-VH Vapour heat	*Ceratitis capitata* Diptera: Tephritidae Mediterranean fruit fly CERTCA	*Mangifera indica* (mango)	Fruit core temperature raised to a minimum of 46.5 °C in a vapour heat chamber and maintained for 10 minutes.	Internationally approved	https://www.ippc.int/en/publications/84356/
ISPM 28 - PT 31	TPT-VH Vapour heat	*Bactrocera tryoni* Diptera: Tephritidae Queensland fruit fly DACUTR	*Mangifera indica* (mango)	Fruit core temperature raised to a minimum of 47 °C in a vapour heat chamber and maintained for 15 minutes.	Internationally approved	https://www.ippc.int/en/publications/84357/