Food and Agriculture Organization of the United Nations

International Plant Protection Convention

REPORT

Technical Panel on Phytosanitary Treatments

Rome, Italy
9-13 October 2023
6, 8 and 22 November 2023

IPPC Secretariat

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1. Opening of the Meeting

Opening remarks by the Secretariat

[1] The International Plant Protection Convention (IPPC) Secretariat (hereafter referred to as the "Secretariat") welcomed the members of the Technical Panel on Phytosanitary Treatments (TPPT).

[2] Mr Avetik NERSISYAN, Standard Setting Unit Lead opened the meeting and warmly welcomed the TPPT members noting the importance of developing scientifically sound phytosanitary treatments for the IPPC community. He highlighted specifically the dedication of panel members and expressed gratitude to the NPPOs delegating the members of this panel. He noted the busy agenda and wished fruitful discussions to continue moving the panel's work programme forward.

2. Meeting Arrangements

Election of the Chairperson

[3] The TPPT elected Mr Scott MYERS as Chairperson.

Election of the Rapporteur

[4] The TPPT elected Mr Eduardo WILLINK as Rapporteur.

Adoption of the agenda

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

3. Administrative Matters

Documents list

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

Participants list

[7] The Participants list is presented in Appendix 3.

[8] The Secretariat was represented by Ms Janka KISS, secretariat lead.

Local information

[9] Further information was provided regarding the local arrangements and logistics[1].

4. Draft Phytosanitary Treatments (PTs) in the Work Programme

[10] The Secretariat provided an overview of the standard setting process making particular note of the recent change to enable a single consultation round if no substantive comments are received during the consultation period.

4.1 Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)

[11] The Treatment Lead, Mr Toshiyuki DOHINO the submission form, the reference provided, the checklist the draft PT, and additional information provided by the submitter[2].

[12] The submission was received in 2023 from the USA and the proposed schedule of 22 days at 1.7 °C or below is based on the study by Dias, V. S., et al. 2023[3].

[1] Local information on Rome: https://www.ippc.int/en/publications/1034/

[2] 05_TPPT_2023_Oct, 06_TPPT_2023_Oct, 07_TPPT_2023_Oct, 2023-004, 11_TPPT_2023_Oct

[3] Dias, V. S., et al. (2023). "High cold tolerance and differential population response of third instars from the *Zeugodacus tau* complex to phytosanitary cold treatment in navel oranges." Postharvest Biology and Technology 203. doi.org/10.1016/j.postharvbio. 2023.112392

[13] The TPPT discussed the proposed submission at the TPPT June 2023 Virtual Meeting and recommended to the Standards Committee (SC) its addition to the TPPT work programme , which the SC later confirmed in October 2023 via e-decision. In order to further evaluate the treatment, the TPPT discussed the submission further at the TPPT August 2023 Virtual Meeting and requested clarification from the submitter on a number of issues. Additional information was received from the submitter in September 2023.

[14] The Treatment Lead identified the following concerns that remain after the additional information had been received.

[15] **Determination of the most tolerant life stage to cold treatment used zucchini instead of oranges.** The study that determined the most tolerant life stage of the target pest to cold treatment used zucchini instead of oranges (the target regulated articles of this proposal). The submitter explained that zucchini was used because oranges are not an optimal host of this pest. Some TPPT members noted that since zucchini is a better host than oranges, the cold tolerance of larvae raised in zucchini could only be better than the ones raised in a suboptimal host like oranges and as a result will provide a conservative estimate of the tolerance. However the TPPT concluded that according to previously agreed procedures, the most tolerant stage should be established in the host, or clear justification for testing otherwise be provided.

[16] **Establishment of efficacy**. The TPPT also discussed that in table 2 round 7 and 8, the treatment was applied only to third instar larvae and not to all stages. The TPPT noted that it is likely the last 2 replicates weren’t including earlier stages because the instars were developing too quickly through stages. If these were removed, the efficacy would be lowered, but the schedule could still be acceptable. However, if the extra life stage testing that was requested confirms the third life stage being the most resistant this would not be unnecessary.

[17] The difference in tolerance between life stages is unlikely to be significant. This has previously been reviewed by the TPPT and it was noted that the tolerance of different larval stages of Tephritidae species is very narrowly different. Older third instars and older eggs are likely the most tolerant, independent of the host species.

[18] **Treatment condition（7 days at 1 ± 0.1°C).** The TPPT noted that the tests that determined the most tolerant stage were conducted only in one treatment condition: 7 days at 1 ± 0.1°C.

[19] The TPPT requested further information from the submitter, as there was only one treatment condition (0°C for 12 h, 2°C for 24 h) to determine the most tolerant stage.

[20] **Variety of treatment duration in most tolerant stage testing.** One member noted that in the most tolerant life stage study, it is unclear how long the tested life stages were observed. Usually, the life stage tests are performed for different length of time (dose-response test). It was clarified the fruit was dissected to see if the right life stage was present. It was checked experimentally in the study to ensure that the period is long enough to ensure that the larvae did develop to third instar in zucchini (in oranges it is probably slower).

[21] One member suggested that *B. dorsalis* tolerance is compared to *B. tau* and establish a treatment for both – as they often present at the same time.

[22] The TPPT considered that there is a lot of data available on this species and any further research is unlikely to result in a change in the result of the confirmatory study. Also need to consider the fact that citrus is a poor host for this species, and thus it is hard to produce normal development, using it as a host. They also noted that this is a very conservative treatment considering the end point (prevention of adult emergence) – an extra 7 days are added compared to absolutely necessary (15 days). The robustness of the study also is supported by the 3 different strains used in the study.

[23] Albeit, the TPPT considered that the most tolerant life stage was not evaluated correctly, and that at least the most tolerant life stage testing needs to be redone for different treatment durations.

[24] **Establishment of treatment temperature.** The proposed cold treatment schedule was 1.7°C or less for 22 days, however, the abstract of the supporting paper describes that the average temperatures ranging from 1.19-1.45°C for 22 days yielded 4 survivors. In response to the request made during the 2023 August TPPT meeting, detailed data of fruit temperature during confirmatory testing was received from the submitter providing the mean fruit core temperature of each replication (7 replications) as 1.38°C, 1.45°C, 1.23°C, 1.33°C, 1.19°C, 1.32°C and 1.33°C, respectively. In accordance with PMRG research guidelines for cold treatment (2019), the lowest mean fruit core temperature (1.19°C) should be used for the development of cold treatment schedule. The TPPT agreed that a cold treatment at 1.2°C or below for 22 days is considered appropriate, based on the additional information provided by the submitter in document 11.

[25] **Endpoint.** In this submission, confirmatory testing of average temperatures ranging from 1.19-1.45°C for 22 days yielded 4 survivors (2 puparia, 1 moving larva, 1 alive discoloured larva which pupariated), however, none of these developed to the adult stage. The TPPT agreed that the endpoint of "failure of adult emergence" is appropriate.

[26] The TPPT noted that it is unusual for cold treatments to allow for live survivals, that inspectors might find, however the TPPT considered that this treatment may be used as part of a systems approach. The TPPT also noted that there are other approved PTs, where the endpoint was established using whole fruit that was not dissected to check if larvae survived, but only check whether larvae emerge and pupariate.

[27] **Morphotypes.** The TPPT noted that *Zeugodacus tau* is likely part of a species complex and having tested different morphotypes in the trials provides more robust evidence that this treatment could be applied to the whole species complex in the future, should there be a revision of the taxonomy of the species. The TPPT agreed that it is beneficial to include wording into the draft PT to describe the use of morphotypes in the trials.

[28] In summary, the TPPT agreed to suggest the submitter provide evidence to determine the most tolerant life stage in orange, not zucchini either by redoing the most tolerant life stage studies or providing other evidence. The TPPT also requested to study the most tolerant life stage with longer exposure times (not only at 7 days at 1 C), reflecting the proposed treatment schedule (PMRG guidelines[4] recommend at least 5 different durations, for example 0, 9, 11, 13, 15 days).

[29] **Draft PT**. The TPPT agreed to discuss the text of the draft to already establish the section on morphotypes and be able to request all necessary information from the submitter at once.

[30] They discussed that it should be very clear in the scope what the expected outcome (measure of mortality) was, to provide for the eventuality of live survivors. This was further expanded on in the "Other relevant information" section, where a detailed description was provided about the 4 survivors found in the study.

[31] They also included a sentence to describe that the study was conducted on 3 different wild populations, as it is foreseen that the species might be split into subspecies.

[32] The TPPT:

(1) *recommended* priority 1 for the Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004) and *agreed* to wait with the further development of this topic until the submitter provided the required information on life stage testing.

[4] PMRG Research Guidelines: Cold Treatments: https://www.ippc.int/en/partners/phytosanitarymeasuresresearchgroup/publications/2019/03/pmrg-research-guidelines-cold-treatments/

4.2 Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006)

[33] The Treatment Lead, Mr Scott MYERS introduced the submission form, the reference provided, the raw data provided, the checklist and draft PT[5].

[34] The submission for a Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006) was received in 2023 from Japan. The proposal is based on the study by Soma *et al.* 2023[6].

[35] The proposed schedule is the fumigation of *Malus x domestica* fruit in accordance with a schedule that achieves the minimum concentration–time product (CT) within a single 2-hour period at the temperature and final residual concentration specified in Table 1.

Table 1. Minimum concentration–time product (CT) within a single 2-hour period for *Malus x domestica* fruit fumigated with methyl iodide.

Temperature	Minimum CT (g·h/m^3)	Minimum concentration (g/m^3)
15 °C or above	32.8	16.9

[36] **CT product**. The TPPT discussed the treatment parameters suggested and they are consistent with the experimental data. However further details on the methods used to generate the supporting data would be useful. For example the dose calculations are not described, and the calculation to determine the CT product is unclear.

[37] **Number of treated insects**. The number of insects treated in the confirmatory studies is estimated from the number in the untreated controls. Efficacy calculations may require additional data from the submitter to align with those used in other adopted treatments.

[38] **Applicability**. It was discussed that this fumigant is not widely used for fresh fruit and is not registered in many countries as already noted in the 2023 June TPPT meeting, when the proposal was first presented. The TPPT noted that it is used in Japan for grain disinfestation but not for fresh fruit yet, although there are plans to use it in the near future. The TPPT noted that although there are other treatments that have not been used before, since this treatment uses a chemical that would require registration in most countries to be legally used, this would make it not feasible for those countries. The TPPT felt that this treatment was a low priority, since the fumigant is not yet registered for use in fresh vegetables and fruit. The TPPT was informed that it was being reviewed for registration in Japan. The TPPT was not aware if the active ingredient was registered in any other countries for fresh commodities.

[39] **Ozone Secretariat**. The TPPT recommended to request information on the registration and use of methyl iodide fumigation for fresh commodities from the Ozone Secretariat

[40] **Information request from the submitter**. The submitter was requested to provide any update on registration status or information on the active ingredient being registered elsewhere for fresh commodities.

[41] The TPPT

(2) *recommended* to not progress further the draft PT on Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006) until the active ingredient is registered for fresh commodities and therefore recommend priority 3

[5] 08_TPPT_2023_Oct, 09_TPPT_2023_Oct, 42_TPPT_2023_Oct, 10_TPPT_2023_Oct, 2023-006

[6] Yukihiro Soma, Masakazu Takahashi, Michio Machida, Fusao Kawakami, Yoichi Ishiguri, Masaki Kato, Takashi Kawai, Kazutaka Omura, Makoto Saito, Yoshiaki Ozeki, Yusuke Hoshikawa and Koji Mishiro (2023) Quarantine Treatment by Methyl Iodide Fumigation to Apple Fruit Infested by the Peach Fruit Moth, Carposina sasakii. Res. Bull. Pl. Prot. Japan 30: pp. 47-56.

(3) *requested* the submitter to provide any update on registration status or information on the active ingredient being registered for fresh commodities

(4) *requested* information from the Ozone Secretariat on whether this active ingredient is registered for use in fresh commodities anywhere.

4.3 Irradiation treatment for *Aspidiotis destructor* (2021-029) – priority 1

[42] The Treatment Lead, Guoping ZHAN introduced the treatment leads summary, the references, the additional information provided by the submitter and the revised draft PT[7].

[43] The proposal was submitted by the USA in 2021, and the treatment was discussed in December 2021, where the TPPT agreed to recommend to add the topic to their work programme. The treatment schedule is proposed as a minimum absorbed dose of 150 Gy to prevent F_1 reproduction of *Aspidiotus destructor*, based on Follett 2006[8] with a 95% confidence that the treatment according to this schedule kills not less than 99.9897% of the target pest.

[44] The TPPT discussed the supporting data at their 2022 September meeting the TPPT requested further information from the submitter. The response from the submitter was presented at this meeting.

[45] **Response from the submitter**. The submitter provided a file with the confirmatory data. The submitter explained that the study was complicated by the fact that eggs and first instar nymphs reside under the scale and so confirmatory testing included both the adult stage (stage 4) and adult stage with eggs (Stage 5). The adult stage has invariably been determined to be the most tolerant stage for mealybugs and scales.

[46] **Efficacy**. The treatment lead noted that according to the raw data provided, a total of 28989 gravid females (reared on pumpkins) had been irradiated at the radiation dose of 100 and 150 Gy, respectively, and resulted in no F_1 generation gravid females. The treatment efficacy calculated is 99.9702% at the 95% confidence level. In table 4 of Follet, the number of treated adults with and without eggs (stage 4 and stage 5) is provided and could be combined both after the explanation provided by the submitter about these stages representing the most tolerant ones.

[47] The Treatment lead also reviewed the paper of Khan *et al*. (2016)[9] in order to establish the most resistant life stage and to possibly include a second treatment schedule into the draft PT and identified a number of issues that needed to be resolved.

[48] **Schedules.** The TPPT noted that there is some contradictory information between the Khan and the Follett studies since there are survivors in Khan's study at 150 Gy where there but none in Follett's. Possibly because Khan used wild populations. The TPPT noted however that the endpoint is different for the 2 treatments, the Follett treatment being the prevention of F1 generation, as the crawlers and gravid females treated still survived but do not lay eggs. The TPPT agreed to suggest the 150 Gy with the endpoint of the prevention of F1 gravid females according to the Follet paper and 224 Gy (highest measured dose in the Khan paper) for prevention of F1 instars, noting however that these are both remote endpoints and may result in the inspection finding live, non-viable insects.

[49] **Calculation of the number of treated insects**. It was clarified that Follett provided estimates based on grid counts, the TPPT felt this was appropriate after having seen the information provided by the submitter. The number of treated insects in the study of Khan were also estimated based on grid counts.

[7] 21_TPPT_2023_Oct, 22_TPPT_2023_Oct, 41_TPPT_2023_Oct, 43_TPPT_2023_Oct, 20_TPPT_2023_Oct, 2021-029

[8] Follett, P. A. 2006. Irradiation as a phytosanitary treatment for *Aspidiotis destructor* (Homoptera: Diaspididae). Journal of Economic Entomology 99 (1): 1138-1142.

[9] Khan, I., Salahuddin, B. and Rahman H. U. 2016. Mortality and growth inhibition of γ-irradiated Aspidiotus destructor (Hemiptera: Diaspididae) on mango (Sapindales: Anacardiaceae) plantlets. Florida Entomologist, 99(Special Issue 2): 125-129.

[50] **Most tolerant life stage**. The TPPT noted that Khan paper adequately addresses the establishment of the most tolerant stage question.

[51] **Draft PT.** The TPPT proceeded to revise the draft and included both schedules into the PT. The efficacy is calculated including counts of stage 4 and 5 as well, and thus established as 99.9897 % for the 150 Gy schedule based on the estimated number of and data provided by the submitter. The efficacy of the schedule based on the Khan paper was established as 99.9941% based on estimated number of 42005 treated insects.

[52] **Gravid female**. The TPPT agreed to use the wording “gravid female” in the draft PT to include both 4th and 5th stages.

[53] **Control mortality**. The control mortality should be calculated in the context of the treated life stage and the life stage of the insect at the endpoint of the treatment (to account for natural mortality). The TPPT discussed how to calculate it, since the mortality rate is provided for the egg stage, and the correction should be applied to the gravid females of the previous generation. This has raised the issue of how to consistently apply Abbot’s formula in such cases.

[54] After a lengthy discussion continued throughout subsequent virtual meetings, the TPPT concluded that when the percentage of control mortality is small (for example below 5 %) the correction would not significantly change the efficacy and, therefore, could be remitted. However, in such cases, the control mortality should be stated in the treatment schedule, also specifying which life stage it refers to.

[55] **Further information needed.** Regarding schedule 1, the TPPT noted that the control mortality in the Follett 2006 paper in one of the confirmatory trials (Table 7) was 84 %, and this requires explanation.

[56] The TPPT noted that the control mortality in the paper of Khan at al. (2016) was not clearly addressed and decided to request information regarding the control mortality, which life stage it refers to and whether the endpoint of the treatment is the prevention of the F1 generation (egg laying) or egg hatch.

[57] Consequently the TPPT did not agree to recommend the PT to the SC for approval for consultation at this point, they decided to request further information from the authors Khan and Follett to clarify the issue with the control mortality and the endpoint (Khan) and continue developing this draft at a later meeting.

[58] The TPPT:

(1) *recommended* priority 1 to the Standards Committee (SC) for the draft PT Irradiation treatment for *Aspidiotis destructor* (2021-029)

(2) *requested* the treatment lead to follow up with Khan to clarify the concerns around control mortality and the endpoint before progressing the treatment further

4.4 Submission: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)

[59] The Treatment Lead, Mr Scott MYER introduced the submission form, the references provided, the checklist and draft PT [10].

[60] The “Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)” was submitted by China in September 2023. The proposed treatment schedule is a minimum exposure time for 15 days to 1% or less O2 (with N2 balance) atmosphere after irradiation at the minimum absorbed dose of 200 Gy. There is 95% confidence that the treatment according to this

[10] 16_TPPT_2023_Oct, 17_TPPT_2023_Oct, 18_TPPT_2023_Oct, 19_TPPT_2023_Oct, 50_TPPT_2023_Oct, 35_TPPT_2023_Oct, 2023-032

schedule kills not less than 99.9973% of all stages of *Trogoderma granarium*. The schedule is based on Mansour 2016, Zhao *et al*. 2012, and Gao *et al*. 2004[11].

[61] **Reference**. The TPPT discussed that Zhao *et.al* (2021) is the main reference documenting the study that produced the suggested treatment schedule. A related publication by Mansour (2016) provides information on a previous study to develop a phytosanitary irradiation treatment for *T. granarium* using a different endpoint. The most tolerant stage testing did not include egg or diapausing larva stages. Control data is not provided for the most tolerant stage testing, but it is given for the confirmatory trials.

[62] **Diapausing larvae.** The TPPT discussed the diapausing stage, and why it was not investigated. They noted that diapausing can be triggered by low or high temperature, overcrowding etc. The potential that diapausing larvae could survive is possible, and it would result in live pests in consignments (potentially surviving for a long time).

[63] The TPPT agreed that it is anticipated that the treated commodity would not include stressed (diapause inducing factors) larvae, and it is anticipated that even diapausing larvae would return from diapause when treated at 24-26 C as suggested here. Availability of food usually draws out the pest from the diapausing state (e.g., in a grain consignment) and it would result in susceptibility of the pest to the treatment. The TPPT agreed to add some restrictions around the environmental conditions and the food source to exclude the presence of diapausing lave.

[64] **Most tolerant life stage**. The TPPT discussed figure 1 of Zhao *et al*. 2022 and noted that since the control data is missing, it is hard to assess if the adult stage is the most tolerant. The TPPT discussed that the first irradiation is probably to prevent the reproduction of adults, and MA is supposed to kill larvae. The adults will die soon anyways, the survival strategy of the pest being fast reproduction cycles. The Gao *et al* 2004. reference addresses the issue of diapausing larvae, as it establishes that diapausing larvae are similarly sensitive to irradiation as not diapausing larvae.

[65] If diapausing larvae are excluded, and the endpoint is mortality, larvae are the most tolerant (Figure 7 in Zhao et al 2021). The confirmatory trial's results are in Table 5 where the number of treated insects are recorded, they are actual counts.

[66] It is noted the efficacy is established based on the publication and the numbers include both the 14 and 15 day treatments and are corrected for control mortality. The TPPT noted that if a separate schedule for the 14 day and 15 day treatment was to be established, then the efficacy number would need to be readjusted.

[67] **Dose.** The TPPT discussed that the confirmatory trial was conducted on late stage larvae. There was 1 survivor, following irradiation and 13 days of modified atmosphere treatment, but after 15 days there were no survivors. One member noted that according to his experience, although the irradiation dose could not be raised further without damaging the product, 100 Gy already prevents reproduction. 200 Gy is normally allowed for stored products (grain etc). Irradiation cuts the necessary MA time to half (15 day). He also noted that Australia uses a similar schedule, but the efficacy data is not available publicly.

[11] Zhao Q.Y., Li T.X., Song Z.J., Sun T., Liu B., Han X., Li Z.H., & Zhan G.P. 2021. Combination of Modified Atmosphere and Irradiation for the Phytosanitary Disinfestation of Trogoderma granarium Everts (Coleoptera: Dermestidae). Insects. 12: 442. Doi.: /10.3390/insects12050442

Mansour, M. 2016. Irradiation as a phytosanitary treatment against Trogoderma granarium (Coleoptera: Dermestidae). Florida Entomologist. 99: 138-142.

Irradiation as a phytosanitary treatment for Trogoderma granarium Everts and Callosobruchus chinensis l. In food and agricultural products MEIXU GAO, CHUANYAO WANG, SHURONG LI, SHENGFANG ZHANG (2004) in Irradiation as a phytosanitary treatment of food and agricultural commodities. Proceedings of a final research coordination meeting (No. IAEA-TECDOC--1427). Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture.

[68] **MB use**. The TPPT noted that the reduction of methyl bromide use would be an advantage.

[69] **Colony fitness**. One member noted that the insects treated in the study were not fed for the duration of the treatment however it was clarified that this pest can survive long periods with food being absent and these stressed populations would not have decreased tolerance to the treatment (in fact the opposite).

[70] **Experimental conditions**. The MA treatment was conducted by reestablishing the low oxygen conditions every 2 days, but the oxygen levels were not monitored during the treatment. However worse case scenario is that the low oxygen conditions weren't fulfilled, and the treatment, if applied, would be more efficacious.

[71] **Draft PT**. The title was changed to reflect the order which the treatment would be applied. The TPPT suggested to maintain "combination" in the title as opposed to PT 42 where the heat and the modified atmosphere is applied at the same time, as opposed to here where it is sequential.

[72] **Commodity**. The TPPT agreed to use the term "stored products" in the scope as defined in ISPM 5 to include grain, dried fruit, and legumes and thus include the "extrapolation section".

[73] **Schedule**. The TPPT agreed to specify that the MA treatment should be conducted in a continuous manner for 15 continuous day.

[74] **Efficacy.** Since the number of treated insects were established based on direct counts and were adjusted for control mortality according to Abbots, the efficacy was calculated based on 111 366 larvae of *Trogoderma*. The TPPT discussed that the control mortality is minor, but it is given as a range, so the TPPT selected the mean of the range as 2.51 and calculated the control survival as 97.49% based on that.

[75] **Reference**. They added the reference relating to efficacy of irradiation to the diapausing larvae. Gao at al 2004.

[76] The TPPT:

(3) *recommended* the approval of the draft PT Combination of Irradiation and Modified Atmosphere Treatment for *Trogoderma granarium* (2023-032) to the Standards Committee (SC) for consultation with priority 1.

4.5 Submission: Irradiation treatment for *Pseudococcus baliteus* (2023-033)

[77] The Treatment Lead, Mr Michael ORMSBY introduced the submission form, the references provided, the checklist and draft PT [12].

[78] The "Irradiation treatment for *Pseudococcus baliteus* (2021-033)" was submitted by China in September 2023. The proposed treatment schedule for *Pseudococcus baliteus* is a minimum absorbed dose of 183 Gy to prevent development to the second-instar nymph of progeny from mature adults of *Pseudococcus baliteus*. There is 95% confidence that the treatment according to this schedule prevents development to the second-instar nymph stage from not less than 99.9937% of mature adults of *Pseudococcus baliteus*. The schedule is supported by Zhao (2023)[13].

[79] The treatment lead explained that the proposed schedule is developed as part of the IAEA CRP that works on supporting a generic treatment of Pseucococcidae, which is on the workporgramme for 250 Gy. The insects were raised on pumpkins, and the females were directly counted. The male has 6 life stages, the female has 5 life stages. The most tolerant stage is the gravid female. One member queried

[12] 23_TPPT_2023_Oct, 25_TPPT_2023_Oct, 26_TPPT_2023_Oct, 24_TPPT_2023_Oct, 2023-033

[13] Zhao Q.Y., Ma F.H., Deng, W., Li Z.H., Song Z.J., Ma C., Ren Y.L., Du X., Zhan G.P. 2023. Phytosanitary treatment of the aerial root mealybug, Pseudococcus baliteus (Hemiptera: Pseudococcidae) using gamma and X-ray irradiation. Journal of Economic Entomology, accepted..

how were they identified in the study and distinguished from younger females. It was explained that the population age would determine that the females would be gravid with eggs at the time of the treatment (35 days). It is not possible to establish how many of the gravid ones were at a late stage. The TPPT discussed how the females were counted in the confirmatory trials one by one. The publication uses the word "estimated" but it was established that this refers to the gravid females age (late stage), not the number of them treated (Zhao et al 2023 – Large scale confirmatory trials section of the paper).

[80] The TPPT reviewed the draft PT.

[81] **Endpoint.** Conservatively suggested in the submission, that the treated females may lay eggs but they will not hatch. The TPPT discussed how to define that in the draft PT and discussed whether prevention of egg hatch or development to F1 nymphs is the right definition. They decided that the prevention of egg hatch is easier to understand.

[82] The efficacy was calculated based on 47316 females treated (based on Zhao et al 2023, Table 4) at 99.9937 %

[83] **Control mortality**. Control mortality is 1.82 %, therefore the TPPT discussed correcting the reported number of treated insects based on Abbot's formula. The 1.82 % is calculated based on the eggs not hatching in the control, and thus the percentage is felt to be reflective of the infertile eggs that would have not hatched even if not treated. It was noted that the efficacy is calculated based on the number of treated females (not eggs). It was clarified that the mortality of females in the control could not be measured as it is hard to determine. The TPPT discussed whether using the mortality of the egg stage can be directly used to adjust the number of females for control mortality. As no consensus could be found, the TPPT ultimately decided that since the control mortality is very low, they will not adjust the numbers with Abbott's formula in this case.

[84] **Target regulated article**. The TPPT agreed to extrapolate the treatment to "all host", not specifying vegetables or ornamental plants, since this is also a surface pest.

[85] **Modified atmosphere**. The TPPT discussed the criteria to not use MA when irradiation is for a non Tephritid species. One members argued that the MA reduces irradiation efficacy but only at sublethal levels and not at doses used in phytosanitary treatments. The TPPT had a discussion reported under "Other business" section of this report, and agreed to keep the criteria for the time being.

[86] The TPPT revised and agreed to the PT, and decided to recommend the draft PT Irradiation treatment for *Pseudococcus baliteus* (2023-033) to the Standards Committee (SC) for approval for consultation with priority 1.

[87] The TPPT:

(4) *recommended* the draft PT Irradiation treatment for *Pseudococcus baliteus* (2023-033) to the Standards Committee (SC) for consultation with priority 1.

4.6 Submission: Irradiation treatment for *Paracoccus marginatus* (2023-034)

[88] The Treatment Lead, Ms Meghan NOSEWORTHY, introduced the submission form, the references provided, the checklist and draft PT [14].

[89] The "Irradiation treatment for *Paracoccus marginatus* (2023-034)" was submitted by China in September 2023. Minimum absorbed dose of 185 Gy is proposed to prevent development to the second-instar nymph of progeny from mature adults of *Paracoccus marginatus*. There is 95% confidence that the treatment according to this schedule prevents development to the second-instar nymph stage from not less than 99.9950% of mature adults of *Paracoccus marginatus*. The proposal is based on Seth *at al.*

[14] 28_TPPT_2023_Oct, 29_TPPT_2023_Oct, 30_TPPT_2023_Oct, 31_TPPT_2023_Oct, 2023-034

2016 and Song *et al* 2023[15]. Seth *et al.* (2016) provides data on the most tolerant life stage, sterility and metamorphic arrest for larval and adult life stages, treating 60368 gravid females. Song *et al.* 2023 provides additional information.

[90] The treatment lead explained that in the trial, the target pest is reared on potatoes, females have 3 instar life stages, males have 4 instars and a pupal stage, gravid females live 16-25 days, on average, females lay 255 eggs. The experiment is done on the gravid females, infesting potatoes, and removing the parents later, rearing the rest of the population until there were gravid females. Potatoes were put in small boxes, treated one by one (considered replicates) and 10 % was kept as control. Post treatment the females were given new potatoes, for any potential new generation. The unhatched eggs were directly counted, not estimated.

[91] **Draft PT**. The TPPT review draft PT and modified the text to align it with the agreed text in agenda item 4.5. The TPPT agreed to use generic terms for the host commodity: "all hosts" and included the numbers used for the calculation as 60368 gravid females treated, with no egg hatch. They agreed not to adjust for control mortality as it is relatively low, but to state it in the text of the PT: the control egg hatch was 96.96% in all confirmatory trials conducted.

[92] **Target life stage**. The TPPT decided to use "gravid female" instead of "adult female" in the text in this and the PT under agenda item 4.5 as well.

[93] The TPPT revised and agreed to recommend the draft PT Irradiation treatment for *Paracoccus marginatus* (2023-034) to the Standards Committee (SC) for approval for consultation with priority 1.

[94] The TPPT:

(5) *recommended* the draft PT Irradiation treatment for *Paracoccus marginatus* (2023-034) to the Standards Committee (SC) for approval for consultation with priority 1.

4.7 Submission: Irradiation treatment for *Planococcus lilacinus* (2023-035)

[95] The Treatment Lead, Takashi KAWAI, the submission form, the references provided, the checklist and draft PT[16].

[96] **Proposal.** All fruit and vegetables that are hosts of *Planococcus lilacinus* was suggested in this submission with treatment protocols as minimum absorbed dose of 163 Gy to prevent development to the second-instar nymph of progeny from mature adult females. The PT is based on the study of Ma et al 2022[17].

[97] **PT 19**. This PT addresses the same target species at a different dose, and this could be recommended either as a revision to PT 19 or as a standalone submission. The lead proposes both new PT development and revision of PT 19 (remove *Planococcus lilacinus* from the 3 species). The reason is that there is no detailed reproduction data of mature adult females of *Planococcus lilacinus* irradiated in Doan *et al*. (2016), although PT 19 is developed based on the reference for *Dysmicoccus neobrevipes* since this species is the most tolerant to irradiation among the three species.

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[15] Song Z.J., Zhao Q.Y., Ma C., Chen, R.R., Ma T.B., Li Z.H., Zhan G.P. 2023. Quarantine disinfestation of papaya mealybug, Paracoccus marginatus (Hemiptera: Pseudococcidae) using Gamma and X-rays irradiation. Insects, 14, 682. https://doi.org/10.3390/insects14080682.

Seth, R., Zarin, M., Khan, Z., Seth, R.K. 2016 Towards phytosanitary irradiation of Paracoccus marginatus (Hemiptera: Pseudococcidae): ascertaining the radiosensitivities of all life stages. Florida Entomologist. 2016, 99 (special issue 2), 88-101.

[16] 32_TPPT_2023_Oct, 27_TPPT_2023_Oct, 49_TPPT_2023_Oct, 33_TPPT_2023_Oct, 2023-035

[17] Ma, C., Liu, H., Liu, B., Zhao J.P., Zhao, Q.Y., Song, Z.J., Han, X., Zhan, G.P. 2022. Gamma and X-ray irradiation as a phytosanitary treatment against various stages of Planococcus lilacinus (Hemiptera: Pseudococcidae). Journal of Asia-Pacific Entomology, 25(4):102009.

[98] **New PT**. The TPPT discussed adding this treatment to PT 19 but agreed that since the endpoint of the new proposal would be different, they prefer to establish a new schedule for the different endpoint.

[99] **Endpoint**. The new proposal is suggesting a less stringent endpoint, than ISPM 19, the irradiated females would lay eggs, and first instars would be born (this species are viviparous, they do not produce eggs, it gives birth to live first instar larvae) that is then prevented from moulting into second instar. The endpoint was chosen as the prevention of second instar stage. It was clarified that the second instar already fixes on the host and is not mobile anymore. The researchers observed that the development stopped at the "crawler" stage, and the new pumpkins provided for feeding weren't infested with the second instars.

[100] **Efficacy**. The calculation was based on direct counts of 97384 treated insect and set as 99.9969%

[101] **Control**. Since the crawlers from this study could not be counted in the controls, there are no controls to adjust for. However, controls were set up to ensure that the population was healthy. Considering that this is a fast-reproducing species and although no counts were made the control is felt to adequately fulfils its purpose to ensures that the population was healthy, and the TPPT agreed to forego the adjustment with the control mortality.

[102] **Revision**: The TPPT agreed to go ahead with the new treatment, however they noted that the endpoint of PT 19 needs to be revisited at a later meeting, and the supporting information reviewed in order to determine if revision or the removal of the schedule for the same pest was necessary.

[103] **Draft PT**. The TPPT reviewed and adjusted the draft PT to reflect the changes applied to the other similar PTs.

[104] The TPPT:

(6) *recommended* priority 1 and the approval of the draft PT Irradiation treatment for *Planococcus lilacinus* (2023-035) for consultation to the Standards Committee (SC)

(7) *recommended* that the endpoint of PT 19 needs to be revisited, and the supporting information reviewed in order to determine if revision or the removal of the schedule for the same pest was necessary – once the new PT is approved.

4.8 From first consultation: Vapour heat treatment for *Planococcus lilacinus* (2021-028)

[105] The Treatment Lead, Michael ORMSBY introduced the responses to the consultation comments, and the draft PT[18].

[106] **Temperature treatments.** One comment suggested to incorporate a reference to the requirements for temperature treatments (ISPM 42) that was missing. The TPPT noted that it was not adopted yet when the PT was drafted but agreed to include it now. The comment also requested to discuss instructions on monitoring the temperature in the PT, but the TPPT felt that those don't need to be incorporated into the PT, as they are addressed in ISPM 42.

[107] **Host commodity.** Some comments noted that the scope should be limited to dragon fruit since the research is done on dragon fruit but the TPPT argued that since this is a surface pest the scope could be extended to all hosts and as long as the schedule is met, it should be efficacious.

[108] **Preheating**. One comment asked clarification about the criteria to reach room temperature. The TPPT noted that it was ambiguous to require the fruit to reach room temperature before the treatment, as it is just useful information but not a requirement as the condensation may affect fruit quality. The TPPT agreed to move the information to the "other relevant information" section.

[18] 36_TPPT_2023_Oct, 2021-028

[109] **RH**. One comment noted that the requirement of 95 % relative humidity (RH) is not mentioned in the publication Ren et al 2021. The TPPT noted that this information was provided by the submitter upon the information request of the TPPT (document 6 and 12 of the 2022 September TPPT meeting).

[110] **Surface temperature measuring**. One comment noted the lack of instructions regarding measuring the surface temperature, but instructions on application are outside the scope of the PTs.

[111] **Colony age**. The comment suggested that normally no older than 3 generations are acceptable for lab colonies for temperature treatments, as tolerance could develop. They also noted that there is no information about how many mealybugs actually attached to the fruit in the experiment. Adults normally don't colonize new fruit, they are fixed to a fruit after the second instar stage, so the TPPT agreed to ask for clarification from the submitter regarding the infestation method and how the transferred adults would have been attached to the new dragon fruit hosts within 4-6 hours.

[112] **Age of females**. The most resistant stage is the gravid female and that stage is reached after 27-32 days, that was not the case for the experiment. The study tested 26 day old life stages when testing for the most tolerant stage, and may have missed out the females with eggs. Last year the TPPT also discussed this, and the response was that all life stages were present. The TPPT noted that the eggs hatch inside the females and eggs are rarely produced. The TPPT discussed whether treating the colony, including adults and the eggs inside them would be sufficient. The TPPT concluded that if the colony reproduced and was treated as a whole, that is sufficient, as it reflects the natural conditions.

[113] **Most tolerant life stage.** Further to the previous comment, the TPPT noted another comment that queried whether eggs were treated. It was clarified that the species is mostly viviparous and the response will be developed to this question after the previous issue about the establishment of the most tolerant stages and the gravid females being included in the test is resolved. The comment also queried about the number of insects tested in the life stage tolerance tests, but the TPPT clarified that they were 300 mealybugs in each replicate according to Ren *at al* 2021[19].

[114] **Efficacy.** One comment queried about the numbers to establish the efficacy, The TPPT agreed to explain that table 5 of Rent at al 2021 was the source of the information, however the raw data was not provided.

[115] The TPPT decided to wait until the issue is reviewed and the background information is provided and discuss again the PT regarding the issue of the colony age and the age of the females treated in the life stage testing.

[116] The TPPT

(8) *requested* the Treatment Lead to follow up with the submitter and request clarification regarding

a. the infestation method and how the transferred adults would have been attached to the new dragon fruit hosts within 4-6 hours.

b. the colony age

c. the age of the females treated in the life stage testing.

4.9 From second consultation: Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029)

[117] The Treatment Lead, Peter LEACH introduced the responses to the consultation comments, the draft PT and a reference[20].

[19] Ren, L., Qian, L., Xue, M., Peng, C., Chen, N., Zhan, G. & Liu, B. 2021. Vapor heat treatment against Planococcus lilacinus Cockerell (Hemiptera: Pseudococcidae) on dragon fruit. Pest Management Science, 78: 150–158. https://doi.org/10.1002/ps.6616

[20] 37_TPPT_2023_Oct, 2017-029, 45_TPPT_2023_Oct

[118] The TPPT discussed the consultation comments.

[119] One comment suggested that there were interceptions when stricter requirements than this treatment were used, but there are no data or evidence that the TPPT could review to determine if the interceptions were the result of treatment failure or the schedule failed. A similar comment was submitted last year. The TPPT agreed to suggest that in order to consider the comments provided it is important that data sets are provided for evaluation. They also emphasized the response provided in the first round of consultation on this issue: "The TPPT recognises that operational issues that do not conform with the parameters of the treatment may result in occasional survivors and corrective actions addressing this issue should be included in bilateral negotiations. The decision to use this treatment schedule as a standalone treatment or as part of a systems approach is a decision for National Plant Protection Organisations involved in bilateral negotiations. The reference to Myburgh (1965) where a small percentage (0.03%) of *T. leucotreta* larvae could survive 1.11 °C for 21 days was addressed in Moore et al. (2016) which stated that "Although the cold treatment may not have been sufficient to kill all larvae, the risk mitigation provided by the treatment was ultimately the same as that for a treatment which killed all larvae". Myburgh (1965) observed that most of the larvae in orange showing life after exposure to low temperatures, providing incomplete cold sterilisation were unable to pupate or developing to moths. While Moore et al. (2016) using a dose of 2°C for 18 days recorded a small number of moths (2 males and two females) which were paired but no mating was observed, and no eggs were laid. In conclusion they noted that NPPOs may determine how to use this treatment (e.g. in a systems approach) or to not use it at all if it does not confirm with their ALOP.

[120] Another comment suggested that the treatment is not practical, because the commercial applicators will set the temperature 0,5 C lower than the treatment temperature, and this may cause damage in the commodity, but the TPPT noted that an even more stringent (colder) treatment is used commercially with longer duration. The TPPT agreed to reply, that while this treatment may not be appropriate for all cultivars, this treatment will provide an option for higher temperatures and shorter treatment times for NPPOs to choose from.

[121] One comment suggested not to use the Hallman and Mangan 1997 reference and the TPPT noted that the reference is about the resistance lab colonies develop to cold treatment after a while. It is used in all other PTs for cold treatments, and the TPPT discussed if it is really relevant in this case and decided to keep it in. The comment didn't provide an explanation on what was the suggestion to do with the reference, so the TPPT was unable to interpret it.

[122] Other comments noted that Moore *et al* 2022[21] should be referenced regarding the comparison of tolerance of larvae reared in diet and in fruit. This publication was not yet released when the TPPT initially drafted the PT, but the submitter provided the raw data based on which this publication was later released. The TPPT agreed to add it as an additional new reference, since this is easier to access then the raw data provided by the submitter.

[123] Another comment noted that the number of treated insects in Morre 2017 are already corrected for control mortality. The numbers are direct counts, and in the PT it is corrected again. The comment suggested to use the full number again, and not reduce it twice with the control mortality. The TPPT agreed and incorporated the comment for both schedules. The TPPT discussed whether to use overall or average for control mortality and agreed to use overall.

[124] **Draft PT.** The TPPT reviewed the draft PT and adjusted it according to the consultation comments.

[21] Moore S.D., Peyper M., Kirkman W., Marsberg T., Albertyn S., Stephen P.R., Thackeray S.R., Grout T.G., Sharp G., Sutton G., & Hattingh V. 2022. Efficacy of Various Low Temperature and Exposure Time Combinations for *Thaumatotibia leucotreta* (Meyrick) (Lepidoptera: Tortricidae) Larvae. Journal of Economic Entomology, 115(4): 1115–1128

[125] One comment suggested to change the title from “on citrus sinensis” to “in citrus sinensis” as the pest is an internal feeder, however the TPPT noted that other PTs were using “on” irrespective of whether it is an internal feeder or surface pest and therefore did not agree to the change.

[126] The TPPT switched around the schedules as requested by a consultation comment to have the lower temperature first.

[127] They also recalculated the efficacy based on the new total number of treated insects after the correction of control mortality was removed as suggested by the consultation comment indicating that the numbers were already corrected.

[128] **Artificial diet**. The TPPT discussed again how to include the new Mayburgh 2022 reference and noted that the study reanalysed all the old data to compare cold tolerance of the larvae in diet and fruit, and noted that the study indeed confirms that although there are differences in cold tolerance at LD50, the difference disappears at LD 90 and at LD 99 the larvae reared in diet is slightly more tolerant, thus the experiment conducted on larvae is a conservative indication of the efficacy of the treatment in fruit.

[129] The TPPT:

(9) *recommended* the approval of the responses to the consultation comments and the draft PT Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029) to the Standards Committee (SC) for approval and adoption by CPM.

5. Updates from IPPC bodies: CPM-14 and Standards Committee

[130] The Steward of the TPPT and the Secretariat updated the TPPT on the recent issues discussed in the Standards Committee meetings and at CPM-17 (2023).

5.1 TPPT’s role in developing commodity standards, including the use of historical datasets to establish efficacy.

[131] The Steward of the panel explained that commodity standards are now being sent for consultation, and they include phytosanitary treatments as well. Some members of the TPPT noted that some of the treatments listed were not in use and had not been for many years while others had been missed. The TPPT agreed to offer support to review draft standards before being sent out for country consultation and, thereafter regarding the phytosanitary treatments and any treatment related issues arising from the new submissions for commodity standards.

5.2 Discussion on the generic treatments impacting existing PTs: PT 1-3 possibly superseded by PT 39

[132] The TPPT discussed revoking PTs 1-3, as they are for fruit flies covered by the generic treatment in PT 39[22].

[133] They agreed that the irradiation treatment schedule currently published for *Anastrepha serpentina* at 100 Gy under PT 3 would be reviewed in context with the 70 Gy dose proposed for all *Anastrepha* (since adopted as PT 39).

Table 1. PTs that include irradiation of *Anastrepha*.

Phytosanitary treatment	Target pest	Dose	Efficacy
PT 1	Anastrepha ludens	70 Gy	99.9968%
PT 2	A. obliqua	70 Gy	99.9968%
PT 3	A. serpentina	100 Gy	99.9972%

[22] 15_TPPT_2023_Oct

PT 39	Genus Anastrepha	70 Gy	99.9968%

[134] The TPPT recalled that a large-scale confirmatory trial at 100 Gy with *A. serpentina* supported a dose of 100 Gy for that insect, because no lower dose was tested. One study showed that *A. serpentina* was no more radiotolerant than *A. ludens*, thus, a dose of 70 Gy could be supported for the former.

[135] The TPPT noted that PT 3 has a higher efficacy then the other treatments (PT 1, 2 and 39). The TPPT considered whether to keep it for this reason, however they there is also remit in revoking PT 3 since it may be confusing that it recommends a higher dose for *Anastrepha serpentina* then the generic dose. They agreed that they will follow up and review the supporting data of PT 3 at a later meeting before making a final decision.

[136] The TPPT agreed to recommend to revoke PTs 1 and 2 to the SC and discuss this further while Scott MYERS will review PT 3. TPPT will make the decision after reviewing the supporting information.

[137] The TPPT

(10) *agreed* to propose to the SC to revoke PT 1 and 2

(11) *agreed* to consider further PT 3 at a later meeting, once the supporting data for PT 3 is available

5.3 Efficacy calculation method

[138] Mr Michael ORMSBY presented the background document, the efficacy calculations for adopted PTs and the review of TPPT working procedures[23]. As agreed at the last face to face meeting, he developed a proposal to the SC on the revised calculation method and prepared a table with how the new calculation would change the efficacy of the adopted PTs as follows.

[139] The paper presents 3 formulas potentially used, and the TPPT agreed with the formula 3 can be used for all examples when the treatment numbers are estimated from the controls:

[140] $$\bar{\mathbf{x}}_t = \bar{\mathbf{x}}_c - \left(\frac{\mathbf{STD}}{\sqrt{r}} \times t_{r-1(0.05)}\right) \qquad \mathbf{(3)}$$

[141] It was noted that the new formula would "reward" doing more replicates, and would lower the efficacy for less replicates. One member noted that for example if after initial testing, the volume of tested fruit was increased, the formula would treat that as variation in the replicates and lower the efficacy.

[142] This formula is applicable to data with normal distribution. [24] When data is non-normal distribution, the submitter may propose another method as long as they give justification.

[143] **Procedure manual**. The TPPT agreed to change the procedures in the procedure manual as demonstrated in document 14, pending the publication of the paper underpinning the calculation method (Wright *et.al* 2024).

[144] **Adopted PTs**. Of the 45 phytosanitary treatments adopted to date, 22 had their treated numbers estimated from control data. Of the 22 that were estimated from controls, three were estimated from non-grouped replicates using the new formula. Of the remaining 19 phytosanitary treatments that were estimated from grouped control data, 25 schedule calculations resulted in decreased estimations of treated numbers and 11 in increases. This resulted in 17 phytosanitary treatments that had reduced efficacy levels, 8 that did not change, and 11 that increased.

[145] The TPPT discussed how to handle the changes in adopted PTs if recalculated based on the new method. However, they felt that the changes to the efficacy would be minor, and the benefit this may mean does not correspond with the resources needed for such revision. Therefore they recommended not to

[23] 21_TPPT_2019_Jun

[24] Pek J., Wong A.C.M., Wong O.C.Y. (2017). Confidence Intervals for the Mean of Non-Normal Distribution: Transform or Not to Transform. *Open Journal of Statistics* 7, 405-421. doi: 10.4236/ojs.2017.73029.

recalculate treatment efficacies for the adopted PTs but to use the new formula after its publication for future PTs.

[146] The TPPT

(12) *invited* the Standard Committee (SC) to note the changes to the working procedures to the TPPT (in May pending on the publication)

(13) recommend not to recalculate the treatment efficacy based on the new calculation of the adopted PTs as they would not result in major change

5.4 African phytosanitary Programme

[147] The TPPT was updated on the recent developments regarding the African Phytosanitary Programme. The TPPT welcomed the update and offered their expertise if needed in this regard, noting the SC's permission was needed.

6. Liaison

6.1 Phytosanitary Measures Research Group (PMRG) [25]

[148] The previous chairperson of the PMRG, Mr Peter LEACH is a member of the TPPT and other members are also participating in PMRG meetings. Mr Scott MYERS, the new Chair of the PMRG reminded the TPPT that the research group was created to support the work of the TPPT, and that it submits a report to the CPM each year summarizing their activities.

[149] He updated the TPPT, that the PMRG is working on research guidelines for different treatment types. The fumigation guidelines are almost ready, and they are proposing to revise and include all guidelines in one document. The PMRG chair explained that the PMRG was not able to meet since the covid pandemic started and some of the activities have been stalled.

[150] One member noted that the IAEA CRP uses the research guidelines documents, and they find them to be very useful in improving the treatment submissions. The guidelines are posted on the website of the PMRG on the IPPC website.

[151] The TPPT:

(14) *noted* the update of the PMRG activities and acknowledged the importance of this group to the work of the TPPT

(15) *welcomed* that the PMRG will continue to develop guidelines on treatment research.

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

[152] The TPPT noted that the Memorandum of Understanding between the Ozone Secretariat and the IPPC Secretariat has expired, however they agreed that maintaining connection with the Ozone Secretariat and the MBTOC would be useful, as reducing the use of methyl bromide is still one of the CPM recommendations.

[153] They have posed a question to the MBTOC (details under agenda item 4.2).

[154] The TPPT:

(16) *noted* the update regarding the Ozone Secretariat and the Methyl Bromide Technical Options Committee (MBTOC)

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

6.3 International Forestry Quarantine Research Group (IFQRG)

[155] The chairperson of the IFQRG, Mr Michael ORMSBY is a member of the TPPT and other members are also participating in IFQRG meetings. The IFQRG also submits a report to the CPM each year summarizing their activities.'

[156] The IFQRG was organizing the symposium virtually this year again. The meeting will include updates from the IPPC Secretariat,

[157] The TPPT:

(17) *noted* the update of the Forestry Quarantine Research Group (IFQRG)

6.4 Update on IC Subgroup on ISPM 15 guide

[158] The TPPT was updated regarding the development of the ISPM 15 guide, and noted that the attached manuals for treatment application will be sent to them for review.

7. Overview of the TPPT Work Programme

[159] The Secretariat provided an overview of the Standard setting process and introduced the summary of the TPPT work programme (see also *List of topics for IPPC standards*[26]).

7.1 General overview, SWOT analysis and next steps

[160] The Secretariat introduced the background document[27] and the TPPT was invited to analyse their work with the SWOT method and identify their strength, weaknesses, opportunities and threats and come up with recommendations on how to improve their work.

[161] The TPPT developed the following Table:

[162]

SWOT	Positive / Helpful aspects to achieve the goal	Negative / Harmful / Risks to achieve the goal
INTERNAL Origin facts/ factors of the TPPT	**Strengths** - Consistency and expertise in membership accumulated over a long time - Broad participation and dedicated members - Strong technical expertise - Helpful to have consistent secretariat support with appropriate expertise and continuity	**Weaknesses** - Challenges in accessing information on specific pest groups - Succession planning (members)
EXTERNAL Origin facts/ factors of the environment in which the TPPT operates	**Opportunities** – to accumulate expertise on new areas - New experts with new areas of expertise - To utilize the expertise to support other IPPC panels	**Threats** - Loss of expertise because of funding issues - Lack of quality submission

[26] *List of topics for IPPC standards*: https://www.ippc.int/en/core-activities/standards-setting/list-topics-ippc-standards/list

[27] 34_TPPT_2023_Oct

7.2 Status of Phytosanitary Treatments (PTs) and draft ISPMs under the TPPT work programme

[163] The TPPT reviewed the status of PTs and draft ISPMs under their work programme.[28]

7.3 TPPT 2023-2024 work plan

[164] The TPPT reviewed and noted the 2023-2024 work plan. [29]

8. Recommendations to the SC

[165] The decisions in this report summarize the TPPT recommendations to the SC from this meeting.

9. Other Business

9.1 Modified atmosphere restriction

[166] The TPPT decided to revisit the Modified atmosphere restriction statement since it was felt that there is not enough evidence to support the inclusion of the statement for all insects. The TPPT recalled that the restriction was removed for Tephritid fruit flies already, however they noted that Table 2 of paper 47 (Follet and Neven 2020) demonstrates that there is a difference in tolerance of *Ostrinia nubilalis* when it is exposed to modified atmospheres before irradiation treatment.

[167] Some members noted that in laboratory conditions, oxygen levels are very low, in commercial conditions the oxygen content of the atmosphere is lowered much less. There is evidence that the lowest oxygen levels do increase the radiotolerance, but it is not reflective of commercial conditions, and is unlikely to cause an issue in real life. However, there is no study available for other groups of insects, as was available for the Tephritidae and some members felt that lack of evidence does not mean there could not be an effect.

[168] The TPPT decided to leave the statement in the PT for now, and revisit the issue once there is more evidence.

10. Close of the Meeting

[169] The Secretariat thanked the TPPT for their work and asked to the members to provide feedback on the meeting process via an online survey.

[170] The Chairperson thanked the Secretariat for hosting the meeting and the TPPT members for the good discussion.

[171] The meeting was closed.

[28] 39_TPPT_2023_Oct

[29] 40_TPPT_2023_Oct

Appendix 1: Agenda

2023 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
1.	**Opening of the meeting**		KISS
	- Opening remarks by the IPPC Secretariat o Mr Osama El-Lissy, IPPC Secretary o Mr Avetik Nersisyan, Standard Setting Unit Lead		EL-LISSY NERSISYAN
2.	**Meeting Arrangements**		
	- Election of the Chairperson		KISS
	- Election of the Rapporteur		CHAIRPERSON
	- Adoption of the Agenda	01_TPPT_2023_Oct	CHAIRPERSON
3.	**Administrative Matters**		
	- Documents List	02_TPPT_2023_Oct	KRAH
	- Participants List	03_TPPT_2023_Oct	KRAH
	- Local Information	https://www.ippc.int/en/publications/1034/	KRAH
4.	**Draft phytosanitary treatments (PTs) in the work program**[30]	Link to Call for treatments page Link to all TPPT reports	KISS
	- Overview of the standard setting procedure (presentation)	04_TPPT_2023_Oct	
4.1	Submission: Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)		DOHINO
	- Treatment submission	05_TPPT_2023_Oct	
	- Reference: Dias *et al* 2023	06_TPPT_2023_Oct	
	- Checklist	07_TPPT_2023_Oct	
	- Draft PT	2023-004	
	- Additional information (temperature data)	11_TPPT_2023_Oct	
4.2	Submission: Methyl iodide fumigation of *Carposina sasakii* on *Malus × domestica* (2023-006)		MYERS
	- Treatment submission	08_TPPT_2023_Oct	
	- Reference: Soma *et al* 2023, Raw data	09_TPPT_2023_Oct, 42_TPPT_2023_Oct	
	- Checklist	10_TPPT_2023_Oct	
	- Draft PT	2023-006	

[30] Additional resources: IPPC procedure manual for standard setting: https://www.ippc.int/en/core-activities/ippc-standard-setting-procedure-manual/; IPPC style guide: https://www.ippc.int/en/publications/81329/; TPPT Specification TP3: https://www.ippc.int/en/publications/1308/

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
4.3	Irradiation treatment for all stages *Aspidiotis destructor* (2021-029)		ZHAN
	- Treatment Leads summary	21_TPPT_2023_Oct	
	- Reference: Khan et al 2016, Khan et al 2016b, Follett 2006	22_TPPT_2023_Oct 41_TPPT_2023_Oct 43_TPPT_2023_Oct	
	- Additional information from the submitter	20_TPPT_2023_Oct	
	- Draft PT	2021-029	
4.4	Submission: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)		MYERS
	- Submission	16_TPPT_2023_Oct	
	- References: Mansour 2016, Zhao et al 2022, MA regulation Australia, Gao et al 2004	17_TPPT_2023_Oct 18_TPPT_2023_Oct, 19_TPPT_2023_Oct 50_TPPT_2023_Oct	
	- Checklist	35_TPPT_2023_Oct	
	- Draft PT	2023-032	
4.5	Submission: Irradiation treatment for *Pseudococcus baliteus* (2023-033)		ORMSBY
	- Treatment submission	23_TPPT_2023_Oct	
	- References: Zhao *et al* 2021, Zhao *et al* 2023	25_TPPT_2023_Oct 26_TPPT_2023_Oct	
	- Checklist	24_TPPT_2023_Oct	
	- Draft PT	2023-033	
4.6	Submission: Irradiation treatment for *Paracoccus marginatus* (2023-034)		NOSWORTHY
	- Treatment submission	28_TPPT_2023_Oct	
	- References: Song *et al* 2023 and Seth *et al* 2016	29_TPPT_2023_Oct 30_TPPT_2023_Oct	
	- Checklist	31_TPPT_2023_Oct	
	- Draft PT	2023-034	
4.7	Submission: Irradiation treatment for *Planococcus lilacinus* (2023-035)		KAWAI
	- Treatments submission	32_TPPT_2023_Oct	
	- Reference: Ma *et al*. 2022, Doan *et al.* 2012	27_TPPT_2023_Oct 49_TPPT_2023_Oct	
	- Checklist	33_TPPT_2023_Oct	
	- Draft PT	2023-035	
4.8	From first consultation: Vapour heat treatment for *Planococcus lilacinus* (2021-028)		ORMSBY

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
	- Consultation comments with Leads responses - Draft PT: 2021-028	36_TPPT_2023_Oct 2021-028	
4.9	From second consultation: Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029) - Consultation comments - Draft PT: 2017-029 - Reference: Moore 2022	37_TPPT_2023_Oct 2017-029 45_TPPT_2023_Oct	LEACH
5.	**Strategic discussion on the TPPTs work**		
5.1	TPPT's role in developing commodity standards, including the use of historical datasets to establish efficacy		OPATOWSKI/ ALL
5.2	Discussion on the generic treatments impacting existing PTs: PT 1-3 possibly superseded by PT 39.	15_TPPT_2023_Oct	HALLMAN/ALL
5.3	Efficacy calculation method - Background document - Efficacy calculations for adopted PTs - Review of TPPT working procedures - Draft paper: Improved Statistical Methods for Estimating Infestation Rates in Quarantine Research When Hosts are Naturally Infested – Wright et al	12_TPPT_2023_Oct 13_TPPT_2023_Oct 14_TPPT_2023_Oct 44_TPPT_2023_Oct	ORMSBY
5.4	Update on the African Phytosanitary Programme	https://www.ippc.int/en/about-app/	All
6.	**Liaison**		
6.1	Phytosanitary Measures Research Group (PMRG) - Update from the Chair - Strategic discussion on the benefit of liaison with this group	Link to PMRG page Link to PMRG update to the CPM	LEACH
6.2	Ozone Secretariat (Vienna Convention and Montreal Protocol / United Nations Environment Programme (UNEP)) - Update from the Methyl Bromide Technical Options Committee - Strategic discussion on the benefit of liaison with this group	Link to Ozone Secretariat website Link to the Ozone Secretariat update to CPM	KISS
6.3	International Forestry Quarantine Research Group (IFQRG) - Strategic discussion on the benefit of liaison with this group	Link to IFQRG page Link to IFQRG update to the CPM	ORMSBY
6.4	Update on IC Subgroup on ISPM 15 guide		PETERSON/KISS
7.	**Overview of the TPPT work programme**	Link to List of topics for IPPC standards	

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
7.1	General overview, SWOT analysis and next steps	34_TPPT_2023_Oct	KISS/ ALL
7.2	Status of Phytosanitary Treatments (PTs) and draft ISPMs under the TPPT work programme	39_TPPT_2023_Oct	KISS/ ALL
7.3	TPPT 2023-2024 work plan	40_TPPT_2023_Oct	KISS/ ALL
8.	**Recommendations to the SC**		CHAIRPERSON
9.	**Other business**		CHAIRPERSON
9.1	Modified atmosphere restriction - Reference: Follett 2013 - Reference: Follett and Neven 2020 - Reference: Dias et al 2020	 46_TPPT_2023_Oct 47_TPPT_2023_Oct 48_TPPT_2023_Oct	MYERS
10.	**Close of the meeting**		CHAIRPERSON
	- Evaluation of the meeting process - Close	Evaluation Link	KISS / CHAIRPERSON

Appendix 2: Documents list

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
Draft PTs			
2023-004	4.1	Draft PT: Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)	
2023-006	4.2	Draft PT: Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006)	
2021-029	4.3	Draft PT: Irradiation treatment for all stages *Aspidiotis destructor* (2021-029)	
2023-032	4.4	Draft PT: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
2023-033	4.5	Draft PT: Irradiation treatment for *Pseudococcus baliteus* (2023-033)	
2023-034	4.6	Draft PT: Irradiation treatment for *Paracoccus marginatus* (2023-034)	
2021-028	4.8	Draft PT: From first consultation: Vapour heat treatment for *Planococcus lilacinus* (2021-028)	
2017-029	4.9	Draft PT: From second consultation: Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029)	
Other Documents			
01_TPPT_2023_Oct	02	Provisional agenda	
02_TPPT_2023_Oct	03	Document List	
03_TPPT_2023_Oct	03	Participants list	
04_TPPT_2023_Oct	4	Overview of the standard setting procedure (presentation)	
05_TPPT_2023_Oct	4.1	Submission: Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)	
06_TPPT_2023_Oct	4.1	Reference: Dias *et al* 2023: Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)	
07_TPPT_2023_Oct	4.1	Checklist: Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)	
08_TPPT_2023_Oct	4.2	Submission: Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006)	
09_TPPT_2023_Oct	4.2	Reference: Soma *et al* 2023: Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006)	
10_TPPT_2023_Oct	4.2	Checklist : Methyl iodide fumigation of *Carposina sasakii* on *Malus* × *domestica* (2023-006)	
11_TPPT_2023_Oct	4.1	Additional information (temperature data): Cold treatment for *Zeugodacus tau* on *Citrus sinensis* (2023-004)	

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
12_TPPT_2023_Oct	5.3	Background document: Efficacy calculation method	
13_TPPT_2023_Oct	5.3	Efficacy calculations for adopted PTs: Efficacy calculation method	
14_TPPT_2023_Oct	5.3	Review of TPPT working procedures : Efficacy calculation method	
15_TPPT_2023_Oct	5.2	Discussion on the generic treatments impacting existing PTs: PT 1-3 possibly superseded by PT 39	
16_TPPT_2023_Oct	4.4	Submission : Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
17_TPPT_2023_Oct	4.4	References: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
18_TPPT_2023_Oct	4.4	References: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
19_TPPT_2023_Oct	4.4	References : Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
20_TPPT_2023_Oct	4.3	Additional information from the submitter: Irradiation treatment for all stages *Aspidiotis destructor* (2021-029)	
21_TPPT_2023_Oct	4.3	Treatment Leads summary : Irradiation treatment for all stages *Aspidiotis destructor* (2021-029)	
22_TPPT_2023_Oct	4.3	Reference: Khan et al 2016: Irradiation treatment for all stages *Aspidiotis destructor* (2021-029)	
24_TPPT_2023_Oct	4.5	Checklist : Irradiation treatment for *Pseudococcus baliteus* (2023-033)	
25_TPPT_2023_Oct	4.5	References: Zhao *et al* 2021, Zhao *et al* 2023: Irradiation treatment for *Pseudococcus baliteus* (2023-033)	
26_TPPT_2023_Oct	4.5	Checklist: Irradiation treatment for *Pseudococcus baliteus* (2023-033)	
27_TPPT_2023_Oct	4.7	Reference: Ma *et al*. 2022: Irradiation treatment for *Planococcus lilacinus* (2023-035)	
28_TPPT_2023_Oct	4.6	Treatment submission: Irradiation treatment for *Paracoccus marginatus* (2023-034)	
29_TPPT_2023_Oct	4.6	References: Irradiation treatment for *Paracoccus marginatus* (2023-034)	
30_TPPT_2023_Oct	4.6	References: Irradiation treatment for *Paracoccus marginatus* (2023-034)	
31_TPPT_2023_Oct	4.6	Checklist: Irradiation treatment for *Paracoccus marginatus* (2023-034)	
32_TPPT_2023_Oct	4.7	Treatments submission :Irradiation treatment for *Planococcus lilacinus* (2023-035)	

DOCUMENT NO.	AGE NDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
33_TPPT_2023_Oct	4.7	Checklist: Irradiation treatment for *Planococcus lilacinus* (2023-035)	
34_TPPT_2023_Oct	7.1	General overview, SWOT analysis and next steps	
35_TPPT_2023_Oct	4.4	Checklist: Combination of Modified Atmosphere and Irradiation Treatment for *Trogoderma granarium* (2023-032)	
36_TPPT_2023_Oct	4.8	Consultation comments with Leads responses: Vapour heat treatment for *Planococcus lilacinus* (2021-028)	
37_TPPT_2023_Oct	4.9	Consultation comments with Leads responses: Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029)	
38_TPPT_2023_Oct	5.1	TPPT's role in developing commodity standards, including the use of historical datasets to establish efficacy	
39_TPPT_2023_Oct	7.2	Status of Phytosanitary Treatments (PTs) and draft ISPMs under the TPPT work programme	
40_TPPT_2023_Oct	7.3	TPPT 2023-2024 work plan	

IPP LINKS:	Agenda item
Local information document	3
Link to Call for treatments page	4
TPPT meeting reports	4
Link to the factsheet	4.7
Link to PMRG page	6.1
Link to PMRG update to the CPM	6.1
Link to Ozone Secretariat website	6.2
Link to the Ozone Secretariat update to CPM	6.2
Link to IFQRG page	6.3
Link to IFQRG update to the CPM	6.3
Link to List of topics for IPPC standards	7

Appendix 3: Participants list

	Participant role & Expertise	Name, mailing, address, telephone	Email address	Term begins	Term ends
	Steward	**Mr David OPATOWSKI** Head, Plant Biosecurity, Plant Protection and Inspection Services (PPIS), P.O.Box 78,Bet Dagan, 50250 **ISRAEL** Tel: 972-(0)3-9681518 Mob.: 972-(0)506-241885	dopatowski@yahoo.com; davido@moag.gov.il;		
	Member Chemical Fumigation Temperature Modified atmosphere	**Mr Michael ORMSBY** Manager– Plants & Pathways Biosecurity Science & Risk Analysis Ministry for Primary Industries P.O Box 2526, Wellington, 6011 **NEW ZEALAND** Tel: +64 4 894 0486	michael.ormsby@mpi.govt.nz;	October 2020 (3rd term)	2025
	Member Fumigation Temperature	**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@arnet.com.ar; eduwillink@gmail.com	October 2020 (3rd term)	2025
	Member Fumigation Temperature	**Mr Scott MYERS** USDA APHIS 1398 W Truck Rd., Buzzards Bay, MA, **USA** Tel: 508-563-0959	scott.w.myers@aphis.usda.gov;	May 2023 (3rd term)	2028
	Member Irradiation Fumigation Temperature	**Mr Daojian YU** Shenzhen Customs District, P. R. China, GACC 1011, Fuqiang Road, Shenzhen, 518045,Guangdong, **CHINA** Tel: +86-755-82117990	yudj_2002@aliyun.com	May 2019 (2nd term)	2024
	Member Irradiation Temperature	**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	toshiyuki_dohino100@maff.go.jp;	October 2020 (2nd term)	2025

	Participant role & Expertise	Name, mailing, address, telephone	Email address	Term begins	Term ends
	Member Irradiation Temperature	**Ms Vanessa Simoes Dias DE CASTRO** Entomologist Insect Pest Control Section Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture International Atomic Energy Agency | Vienna International Centre, PO Box 100, 1400 Vienna **IAEA** **Telephone number: +43 (1) 2600-27418** **Fax: +43 (1) 26007 27418**	V.Dias-De-Castro@iaea.org;	May 2023 (1st term)	2028
	Member Irradiation Temperature Chemical Fumigation	**Mr Peter Llewellyn LEACH** Senior Principle Entomologist and Market Access Focus Team Leader, Agri-Science Queensland, Department of Agriculture Fisheries (DAF) 21 Redden St. Portsmith, Queensland 4870 **AUSTRALIA** Tel: +61 408077752	peter.leach@daf.qld.gov.au	January 2019 (1st term)	2024
	Member Temperature	**Ms Meghan NOSEWORTHY** Research Manager – Entomology and Phytosanitary Research Canada/ Natural Resources Canada – Canadian Forest Service Address: 506 West Burnside Road, Victoria, BC, V8Z 1M5 **CANADA** Telephone number: 250 298 2354	Meghan.noseworthy@nrcan-rncan.gc.ca;	April 2022 (1st term)	2027
	Member Irradiation, Fumigation, Temperature, Modified Atmosphere	**Mr Guoping ZHAN** Professor Chinese Academy of Inspection and Quarantine (CAIQ), P. R. China Address: No. A3, Gaobeidian Bei Lu, Chaoyang District, Beijing, 100123, **CHINA** Telephone number: +86 136 1119 2153	zhangp@caiq.org.cn; zhgp136@126.com;	April 2022 (1st term)	2027

	Participant role & Expertise	Name, mailing, address, telephone	Email address	Term begins	Term ends
	Member Fumigation Temperature	**Mr Takashi KAWAI** Senior researcher, Disinfestation Technology Section, Research Division, Yokohama Plant Protection Station, MAFF Japan / Ministry of Agriculture, Forestry and Fisheries (MAFF) Address: 1-16-10, Shin-yamashita, Naka-ku, Yokohama 231-0801, **JAPAN** Telephone number:(+81) 45 622 8893	takashi_kawai660@maff.go.jp;	April 2022 (1st term)	2027
	IPPC Secretariat Lead	**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		
	IPPC Secretariat Support	**Mr Emmanuel KRAH** 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	Emmanuel.Krah@fao.org;		
	IPPC Secretariat Support	**Ms Colleen STIRLING** 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	Colleen.Stirling@fao.org;		