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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") thanked the FAO/IAEA Joint Division for hosting the meeting and welcomed the members of the Technical Panel on Phytosanitary Treatments (TPPT).

[2] The Secretariat informed the TPPT of changes in membership. The panel wished Mr Yuejin WANG (who resigned earlier form the panel) well, and welcomed Mr Peter LEACH, the new member of the panel at his first face to face meeting. Mr Andrew PARKER will retire after 7 years of work on the TPPT and the Secretariat and the panel expressed appreciation and wished him well for his retirement. Mr Walter ENKERLIN was delegated by the IAEA and approved by the SC to take over his membership and the TPPT welcomed him.

[3] The Secretariat highlighted the importance of the IPPC Strategic Framework 2020-2030, and the potential role of the TPPT in the development of the commodity standards and other items of the development agenda. The cooperation with IFQRG and PMRG are also an important elements of the TPPT's work. The Secretariat also thanked the TPPT members for the intersessional work completed since the last face to face meeting.

Opening remarks by the Host Agency

[4] Mr Rui Cardoso PEREIRA and Mr Carl BLACKBURN welcomed the participants and highlighted the accomplishments of the joint work of the FAO/IAEA Joint Division and the IPPC.

2. Meeting Arrangements

Election of the Chairperson

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

Election of the Rapporteur

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

Adoption of the agenda

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

3. Administrative Matters

Documents list

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

Participants list

[9] The TPPT noted that Mr Matthew SMYTH and Mr Walther ENKERLIN HOEFLICH were unable to attend the meeting. Ms Vanessa ASIMOGS DIAS DE CASTRO attended the meeting on behalf of the host agency. The Participants list is presented in Appendix 3.

[10] The TPPT members reviewed their contact information and noted to update it on the International Phytosanitary Portal (IPP)[1].

[11] The Secretariat was represented by Ms Adriana MOREIRA and Ms Janka KISS.

[1] TPPT membership list: https://www.ippc.int/en/publications/81655/

Local information

[12] Further information was provided regarding the local arrangements and logistics[2].

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

[13] **Standard Setting Process.** The Secretariat provided an overview of the standard setting process and the TPPT discussed the length of the processes and how to potentially shorten it. The consideration are reported under agenda item 5.1.

[14] **Wording of the scope in PTs**. The TPPT discussed the wording of the scope of PTs, as outlined in the discussion paper[3] presented by Mr Toshiyuki DOHINO and agreed to use consistent wording across PTs of the same treatment type aligning them to existing ones.

[15] All references quoted in the main part of the report are listed in Appendix 4.

4.1 Irradiation treatment for *Drosophila suzukii* (2017-017) – priority 1

[16] The Treatment Lead, Mr Matthew SMYTH was unable to attend the meeting. In his absence Mr Peter LEACH introduced the draft PT for the Irradiation treatment for *Drosophila suzukii* (2017-017), the Treatment Lead's summary and the relevant efficacy calculation[4] on his behalf.

[17] The draft PT was discussed by the TPPT at their February 2019 virtual meeting[5] where they considered the provided additional information and the proposed treatment schedule (irradiation at 78 Gy) for *Drosophila suzukii*. The submission is based on Follett, *at al.* 2014 that describes a study with a large number of insects tested; however the number of treated insects weren't counted directly, but estimated from 10 % of the sample and were scaled up.

[18] **Estimated number of treated insects** As the full dataset is only available on the study conducted with cherries the TPPT agreed at the February 2019 meeting to calculate the number of treated insects and consequently the efficacy based on this study – about 15 000 insects reported in the study of Follett et al. (2014). As agreed, the re-calculation of the number of treated insects, and consequently the efficacy level was undertaken by the Treatment Lead using the corrected estimate of total treated insects based entirely on the sweet cherry results, given that raw data for grapes was not provided.

[19] The Treatment Lead further revised the 6,005 sweet cherry estimate to account for the difference in estimates provided to the TPPT, verse that underpinning the publication. According to the submitter, a total of 2,099 pupae were counted from three control sample replicates, representing a 10% subsample of the treatment population. This control estimate was scaled by a factor of 10 to give a total number of 20,990 total treated pupae in the treated group. Using the methods outlined in Section 4 of the "*IPPC Procedure Manual for Standard Setting*", an amended corrected total treated insect estimate of 13,413 (99.978% efficacy at the 95% confidence level) has been calculated based on a statistical analysis of the controls for the reduced sweet cherry dataset. The supporting calculations were provided by the Treatment Lead[6].

[20] **Appropriate level of efficacy.** The TPPT discussed the efficacy of the treatment based on the reduced number of treated insects. The TPPT considered that the pest occurs in large numbers, and poses a high risk of introduction in many cases. Some members were concerned with applicability of such treatment as the recalculated treated numbers resulted in a moderate level of efficacy considering the nature of the pest.

[2] 04_TPPT_2019_Jul

[3] 06_TPPT_2019_Jul

[4] 2017-017, 07_TPPT_2019_Jul, 08_TPPT_2019_Jul

[5] Report of the 2019-02 TPPT virtual meeting: https://www.ippc.int/en/publications/87013/

[6] 08_TPPT_2019_Jul

[21] The TPPT considered how to improve the supporting data and gather more information to support the efficacy, but the TPPT felt that the submitter has provided all available information already, and no other sufficient study is available.

[22] **Treatment endpoint.** In the supporting documentation the prevention of F1 generation was defined as the endpoint. However the study describes that no eggs were observed either, so prevention of oviposition may be considered as the endpoint. In either case, live non-viable adults may be detected in the importing country. The TPPT was considering whether this is an appropriate endpoint for a treatment for such a high risk pest that could be present in traded commodities in large numbers.

[23] One member highlighted that currently methyl bromide is most often used for treatment of this pest and this PT could be an alternative if adopted. Some members considered that in some irradiation facilities, it might be challenging to apply such low dose in operational circumstances.

[24] The TPPT recognized the importance of the treatment but considering the relative low number of treated insects and the moderate efficacy they considered more research was needed to support such a treatment. Any further studies should focus on careful evaluation of the absence of eggs. Consequently they proposed that the Standards Committee (SC) removes the PT from their work programme.

[25] **Modified Atmosphere Packaging**. Additional information on the effect of modified atmosphere treatments to the efficacy of irradiation have been provided for assessment by the submitter. As this treatment was not recommended for approval, the TPPT decided to further consider the issue of modified atmosphere under agenda item 9.1.

[26] The TPPT:

(1) *recommended* to the Standards Committee (SC) to remove the draft PT Irradiation treatment for *Drosophila suzukii* (2017-017) – priority 1 from the TPPT work programme

4.2 Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) – priority 2

[27] The Treatment Lead, Mr Eduardo WILLINK introduced the draft PT and the summary for the Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028)[7].

[28] The treatment was discussed in the July 2017 meeting[8], and the TPPT recommended its inclusion in the work programme. Additional information was requested from the submitter. At their June 2018 meeting the TPPT asked the submitter to provide further information on whether eggs are indeed the most tolerant life stage. This information was provided by the submitter prior to this meeting.

[29] **Most tolerant life stage.** The TPPT queried whether the tolerance of the eggs and the larvae were compared by conducting test with sub-lethal doses. The submitter didn't test whether the eggs are the most tolerant, but arrived to the conclusion that the eggs showed 100 % mortality when treated according to the proposed schedule. 3-5 day old eggs were tested that were laid on the surface of the bamboo. The eggs are assumed to be the most tolerant stage and require 7-10 days to hatch.

[30] The lack of most tolerant life stage testing posed several problems in establishing the treatment schedule. The TPPT considered if it was possible to calculate the efficacy of the treatment as the original study were done with larvae. It was considered whether to include a 10 day holding period into the treatment schedule in order to eliminate eggs being present. It was queried whether adults (that could lay further eggs) might occur on cut bamboo.

[31] The original treatment included three treatment schedules as presented in Table 1.

[7] 2017-028, 09_TPPT_2019_Jul

[8] Report of the July 2017 TPPT meeting: https://www.ippc.int/en/publications/85139/

Table 1. Minimum concentration-time product (CT) within a single 24 hour period for bamboo pole, fumigated with sulfuryl fluoride

Temperature (℃)	Dose (g/m^3)	Minimum concentration (g/m^3)				CT ($g\text{-}h/m^3$)
		0.5 h	2 h	4 h	24 h	
15 .6-21.1	96	103	93	87	63	1826
21 .1-26.7	80	85	77	73	53	1536
26 .7 or above	64	68	59	53	28	1008

[32] **Temperature during fumigation**. Temperature is an important factor in the fumigation treatment efficacy. In the subsequent trial described in the additional information provided by the submitter, eggs were used. Three temperatures were tested: the 14ºC treatment had a very high mortality in the controls (64 %), and was removed from the treatment schedule, while the 96 g/m^3 at 20ºC, 80 g/ m^3 at 24ºC, and 64 g/ m^3 at 30ºC treatments killed 100% of the eggs. However the TPPT was concerned that the treatment on eggs were not applied at the lower end of the temperature range proposed in the original treatment schedule (Table 1) for the corresponding concentration (e.g. the tests with egg were done at 24 C in case of the 21.1-26.7 C temperature range using 80 g/m3).

[33] The TPPT considered whether to include into the PT the schedules at the 2 higher temperatures considering the eggs were killed at the lower temperature as well or to exclude eggs (allow all eggs to hatch before treatment).

[34] One member agreed to narrow the scope of the treatment to larvae, and include the containment period, however other members were concerned that eggs are usually the most tolerant stage when SF is used (often eggs are not penetrated easily by sulfuryl fluoride and could be 10 times more tolerant then larvae) and including a 10 day containment period will limit the usefulness of the treatment significantly. The data provided on eggs does not addresses sufficiently the concern due to a number of issues (temperature not aligned to proposed treatment, low number tested (3 replicates of 50 eggs), and lack of tolerance comparison between the life stages).

[35] Even though it is likely that the egg is the most tolerant life stage of *Chlorophorus annularis*, it is also unclear if pupae or the larvae are more tolerant – wasn't established either. One member argued that it is very unlikely to find eggs on the treatment but the TPPT thought that it was not possible to exclude the presence of eggs. Some members were concerned that if eggs are excluded there is still no certainty if pupae or larvae were more tolerant.

[36] Considering the difficulty of obtaining data on wood borers due to the difficulty of rearing them, it was considered that it was very unlikely that the submitter would be able to provide more information. It was discussed that the tests could be done on only on one temperature (lower) to cover many possibilities and to reduce the burden of the researcher but it would mean that more fumigant may be used then necessary at higher temperatures.

[37] The TPPT considered that the data on larvae is adequate as agreed at the last meeting (2024 larvae were tested in the original trial) but after exhaustive discussions the TPPT agreed that as only small number of eggs were tested and the temperatures under which the eggs were tested do not align with the originally proposed schedule, the new data does not allow to conclude that the treatment is efficacious against the eggs.

[38] As the most tolerant stage was not determined, the TPPT decided to ask the submitter to consider conducting further tests to establish the whether eggs are the most tolerant life stage and compare their tolerance to the tolerance of larvae to allow the calculation of efficacy based on data on larvae. The TPPT also asked the submitter to provide data on the egg tolerance at the lower end of the temperature

ranges proposed in the schedule. The submitter may also want to consider a dose mortality approach to estimate the efficacy. Considered that these are provided, the treatment schedules for the two higher temperatures could be proposed to be approved.

[39] The TPPT

(2) *asked* the submitter of the draft PT on Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) to provide further information on egg tolerance at the lower end of the temperature ranges proposed in the schedule and determine the most tolerant life stage.

4.3 Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) – priority 1

[40] **Treatment Lead summary.** The Treatment Lead, Mr Matthew SMYTH was not able to attend the meeting. In his absence, Mr Guy HALLMAN introduced the draft PT and the summary for the Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011)[9].

[41] At the July 2017 TPPT meeting[10] the TPPT asked the submitter to compare the irradiation-tolerance of the economically important species of the Tortricidae family to support the effectiveness of a generic dose and justify how it can be assumed that the treatment is efficacious against the non-tested species as well. Further information was provided as presented in Table 2. The submitter listed economically important species and studies conducted on them to establish a generic dose that is sufficient even the most tolerant species of the group.

Table 2. Comparative tolerance to irradiation among species of the Tortricidae.

Species	**Dose***	**Number treated at dose**	**Reference**
Clepsis spectrana	200	73	Wit and van de Vrie (1986)
Cryptophlebia illepida	289	11,910	Follett and Lower (2000)
Cydia pomonella	100	332	Burditt and Moffitt (1985)
C. pomonella	156	237	Burditt (1986)
C. pomonella	153	4230	Burditt and Hungate (1989)
C. pomonella	200	>133,953	Mansour (2003)
Ecdytolopha aurantiana	200	50	Faria et al. (1998)
E. aurantiana	200	50	Arthur (2004)
Epichoristodes acerbella	150	42	Bestagno et al. (1973)
Epiphyas postvittana	200	56	Batchelor et al. (1984)
E. postvittana	199	600	Dentener et al. (1990)
E. postvittana	150	38,202	Follett and Snook (2012)
Eucosma notanthes	150	60	Lin et al. (2003)
Grapholita molesta	232	58,779	Hallman (2004)
Lobesia botrana	200	250	Mansour and Al-Attar (2014)
L. botrana	250	8,748	Nadel et al. (2018)
Thaumatotibia leucotreta	163	6000	Hofmeyr (unpublished)

*Lowest dose to last instar that resulted in 100% prevention of normal-looking adults

[9] 2017-022A, 08_TPPT_2019_JulTPPT_2019_JulTPPT_2019_Jul

[10] Report of the July 2017 TPPT meeting: https://www.ippc.int/en/publications/85139/

[42] Among the listed species, 1 exceeds the proposed generic dose of 250 Gy and 1 equals that dose (the proposed dose should exceed all doses found in studies to add a margin of error for untested species). In both cases the next highest dose tested was much lower. Nadel et al. (2018) found 2 survivors of 1,839 fifth instar *Lobesia botrana* treated at 150 Gy in grapes and raised the dose to 250 Gy before continuing confirmatory testing. It is likely that less than 250 Gy would have sufficed. Likewise, Follett and Lower (2000) found adult emergence of irradiated fifth instar *Cryptophlebia illepida* at 125 Gy and raised the target dose to 250 Gy (the maximum dose absorbed was 289 Gy). Again, a target dose <250 Gy would probably have sufficed.

[43] **Efficacy**. The most tolerant species is suggested as *Grapholita molesta*, based on the data present and thus a dose somewhat higher than the dose found to prevent adult emergence for that species (232 Gy) is proposed as the generic dose. For transparency, an explanation was included into the draft PT along with the reference to the particular study supporting the efficacy on *Grapholita molesta*. The efficacy is established as in PT 10 (Irradiation treatment for *Grapholita molesta*), based on Hallman 2004b.

[44] **Treatment endpoint**. The treatment outcome is proposed as prevention of emergence of viable adults. One member queried if this is indeed the case in all the studies listed and whether that is sufficient outcome. It was confirmed that all studies were done with aiming at least for this outcome.

[45] **Target regulated article**. It was proposed to focus the treatment to fruits. The TPPT removed the reference to vegetables in order to avoid the possible presence of tortricids in leafy vegetables and all leaves that are considered a host for leaf roller species. The TPPT also revised the title to reflect this: Irradiation treatment for Tortricidae on fruits (2017-011)

[46] The TPPT added a disclaimer similarly to other generic fruit fly treatments: "It is recognized, however, that treatment efficacy has not been tested for all potential fruit hosts of the target pest. If evidence becomes available to show that the extrapolation of the treatment to cover all fruit hosts of this pest is incorrect, then the treatment will be reviewed."

[47] The TPPT decided to recommend the draft PT for the SC for consideration for approval for consultation.

[48] The TPPT:

(3) *recommended* the draft PT on the Irradiation treatment for Tortricidae on fruits (2017-011) to the Standards Committee (SC) for approval for first consultation.

4.4 Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) – priority 1

[49] **Treatment Lead summary.** The Treatment Lead, Mr Daojuan YU introduced the draft PT and the Treatment Leads summary[11] for the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012).

[50] The submission proposes 250 Gy as a generic dose. At the 2017 July TPPT meeting the TPPT asked the submitter: i) 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 and ii) to provide more information on the treatment end-point (if F1 or F2 sterility). The submitter had provided further information.

[51] Miller *et al*. (2002) identifies 158 species of mealybug considered threats to agriculture and the submitter provided a list of 12 species that irradiation studies were available on (Table 3).

Table 3. Treatment doses that resulted in reproductive sterility, failure of egg hatch or non-viable F1 generation first instars when parent mature females were irradiated (Hofmeyr et al. 2016a).

Species	Dose (Gy)	End-point	Reference

[11] 2017-022B, 11_TPPT_2019

Cataenococcus hispidus	120	No eggs laid	Kuswadi et al. 2016
Dysmicoccus neobrevipes	200	No eggs laid	Doan et al. 2016
Maconellicoccus hirsutus	200	No development beyond F1 1st instar	Seth et al. 2016b
Paracoccus marginatus	165	No eggs laid	Seth et al. 2016c
Phenococcus solenopsis	200	No development beyond F1 1st instar	Seth et al. 2016a
Planococcus citri	150	No eggs laid	Hofmeyr et al. 2016b
Planococcus ficus	150	No eggs laid	Hofmeyr et al. 2016b
Planococcus lilacinus	150	No eggs laid	Doan et al. 2016
Planococcus minor	150	No eggs laid	Doan et al. 2016
Pseudococcus comstocki	400*	No eggs hatched	Dohino & Masaki 1995
Pseudococcus cryptus	100	No eggs laid	Hofmeyr et al. 2016a
Pseudococcus jackbeardsleyi	125	No development beyond F1 1st instar	Zhan et al. 2016

*The next lowest dose used was 200 Gy, and at that dose 2.5% of eggs hatched and 0.27% of eggs laid developed to the F1 adult.

[52] The TPPT considered that as Pseudococcidae is the second largest family of Coccidae with more than 2000 species and as the table only lists 12 species important for the USA, and several important species (for example *Heliococcus bohemicus* (grape), *Pseudococcus viburni* (grape) and *Pseudococcus longispinu* (asparagus, avocado, citrus, guava, mango, pineapple)) are not included in the list, the TPPT was concerned that the important economic species elsewhere in the world may not have been considered.

[53] **Treatment endpoint**: none of the researched species developed further in the F0 generation then 4th instar (the last larval stage before the adult stage) in the referenced studies in the submitter's response. According to the assessment of the Treatment Lead, the treatment end point as no F1 generation is acceptable.

[54] Although most studies indicate prevention of egg lay as the treatment outcome, some members of the family are viviparous (development of the embryo inside the body of the parent, eventually leading to live birth), thus prevention of egg lay might not be an applicable treatment outcome for all species. One member proposed to include the number of insects tested in each study into Table 3.

[55] **Natural vs artificial diet**. The referenced studies use artificial hosts, mostly pumpkins and potatoes. One member noted that there is a comparison of the use of natural and artificial hosts in the relevant IAEA publication that could be referenced.

[56] The family contains about 2000 species and 274 genera. Some members proposed to consider whether there is a way to break down the group to genera or smaller group of species and establish a generic dose for each of those. This could be considered by the submitter. One member noted that 4 out of the 12 important genera are covered by referenced studies. It was also considered that even though the pest group is not fully represented, there is no contradicting evidence. The TPPT agreed that the concept of generic treatments should be pursued for mealybugs as the second most important pest group after the Tephritids in term of trade barriers, but they considered that a more thorough review of the group was needed.

[57] The TPPT concluded that a request should be made to the submitter to either restructure the treatment targeting important genera in the family separately or gather more data and attempt to cover more species with economic importance globally. The submitter should also identify the most resistant species in the group considering the discussion of the TPPT.

[58] The TPPT decided to also ask the PMRG to consider assembling a more comprehensive and compelling set of studies better covering the globally important mealybug species. The PMRG could also help

identify the important economic mealybug species, especially the ones considered quarantine pests in their regions.

[59] The TPPT:

(4) *asked* the submitter to consider either restructuring the draft PT for the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) – priority 1 targeting separately important genera in the family, or gathering more data and attempt to cover more species with economic importance globally. The submitter should also identify the most resistant species in the group considering the discussion of the TPPT.

(5) *invited* the PMRG to identify the economically important Pseudococcidae species, especially the ones considered quarantine pests in their regions, and gather available studies covering Pseudococcidae species.

4.5 Cold treatment for *Thaumatotibia leucotreta* on *Citrus* spp. (2017-029) – priority 2

[60] **Treatment Lead summary.** The Treatment Lead, Mr Yuejin WANG resigned from the TPPT, thus Mr Peter LEACH introduced the draft PT and the summary[12] for the Cold treatment for *Thaumatotibia leucotreta* on *Citrus* spp. (2017-029).

[61] Following discussions by the TPPT on the proposed cold treatment for *Thaumatotibia leucotreta* on *Citrus* spp. in July 2017, it was agreed that additional information would be required from the submitter supporting the proposal to include a wider range of commodities (not only citrus species) and justify the use of an artificial diet in the trials.

[62] **Natural vs artificial diet**. Regarding the additional information on the equivalence of diet to the natural host, studies and an explanation was provided. Comparing the cold tolerance of the insects in diet with oranges showed a slightly higher cold tolerance of the insects in diet (Myburgh (1965) and Moore *et al*. (2016)). The TPPT agreed that the trials done on larvae in diet satisfy the criteria and would not underestimate the dose needed.

[63] **Target regulated article**. The TPPT discussed how to define the host commodity and whether to restrict Citrus species to *Citrus sinensis* used in the trials. The submitter informed the panel that the cold treatment has been tested with two fruit types in addition to *Citrus sinensis*, namely grapes and litchis. The TPPT considered whether to expand the treatment to these commodities as well. In all three cases susceptibility of *Thaumatotibia leucotreta* was similar.

[64] Literatures shows that the mechanism of insect tolerance to cold is very complex and the survival of insect exposed to cold be dependent on nutrition components of food. *Thaumatotibia leucotreta* has a great deal of diversity in hosts and is capable of feeding on different varieties of fruits, vegetables and crops.

[65] Most trials were conducted in artificial media and the comparing of media and host commodity was only done for *Citrus sinensis*. The trial on grapes were done with a different treatment schedule of 20 days at 0.8°C, although 35 000 insects were tested. The data on litchis in not published yet (Moore *et al*. in preparation). Therefore, restriction of the treatment scope of the proposed PT to oranges was agreed.

[66] The TPPT considered the treatment valuable to recommend for consultation on oranges and will later consider establishing other treatment schedules for litchi and grapes (or potentially a generic treatments) once data is available to support those schedules. The TPPT decided to ask the submitter to provide more information on litchis once the publication is released, and ask for a more extensive data set on grapes including details and measurements of the temperature variation during the confirmatory trial.

[67] **Treatment temperature**. The schedule is established based on Moore *et al*. (2017), and proposed in the submission as 1.2°C for 19 days and -0.1°C for 16 days. 1.2°C was calculated as the mean hourly

[12] 2017-029, 12_TPPT_2019_Jul

maximum temperature and it was proposed to lower the temperatures according to the approach recommended by the PMRG.

[68] The TPPT discussed how to determine the treatment temperature and considered whether to reduce the recommended temperature to the measured minimum, based on the graphs provided. One member thought that it is excessive to go with the absolute minimum of the measured temperatures (every 15 min throughout 19 days).

[69] The TPPT considered that in case of irradiation research, the highest dose is commonly used to establish a treatment schedule and was querying whether it was appropriate to not be consistent about that across treatment types – and use the absolute lowest temperature measured. Some other members thought that cold treatment differ as they are effecting the pest in a different way.

[70] The TPPT also considered the percentile approach (setting the treatment temperature excluding a certain percentage of the temperatures to avoid outliers modifying too much) and considered that it was a good approach as well. They noted however that the percentile approach would require a detailed data set with the records of all the probes.

[71] One member remarked that good temperature control in these trials is important and the range with which the temperature changes in one trial that may be considered and need guidance as well. The TPPT debated whether to use the average of the mean temperature or average of the minimum temperature.

[72] The TPPT discussed the need to establish a consistent approach to take on measuring the temperature and the PMRG chair presented the PMRG Research Guidelines on cold treatments[13]. It recommends to choose the recommended treatment temperature based on the lowest of the mean temperatures of the replicates, considering that the treatment schedule would not allow to exceed that temperature (which means the treatment temperature in commercial setting will be set below).

[73] For the time being the TPPT decided to consider the PMRG guidelines and use the lowest of the means of the 3 replicates as the treatment temperature thus adjusted the treatment schedule to 1°C for 19 days and -0.2°C for 16 days. The TPPT favors establishing a consistent method on setting treatment temperatures and will consider this further after the PMRG meeting in September 2019.

[74] The TPPT revised the recommended treatment temperatures according to the discussion above (lowest of the means of the replicates). The efficacy of schedule 1 and schedule 2 was calculated based on 108,859 and 98,113 4th and 5th instar larvae respectively, treated with no survivors described in the publication Moore *et al* 2017. The efficacy calculation is presented in Appendix 5.

[75] The TPPT:

(6) *recommended* the draft PT Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029) to the Standards Committee (SC) for approval for first consultation.

(7) *asked* the submitter to provide more information on the cold treatment for *Thaumatotibia leucotreta* on litchis once the publication is released, and a more extensive data set on grapes including details and measurements of the temperature variation during the confirmatory trial to allow to establish a cold treatment schedule for these commodities.

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

4.6 Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013) – priority 2

[76] **Treatment Lead summary.** The Treatment Lead, Mr Toshiyuki DOHINO, introduced the draft PT the Treatment Leads summary and the efficacy calculation[14] for the Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013).

[77] The cold treatment for the peach fruit fly *Bactrocera zonata* on orange *Citrus sinensis* (2017-013) was discussed at the 2017 November virtual meeting[15] of the TPPT. The submitted treatment is supported by 4 references (Hallamn *et al*. 2013a, Hallman *et al*. 2013b, Hashem *et al*. 2004, Mohamed and El-Wakkad 2009).

[78] It was established that the most cold tolerant stage of *Bactrocera zonata* in orange is 3rd instar, among egg, 1st instar, 2nd instar and 3rd instar larvae (Mohamed and El-Wakkad 2009, Hashem *et al*. 2004). The proposed schedule (1.7°C for 18 days) is identical to the cold treatment T107-L in USDA APHIS PPQ Treatment Manual.

[79] The TPPT agreed ask for more information from the submitter on the number of survivors from control group and the temperature data of each replication in Hallman *et al.* (2013). The submitter provided the raw data from the controls for each replication and the temperature measurements for each replication. It was pointed out that natural infestation was used and the larvae were not estimated but counted in the controls.

[80] One member queried whether any shorter durations were considered, e.g. considering the one in the reference Mohamed and El-Wakkad (2009). It was clarified that a 16 day old treatment (Table 1 Hallman *et al*. 2013) was considered but there was one survivor.

[81] The efficacy was calculated by the treatment lead (Appendix 6) and adjusted based on Abbott's formula. Natural mortality was discounted from the effect of the treatment and the corrected tested insect number was calculated as 35,733 with the resulting efficacy of 99.9916 %.

[82] The TPPT included in the text of the draft PT the total number of insects before the correction and the control mortality for clarity (similarly with Irradiation treatment for *Carposina sasakii* (2017-026) under country consultation). Some members were concerned that this was unclear and does not provide enough explanation why the corrected number of treated insects in the PT differs from the one described in Hallman *at al.* 2013 and decided to include the corrected number (35,733) but add a clarification sentence to explain that it was corrected from the total number of 36,820.

[83] The Treatment Lead quarried whether to adjust each replicate first and then average it *or* first add them up and then correct the sum for control mortality. One member quarried whether to choose a method that can be applied when the dataset is not so detailed for each replicate (using the sum for correcting for control mortality) but the TPPT decided to recommend correcting each replicate first *when possible* before adding them up.

[84] The TPPT agreed to submit the draft PT as revised at this meeting to the SC for approval for consultation.

[85] The TPPT:

(8) *recommended* the draft PT on Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013) to the Standards Committee (SC) for approval for consultation.

[14] 13_TPPT_2019_Jul, 14_TPPT_2019_Jul, 2017-013

[15] Report of the 2017 November virtual meeting: https://www.ippc.int/en/publications/85546/

4.7 Irradiation treatment for *Sternochetus frigidus* (2017-036) – priority 2

[86] **Treatment Lead summary.** The Treatment Lead, Mr Andrew PARKER, introduced the draft PT and the Treatment Leads summary[16].

[87] Following discussion by the panel on the proposed *Sternochytus frigidus* irradiation treatment in March 2018[17], clarification was requested on the efficacy data and the number of individuals treated in the trials from the submitter.

[88] **Efficacy**. The submitter agreed to the correction in order to align with the normal manner of expressing efficacy adopted by the TPPT (efficacy at the 95% confidence level).

[89] **Number of treated individuals**. The number of individuals treated was unclear as the numbers presented in the table and the text of the paper of Obra *et al.* (2014) differ. The submitter clarified that the correct number of treated individuals was as stated in Table 1 of Obra *et al.* 2014. The submitter also clarified that the total of 4549 individuals treated at 150 Gy nominal dose consisted of 2275 males and 2274 females. As the proposed measure of efficacy was the prevention of oviposition, the number of individuals treated is, therefore, 2274 females, giving an efficacy of 99.868 % at the 95% confidence level that a dose of 165 Gy prevents oviposition. It was clarified that the number of treated insects were counted, and not estimated.

[90] One member quarried whether it was really necessary to have the sex ratio, as for fruit flies the sex ratio is not considered when establishing efficacy even if the treatment endpoint is prevention of oviposition. It appears that separating the sexes is a difficult task in case of these weevils – microscopic examination of morphology of insects needed.

[91] The PT for sweet potato weevil (PT 12: Irradiation treatment for *Cylas formicarius elegantulus*) that prevents the development of the target pest to adults had been already accepted with no differentiation for sexes in the study it is based on (Hallman, 2001a).

[92] The TPPT considered that the establishment of the treatment would have significant benefits in reducing the radiation dose for the Philippines, where only this species are present of the 3 important quarantine pests associated with mangoes.

[93] The TPPT decided to request further clarification for the submitter on the data supporting the treatment. The panel was appreciative of the responses supplied, but addition issues were raised:

- Sex determination: Was the research based on the sexing of all adults involved (as described in De Jesus et al. (2002))?
- Sex ratio: In Table 1 of Obra *et al*. 2014, figures are given for the control egg production and the eggs per female. Based on these figures, the number of females in each control can be calculated as 64 (30877/483) and 171 (87431/510), giving a sex ration of approximately 60:40 male:female. In the response to the questions in the letter of 31 July 2018, the number of males and females in each of the treatment groups was given as 2275 and 2274 for the 150 Gy treatment and 740 and 740 for the 100 Gy treatment. This gives a sex ratio of almost exactly 50:50. Why was the sex ratio in the control so different?
- Detailed data: the submitter is requested to provide the raw data used to generate Table 1 in Obra *et al*. 2014 which will be used to calculate the efficacy, in particular the counts of the control and the treatment group for each replicate.

[94] The TPPT thought that the overall study was thorough and if these questions was satisfactorily answered, the treatment could be considered for recommendation for consultation.

[16] 15_TPPT_2019_Jul, 2017-036

[17] Report of the March 2018 virtual meeting: https://www.ippc.int/en/publications/85772/

[95] The TPPT:

(9) *asked* the submitter of the draft PT on the Irradiation treatment for *Sternochetus frigidus* (2017-036) to provide additional clarification on the issues specified in the 2019 July TPPT report.

4.8 Irradiation treatment for *Omphisa anastomosalis* (2018-042) – priority 2

[96] The Treatment Lead, Mr Toshiyuki DOHINO introduced the draft PT and the summary for Irradiation treatment for *Omphisa anastomosalis* (2018-042)[18].

[97] This treatment was evaluated by TPPT at their virtual meeting in December 2018[19]. The proposed treatment schedule is 150 Gy to prevent the development of F1 adults. The schedule is supported by three reference papers. Follett (2006) provides information on the most radio-tolerant stage (pupae) of *Omphisa anastomosalis* and provides large-scale test data (total 37 tests: 30282 pupae, measure absorbed dose: 135-148 Gy) to calculate the efficacy.

[98] The TPPT agreed to recommend the treatment to the SC for addition to the work program with priority 2 due to its economic importance, but to request clarification from the submitter if it was indeed *late* pupae that were tested, what were the emergence rate of F1 adults in the control, and why is there low performance of controls.

[99] **Most tolerant stage**. The submitter responded explaining that 44 day old *Omphisa anastomosalis* (late pupae) was used as shown in Figure 1 in Follett (2006). The late stage pupa was identified in age/stage response tests at 100 Gy as the most tolerant stage and this stage was targeted in large-scale confirmatory tests.

[100] **The low emergence rates in control**. The submitter informed the TPPT that *Omphisa anastomosalis* mainly feeds on the above-ground plant. Therefore, the sweet potato root is not a preferred plant part for oviposition and feeding. On rare occasions, larvae bore down a vine into the root below ground or oviposit on roots left on the field if there are no more vines and pose a quarantine risk. In Follett *et al*. (2007), commercially packed sweet potato roots were used.

[101] The TPPT considered the information provided by the submitter and concluded that the use of the "not preferred host" is not sufficiently justified in such trials, but that it indeed explains the poor performance of the controls.

[102] The TPPT was still concerned with the mortality rate of the control and whether it influenced the irradiation tolerance of the pest. The TPPT considered that it may have given more robust results to rear the insect on its preferred host when tested for irradiation tolerance. The TPPT considered that the F1 adult raised on non-preferred host (roots of sweet potato) may be able to produce progeny on the sweet potato vines (preferred host) once arriving at the importing country. It was also noted that this is a low dose for a Lepidopteran pupae.

[103] The TPPT also considered that the same treatment had been submitted to the TPPT in 2006 and had received an objection at CPM-4 (2009). It was subsequently removed from the work programme of the TPPT.

[104] Although the TPPT considered that this would be a useful treatment, due to concerning issues with the use of a non-preferred host in the trials and the consequential poor performance of the controls, the TPPT agreed to propose to the SC that they remove the treatment from the work programme of the TPPT.

[105] The TPPT:

[18] 16_TPPT_2019_Jul, 2018-042

[19] 2018-12 TPPT Meeting report: https://www.ippc.int/en/publications/86905/

(10) *recommended* to the SC to remove the Irradiation treatment for *Omphisa anastomosalis* (2018-042) from the work programme of the TPPT

4.9 Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014) – priority 3

[106] **Treatment Lead summary.** The Treatment Lead, Mr Scott MYERS, introduced the draft PT and the summary for the Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014)[20].

[107] The draft PT was discussed by the TPPT at their 2018 January and June meetings[21]. Clarification on a range of issues was provided by the submitter.

[108] **Generic treatment**. The TPPT discussed if the amount of available information was sufficient to establish a generic treatment for all ant species. During dose response testing with *Pheidole megacephala*, *Wasmannia auropunctata*, *Linepithema humile*, and *Solenopsis invicta*, a total of only 152 fertile queens in microcolonies were irradiated during a period of about 5 yrs. Three of the 4 species studied are found in Hawaii (not *Solenopsis invicta*). The species that were selected are 4 of the 5 ants on the list of a 100 of the most globally invasive species (only yellow crazy ant was not tested).

[109] **Efficacy.** The submitter agreed that the numbers of treated queens was low for all four species, but stated that this reflects the difficulty of rearing and testing queens. The efficacy would be set at 98.05 % based on the 152 fertile queens were tested of four species. The TPPT recognized that it is unreasonable to expect a large number of insects to be tested, but found the number of tested insects is still a little too low. The TPPT discussed that countries may apply quantitative risk analysis and establish their requited confidence level for different pests. One member thought that considering low risk pathways (fresh fruit in this case) the efficacy could be considered adequate for the certain locations. The TPPT members considered that different regions may have different needs for treatments for ants. In some regions it is considered a high risk pest, in some regions it is considered unlikely to be introduced with trade.

[110] One member considered that the scope focuses on fresh commodities and that most interceptions are found in soil and on contaminants on containers. Fresh produce is a less frequent pathway, and thus lower level of efficacy may be considered. The TPPT also considered the benefits of the risk of introduction of ants could be eliminated along with the generic dose applied for fruit flies.

[111] One member thought that if it is a problem in a region and countries consider the level of protection provided by this treatment adequate, they could still approve this treatment in a bilateral basis, considering the different levels of risk in different regions. The TPPT questioned if there is a need for an international treatment, or solutions should be sought on a regional basis adapting to the needs and risk thresholds of specific countries.

[112] It was mentioned that there is a margin of safety included in the irradiation dose as it is proposed at 150 Gy, and the ant queens were sterilised at 100 Gy or less. The TPPT queried if the irradiated queen was placed back in a non-irradiated colony or the whole colony was irradiated. Supporting data for this treatment schedule suggests a dose of 90 Gy would be provide quarantine level control, however confidence in the efficacy of the treatment is low due to the relatively few number of individuals tested. The treatment submission proposes a dose of 150 Gy in order to provide an additional margin of safety and ensure treatment efficacy. The species tested appear to respond similarly in terms of the ability of eggs and larvae to develop following irradiation with no species clearly more tolerant than the others. It is recognized, however, that treatment efficacy has not been tested for all potential pest species in the family Formicidae. For this reason, and because of the confidence in the efficacy of the treatment is low due to the relatively few number of individuals tested, the TPPT felt that as there is not enough

[20] 17_TPPT_2019_Jul, 2017-014

[21] 2018-01 TPPT Meeting: https://www.ippc.int/en/publications/85607/

2018-06 TPPT Meeting: https://www.ippc.int/en/publications/86619/

supporting data to approve such a treatment and recommended to the SC to remove the topic from their work programme.

[113] The TPPT:

(11) *recommended* to the SC to remove the Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014) from the TPPT work programme.

4.10 Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027) – priority 3

[114] **Treatment Lead summary.** The Treatment Lead, Mr Andrew PARKER, introduced the draft PT and the Treatment Lead summary[22].

[115] The proposed treatment schedule is 66 Gy to prevent development to the second instar nymph stage of progeny from late adult females of *Pseudococcus jackbearsleyi* based on the work of Zhan *et al.* (2016). Following discussion by the panel on the proposed PT in March 2018[23], further information was requested from the submitter. The submitter provided clarification regarding the identification of species and the voucher specimens, and the TPPT discussed the calculation of treated number of treated insects.

[116] **Efficacy.** The data set is considered robust and suitable, but the submitter explained in their response that although the controls were counted individually, in the treated lot only a single count is given. The females on half of all treated potatoes/pumpkins were counted, so there was an absolute count of 59,260 late females in the first treatment (half of 118,520), 11,170 in the second and 13,475 in the third, providing a total treatment size of 83,905. This total gives a treatment efficacy of 99.9964% at the 95% confidence level.

[117] Without individual counts of infestation in individual commodities (potatoes/pumpkins) there are no way to calculate the means to estimate the uncertainty in the count or infestation rate. Lacking a means of estimating uncertainty (standard error) it is not possible to adjust the total number of treated pests in the manner normally adopted by the TPPT.

[118] The Treatment Lead reported that estimates provided from counting half the treatment potatoes/pumpkins agreed closely (within 9%) with the total counts from the controls appropriately scaled. The TPPT considered whether to request the submitter to provide the individual count on the pumpkins/potatoes, which would allow to calculate a more refined efficacy, or to use half of the data.

[119] Some members also felt that more details on the data evaluation and the experimental methods would be necessary, particularly at what point were the different life stages of the F1 generation counted and checked.

[120] The TPPT discussed if the use of potatoes and pumpkin in the trials were satisfactory and agreed that as they are only a substrate and the irradiation treatment doesn't consider separately the different fruits and vegetables, this doesn't undermine the results.

[121] The TPPT decided to ask the submitter to provide further information. In particular, the submitter is requested to provide the raw data used to generate Table 2 in Zhan *et al*. 2016 which will be used to calculate the efficacy, in particular the counts for each individual potato or pumpkin if available or per rearing box. This will be used to determine the total number of insects treated and calculate the efficacy of the treatment.

[122] The TPPT also requested more details on the methods used to determine the timing for the counts of F1 neonates and 2nd instar nymphs.

[123] The TPPT:

[22] 18_TPPT_2019_Jul, 2017-027

[23] Report of the March 2018 meeting: https://www.ippc.int/en/publications/85772/

(12) *asked* the submitter of the draft PT for the Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027) to provide further information on the raw data supporting the treatment and methods used in the trials as discussed in the July 2019 TPPT meeting report.

4.11 CATTS (Controlled Atmosphere/Temperature Treatment System) treatments against codling moth (*Cydia pomonella*) and western cherry fruit fly (*Rhagoletis indifferens*) in cherry (2017-037) – priority 3, and CATTS treatments against codling moth (*Cydia pomonella*) and oriental fruit moth (*Grapholita molesta*) in apple (2017-038) – priority 3

[124] **Treatment Lead summary.** The Treatment Lead, Mr Michael ORMSBY, introduced the draft PT, the efficacy calculation and the Treatment Lead's summary[24].

[125] The submission was briefly discussed before at the June 2018 TPPT meeting[25]. After a more thorough review, the Treatment Lead suggested that as the trials completed by Neven (2005) and Neven *et al*. (2006a) on cherries were completed under different conditions from those of Neven *et al*. (2006b, 2006c) on peaches, nectarines and apples, only the results of codling moth and oriental fruit moth on peaches and nectarines and apples should be considered.

[126] **Most tolerant life stage**. The most tolerant life stage was determined from the life stage exposure trials on *Cydia pomonella* and *Grapholita molesta* on apples (Neven *et al*. 2006b) and peaches and nectarines (Neven *et al*. 2006c). Although there is only a small difference between life stage responses it was apparent that no life stages of the *Cydia pomonella* and *Grapholita molesta* on any of the fruit tested were significantly more tolerant to the treatment than 4th instar larvae of codling moth in apples. This is noted by the TPPT and deemed acceptable.

[127] It was considered that *Grapholita molesta* does not pupate in the fruit, but possibly in leaves. These are managed through inspection and cleaning.

[128] **Schedule.** The treatment applied could best be described as vapour heating in a chamber with 45°C air temperature, air speed 1.2 to 2.0 m/s, and humidity ≥ 90% or dew point -2°C from fruit surface temperature, in 1% O_2 and 15% CO_2 (with the balance N_2) to achieve a core temperature of >44.5°C for at least 25 minutes followed by forced air cooling in a 0°C cold room for 15 minutes.

[129] One member queried whether there was enough time allowed for the gas to reach equilibrium in the treatment chamber, as this could be an issue with modified atmosphere treatments in his experience. It was clarified that according to the graph, the appropriate oxygen concentration was reached before the commencement of the treatment.

[130] The TPPT considered how to define the required humidity. In vapour heat treatments it's preferable to prevent dew formation to limit fruit damage, and the humidity should be kept at 90 % or 2°C below the dew formation point. However this was considered an issue of fruit quality and not a phytosanitary issue. The TPPT agreed to consider the conditions required for the killing of the pest in the treatment schedule and provide additional information on the considerations for the fruit quality in the "other information" to explain that for the treatment schedule of 44.5°C core temperature was needed and 90-95 % humidity for at least 25 minutes. Further explanation is provided to indicate that the temperature should be kept 2°C below the dew point in order to prevent dew formation.

[131] The schedule requires 1 % O_2 and 15 % CO_2, and this should be achieved by excluding all other atmospheric gas by adding nitrogen ("with the balance of N_2").

[132] The TPPT discussed that there is a need to indicate whether cooling is permitted or not, and how exactly to do it to not to exceed the tested conditions. It was discussed whether to limit the cooling period to 15 min as indicated in the research. The TPPT agreed to include the restriction not to go below 0°C of

[24] 2017-037/8, 19_TPPT_2019_Jul, 20_TPPT_2019_Jul

[25] Report of the June 2018 meeting: https://www.ippc.int/en/publications/86619/

cooling temperature. The commercial application will aim to cool the fruit as soon as possible to preserve fruit quality and the TPPT discussed if this would need to be limited to 15 minutes in order to retain any possible heat that would contribute to the effect of the treatment. They decided not to include a restriction on time because the speed of the air flow is not specified and thus the restriction of 15 minutes by itself would not determine the cooling rate. The TPPT included the criteria to not to cool with air temperatures below 0°C.

[133] **Efficacy.** Using the control mortality data from the life stage exposure trials on codling moth in apples (Neven *et al*. 2006b), the efficacy or the confirmatory trials were calculated at the 95% level of confidence as 99.9884% or no survivors in 8,627 eggs or larvae of codling moth and oriental fruit moth on apples, peaches and nectarines.

[134] The authors (Neven *et al*. 2006b) were able to provide the data for their life stage exposure trials that include the mortality numbers for the 4th and 5th instar larval replicates (Appendix 7). Using the 95% confidence intervals from these control survival data, the exposure mortality estimates for *Cydia pomonella* (oriental fruit moth) can be calculated at the 95% level of confidence. From these the levels of efficacy can be determined (at the 95% level of confidence) as 99.9884% or no survivors based on 25,882 treated insect (corrected for mortality of controls).

[135] **Natural vs artificial diet.** The coddling moth were raised in substrate and the 4th instar was placed on fruit 24 hour before the treatment. The lead also queried that as the larvae feed on the seeds, whether 24 h is enough time to burrow in. The comparison between artificial and natural diet was assumedly done but no data is presented on it. However they used the most tolerant stage and let it feed on apples (the natural host) for 24 hour before the test.

[136] **Title.** It was proposed to change CATTS to vapor heat treatment with modified atmosphere according to the IPPC terminology. The treatment is a low humidity vapour heat treatment, with forced air cooling afterward. The cooling is part of the schedule, as the experiments were conducted including the cooling period.

[137] **Target regulated article**. The schedule would cover apple, peaches, and nectarines for coddling moth and oriental fruit moth. According to previous discussion at the June 2018 meeting, the TPPT decided to in refer to peached and indicate in the draft PT that it included nectarines.

[138] **Utility of the treatment**. The TPPT pondered the utility of the treatment and whether it would be used. They considered that by removing the *Rhagoletis indifferens* from the schedule for the above reasons the treatment loses some of its value, as *Rhagoletis indifferens* may require additional treatment to *Grapholita molesta* on cherries. To establish boundaries of how closely to follow the treatment schedule could be one of the issues to consider when implementing the treatment. However there are ISPMs on modified atmosphere treatment and heat treatment as well, and it was clear that one of the impediments is the lack of available treatment schedules. The treatment is considered as a possible methyl bromide alternative.

[139] The TPPT have reviewed a similar submission before, at their December 2012 meeting[26] (CATTS for *Cydia pomonella* and *Grapholita molesta* on *Prunus persica* and *Prunus persica* var. *nectarina* (2012-010) and CATTS for *Cydia pomonella* and *Grapholita molesta* on *Malus domestica* (2012-013)), but rejected them as the proposed treatment was not a topic under the TPPT at the time and, therefore, could not be considered.

[140] For cherries the experiments were conducted with different methods from all the other commodities, as the temperature exposure period was not recorded. The schedule for the submission on CATTS (Controlled Atmosphere/Temperature Treatment System) treatments against codling moth (*Cydia pomonella*) and western cherry fruit fly (*Rhagoletis indifferens*) in cherry (2017-037) was not possible

[26]Report of the December 2012 meeting: https://www.ippc.int/en/publications/1220/

to assemble at the time and the Treatment Lead will go back to the submitter to clarify further details and present it to the TPPT again.

[141] The TPPT:

(13) *recommended* the draft PT on Vapour heat - modified atmosphere treatment for *Cydia pomonella* and *Grapholita molesta* in fruit of *Malus pumila* and *Prunus persica* (2017-038) to the Standards Committee (SC) for approval for consultation

(14) *asked* the Treatment Lead of the draft PT on CATTS (Controlled Atmosphere/Temperature Treatment System) treatments against codling moth (*Cydia pomonella*) and western cherry fruit fly (*Rhagoletis indifferens*) in cherry (2017-037) to review the submitted information again, draft the PT and clarify any further details with the submitter as necessary before presenting it to the TPPT again.

4.12 Heat treatment of wood using dielectric heating (2007-114)

[142] The Treatment Lead, Mr Michael ORMSBY, introduced the draft PT and provided some background information on the objection received at CPM-12 (2017)[27]. The TPPT was informed that China has a set of large-size microwave dielectric heating equipment and are carrying out in-depth testing of that facility in preparation for phytosanitary use. Their operational trials found that under the conditions they applied, all of the exposed *Bursaphelenchus xylophilus* in wood in international trade were not killed under the condition of 60ºC / 1 min, as proposed in the draft PT. The objection suggested that the draft PT on Heat treatment of wood using dielectric heating (2007-114) should not be adopted temporarily and should only be adopted after the test results are verified.

[143] The SC requested the TPPT to evaluate the objection. The submitter of the objection provided additional information on how they conducted the treatment and the TPPT requested more information in order to determine what resulted in the survival of the target pest. The official contact point of China provided some further technical information on the experiments, and informed the Secretariat that they were carrying out further trials and working on the application of the dielectric heat treatments. The TPPT was awaiting the results of these trials, however in 2019 May upon the request of the Secretariat, they informed that there is no further information available.

[144] The TPPT discussed again the objection including all supplemented information to evaluate the objection as requested by the SC.

[145] The question was raised if the implementation would be an issue that the TPPT should address and whether there are other avenues to address implementation challenges. It was discussed that the IC addresses implementation issues and that IFQRG is preparing guidance on dielectric heat treatment focusing on ISPM 15 schedule that is already approved. This was considered not applicable to this PT in question as the PT focuses on wood and not wood packaging material.

[146] The Treatment Lead reminded the TPPT that the treatment schedule is adopted by all contracting parties under ISPM 15 for wood packaging material. The survival rate the objection found was a very small number, and may have indicated the presence of a cold spot or other issue with the implementation of the treatment.

[147] TPPT considered that if there is no protocol to ensure that there are no cold spots in the wood then this treatment has very low utility compared to the ISPM 15 treatment and considering the operational limitations (also highlighted in the PT) it may be removed from the work programme.

[148] The TPPT decided to report to the SC that it cannot be concluded with certainty that the detection of survivors in the operational trials were due to a failure in the treatment schedule rather than a failure to *achieve* the treatment schedule, and that resolving problems with the operational implementation of dielectric heat treatments is outside the purpose of the TPPT.

[27] 2017-014, , objections presented to the CPM-12 (2017): https://www.ippc.int/en/publications/84146/

[149] The Treatment Lead prepared a paper summarizing the review of the objection by the TPPT to be presented to the SC. The TPPT reviewed the paper and agreed with the content.

[150] The TPPT:

(15) *invited* the SC to consider the response of the TPPT to the objection to the Heat treatment of wood using dielectric heating (2007-114) and

a. *decide* whether the draft PT should be withdrawn from adoption by the CPM and removed from the TPPT work programme *or*

b. *consider* how the issues with the operational implementation of dielectric heat treatments by contracting parties should be resolved and whether to submit the draft PT (Appendix 4) for adoption.

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

[151] The Steward of the TPPT and the Secretariat updated the TPPT on the recent issues discussed the Standards Committee meetings and at the CPM-14 (2019).

5.1 Strategic discussion on the TPPTs work

[152] The Steward of the TPPT presented the discussion paper[28] on the relevant outcomes of recent meetings of the Commission on Phytosanitary Measures (CPM-14), the Standards Committee (SC) and the Standards Committee Working Group (SC-7).

[153] In particular, the TPPT was informed that the CPM-14 (2019) adopted the ISPM 43 (*Requirements for the use of fumigation as a phytosanitary measure*) and the SC-7 revised the draft ISPM on Requirements for modified atmosphere treatments and approved it for second consultation. The SC-7 invited contracting parties to submit proposals for modified atmosphere treatments in the ongoing call for phytosanitary treatments.

[154] The TPPT was updated on strategic discussions of the SC at their 2019 May meeting on the technical panels work. The TPPT discussion related to the different points are reported below:

[155] **Call for new TPPT members**. The SC asked the Secretariat to issue a new Call for experts for the TPPT. Based on the input provided by the TPPT at their 2019 February virtual meeting, the SC agreed that the TPPT needed panel members actively involved and with expertise in developing phytosanitary treatments. The IPPC Secretariat will open the call at the 3rd or 4th quarter of 2019, and the Steward of the TPPT asked the panel to consider to solicit nominations of suitable candidates if they wish.

IPPC Strategic Framework 2020–2030

[156] The SC invited the technical panels to comment on the potential impact of the IPPC Strategic Framework 2020–2030 (SF) on their work. The Steward of the TPPT introduced the Strategic Framework 2020-2030 and highlighted several sections of the strategic frameworks that has links with the work of the TPPT.

[157] Commodity standards are item 2 of the Development agenda presented in the SF. The Focus Group on Commodity and Pathway Standards met in June 2019 and drafted an overarching concept standard (similar to ISPM 27 and 28) including requirements for future commodity specific standards. These will be annexed to the concept standard. They also proposed the establishment of a new technical panel on commodity standards that would coordinate the expert input into the development of specific commodity standards. This proposal and the concept standard will be presented to the SC, Implementation and Capacity Development Committee, the Strategic Planning Group and the CPM Bureau before presenting it to CPM-15 (2020). Another development agenda that may be relevant for the work of the TPPT is the "7. Global Phytosanitary research Coordination".

[28] 21_TPPT_2019_Jun

[158] **Commodity standards and TPPT**. The TPPT discussed how they could contribute to the goals of the development agenda and the SF, in relation to the commodity standards. One member proposed to consider how the proposed process to develop commodity standards will affect the TPPT.

[159] The TPPT considered that commodity standards would include several different kind of phytsonitary measures, among them treatments. They expressed their willingness to provide input in the process of developing commodity standards and associated phytsonitary measures. The TPPT considered that because of the diversity of potential measures, the same level of rigor cannot be expected in the evaluation of those as for the annexes to ISPM 28. For example one member mentioned, that if the commodity is resistant (e.g. wood), a sufficiently robust treatment can be designed that would kill every pest that could be assumed to be present and rigorous evaluation of the supporting data is not as crucial as in cases where sensitive commodities, like fruits need to be treated with the possible lowest effective dose.

[160] One member highlighted the importance of the developed databases (e.g. the commodity tolerance database, or the PT search tool) and to consider and utilize these when developing commodity standards.

[161] **Historical data**. In some cases the evaluation of historical data may be necessary and the Steward queried whether it was possible to develop criteria to adopt treatments based on successful use rather them the research data. The TPPT considered that the evaluation of historical data was difficult to consider as a basis for treatments under ISPM 28, as it requires efficacy to be established. It was considered that historical data could be used to establish the efficacy of the treatment in some cases. It was highlighted that this has been discussed before and the SC was presented with a position paper on the acceptance of experience or historical-based phytosanitary treatments (21_SC_2014_May) at their 2014 May meeting[29] but didn't agree that the paper should be included in the working procedures of the TPPT.

Length of standard setting process: PT development

[162] The SC at their May 2019 meeting[30] suggested that the technical panels consider options for shortening the standard setting process without altering the quality of the technical standards they develop. They invited the TPDP and TPPT to comment on possible ways to shorten the length of time it takes to develop technical standards, particularly in the case of emerging pests.

[163] The TPPT discussed the length of the processes and how to potentially shorten it and proposed the following:

[164] **Improve the quality of submissions**: The TPPT considered how to aid countries to improve the quality of their submissions and that if the submissions would arrive complete with the research data necessary to evaluate the submission, the time to develop a new PT would be significantly shorter, as the lengthy process of requesting further information from the submitter could be avoided. They discussed that this is an issue both of conducting research in a way that allows the calculation of efficacy and also the quality of the submission e.g. how it presents the information.

[165] To address the research methods and clarify what are the necessary requirements of a research study that could sufficiently support a PT, the PMRG is continuously working on the development of research guidelines for different treatment types, and has already finalized research guidelines for vapor heat treatments and cold treatments.

[166] In order to further improve the quality of submission, the TPPT decided to revise the submission form. One member suggested to consider developing different submission forms for the different treatment types. Mr Scott MYERS and Mr Peter LEACH volunteered to review the checklist for evaluating treatment submissions and submission form taking into account the PMRG guidelines and the recent

[29] 2014 May SC report: https://www.ippc.int/en/publications/2514/

[30] 2019 May SC report: https://www.ippc.int/en/publications/87249/

experiences on evaluating treatment submissions to make it more user friendly and highlight better the necessary elements of the submission.

[167] **Reduced number of consultation periods.** The TPPT also discussed the number of consultations necessary to balance the need to ensure a thorough review of the PTs but also to speed up the process. It was discussed that some PTs are very technical, straightforward and short documents, and the SC may decide that one consultation is enough if there is no significant concern submitted during consultation with the draft PT.

[168] **Timing of consultation process and meetings**: The TPPT considered that often the approved PTs are awaiting consultation for a lengthy period and to time the meetings differently would allow to shorten the delay before the consultation. It was discussed that the Secretariat schedule would allow the meetings to be held in January or February in order to submit PTs for the July consultation period, but not later due to the other meetings the Secretariat needs to cater for. The TPPT also considered the possibility to have another consultation period in December-January parallel to the DP notification period in order to speed up the process.

[169] The TPPT agreed to present the outcome of their deliberation to the SC in order to consider the way forward and invited the SC to and to consider the possibility to have 2 consultation periods in a given year for PTs and to give guidance on the minimum number of consultation periods necessary for PTs.

[170] The TPPT

(16) *noted* the update from the IPPC bodies

(17) *asked* Mr Scott MYERS to lead the review of the submission form for phytosanitary treatments and the checklist for evaluating treatment submissions with the assistance of Mr Peter LEACH considering the PMRG guidelines

(18) *invited* the SC to consider the possible ways to streamline the TP processes (listed in the TPPT meeting report under agenda item 5.1)

6. Liaison

6.1 Phytosanitary Measures Research Group (PMRG) [31]

[171] The 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 research coordinator 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[32] to the CPM each year summarizing their activities.

[172] The PMRG is working on developing research guidelines on different types of phytosanitary treatments. The “Guidelines for vapour heat treatment research” and the “Guidelines for cold treatment research” is ready and is posted now. The “Guidelines for fumigation treatment research” and the “Guidelines for controlled atmosphere treatment research”, including controlled atmosphere heat treatments, are being developed.

[173] The PMRG chair introduced the document on Guidelines for cold treatment research and asked the TPPT to review briefly. The TPPT made the following comments:

[174] **Expand to all insects**. It was considered if the guidelines could be expanded to all insect pests and not only fruit flies. One member commended the authors of the guidelines and considered that it is well

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

[32] CPM 2019/INF/17: Written reports from relevant international organizations - Phytosanitary Measures Research Group (PMRG): https://www.ippc.int/en/publications/87042/

applicable for fruit flies but may be hard to expand onto all insects. The TPPT agreed that it would be beneficial but that the guidelines would need to be revised.

[175] **Terminology.** The PMRG chair highlighted that "small scale testing" was changed to "exploratory testing". Some members thought there should be a better description of the purpose of this (e.g. that it is aimed at dose-rate testing, most tolerant stage testing etc.)

[176] **Fruit quality** is discussed in the guidelines and it is established that it isn't part of the treatment schedule, but may be important when setting up the research methods.

[177] **Test population**. The founder population should not be older than 5 generation according to ISPM 37 (*Determination of host status of fruit to fruit flies (Tephritidae)*) but it is difficult to adhere to this especially in case of some of the short life cycle species, when a sufficiently big colony is needed that takes time to build up (for example fruit flies). The TPPT discussed also the utility of replenishment, as whether that is sufficient to guarantee that the colony is akin to the wild population as there is no method to measure how much of the new genes were passed on. The TPPT also discussed how the cold tolerance of fruit flies is effected by the age of the colony and the diet of the insects, and whether it is the gut bacteria of the fruit flies that effect the tolerance or the natural selection.

[178] **Air temperature**. Defrost cycles may cause temperature spikes. The description of the research should include information on the type of cooler and how the defrost cycles are set. It is recommended to measure (although not part if the treatment schedule) the ambient temperature in the treatment chamber to explain any temperature spikes or other discrepancy.

[179] **Mandatory information**. One member queried whether the guideline distinguishes sufficiently between the information that is mandatory to provide and what is not, but it was agreed that the TPPT provides that in their submission forms and the criteria should be clear there. These guidelines are about how to conduct thorough research that will result in information that is supported. The guidelines should recommend to describe any unusual circumstance (e.g. temperature spikes).

[180] **Temperature measurements**. The TPPT discussed temperature probe placement and that the temperature measurements should be recorded starting from the loading of the fruit (room temperature) even though the treatment commences later. It was recommended to place the temperature probe in a "not infested" fruit. Sensors should also be calibrated and their measurements corrected when recording the temperatures. A calibration factor should be applied when finalizing the table of measurements and the submitter may send the supporting information for a PT proposal with the corrected temperatures. The PMRG guideline contains an example for such correction.

[181] **The start of the treatment**. The TPPT discussed whether the treatment should start when half the probes reached within 0.5°C of the treatment temperature. They considered that this was the requirement in some practical examples from research satisfying Japans import requirements. The issue of measuring cold treatment temperatures will be further discussed at the upcoming PMRG meeting.

[182] **Artificial vs natural infestation.** The guidelines advise that natural infestation is preferred (or simulated natural infestation) but this is not always possible. The TPPT suggested to include the requirement to compare the artificial infestation with the natural to establish that it does not affect the efficacy of the treatment. The TPPT discussed where are the borders between what is natural or artificial infestation. For example when eggs are artificially placed on the fruit but the larvae feeds on the fruit and a late stage larvae is tested, it is considered acceptable as "simulated natural infestation" but it is less well regarded when late stage fruit fly larvae raised on artificial diet is placed on a fruit.

[183] **Most tolerant stage**. To choose the most tolerant stage, dose rate testing is necessary with sub-lethal doses. The guidelines give guidance on this. The statistical analysis to establish the most tolerant life stage was discussed. It is recommended to have 3 replicates, but if the second one has identical and statistically significant results to the first one, it is accepted to stop at 2 replicates. If the results have differences, a third replicate is needed. One member suggested that if the most tolerant life stage is already established, no testing is needed, it's enough to include reference for the relevant study.

[184] **Establishing the dose**. The TPPT discussed how wide the range of tested doses should be. It was considered important to find the least restrictive treatment and it was recommended to invest in tests at several close doses, to determine the least restrictive one instead of going for a more restrictive but secure dose that is sure to work and will probably need less investment.

[185] **Control quantity**. The guidelines recommend one fifth of the treated lot to be kept as a control. The TPPT considered that this is not a binding requirement but rather a guideline and may be adopted to the particular conditions.

[186] **TPPT treatment research guidelines**[33]. One member reminded the TPPT treatment research guidelines that were previously attached to the relevant ISPMs on the requirements of the application of different treatment types, and are posted on the IPPC website. This should be taken into account to ensure consistency.

[187] **Control fruit.** The fruit used in the trial and in the control should be similar in terms of quality, size and origin to the one that will be treated in operational conditions.

[188] **Correction of sample size**. The sample size should be set up with sufficient excess, in order to result in high number of treated insects that in turn allows to calculate a high enough efficacy.

[189] **Target temperature**. The guidelines recommend to use the lowest one of the averages of the replicates as the recommended treatment temperature (refer to the discussion under agenda item 4.5). However the TPPT will discuss this further before making a recommendation.

[190] **PT database**. The chair of the PMRG suggested that the already gathered ~200 cold treatments from the PPTEG could be included and would be keen on working on a database. It was also proposed for discussion at the PMRG.

[191] **Next meeting**. The next meeting of the PMRG will be held in Cairns, Australia 24-27 September 2019.

[192] The PMRG group is will discuss issues related to research and operational issues covering generic cold treatments, modelling phytosanitary treatments, documenting existing phytosanitary systems, treatment of mixed loads, heat treatments and non-target organisms, as well as the use of systems approaches.

[193] The TPPT recalled that there were several items that they wanted to request the PMRG's input on, among them the following:

- Correcting sample sizes and estimating number of insects treated (reported under agenda item 6.8 of the 2018 June TPPT meeting)
- Evaluation criteria for temperature treatment exposure parameters (reported under agenda item 11.1 of the 2018 June TPPT meeting)
- If there are any possibility of conducting further research on of *Franklinella occidentalis*. (TPPT meeting in February 2019 discussing the Irradiation treatment for Frankliniella occidentalis on all fresh commodities (2017-019))
- To identify the economically important Pseudococcidae species especially the ones considered quarantine pests in their regions and gathering available studies covering Pseudococcidae species in order to establish the generic treatment for the family Pseudococcidae. (TPPT meeting in June 2019 discussing the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012))
- How to invite good quality treatment submissions
- Guidelines for laboratory colony maintenance

[194] The TPPT:

[33] TPPT Treatment Research Guidelines: https://www.ippc.int/en/publications/86871/

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

(20) *invited* the PMRG to consider providing input on the above topics

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

[195] The Secretariat introduced the brief update[34] of the activities of the Ozone Secretariat and the Methyl Bromide Technical Options Committee (MBTOC).

[196] **Methyl bromide treatment alternatives**. According to the update, quarantine and pre-shipment uses of methyl bromide (approx. 11 000 tonnes) are presently exempted of phase-out measures under the Montreal Protocol. Quarantine and pre-shipment uses have become, by far, the main uses of methyl bromide. The SC considered the request of the Ozone Secretariat and the Methyl Bromide Technical Options Committee (MBTOC) and asked the TPPT to consider the best approach to work on a list of the pests for which methyl bromide is most commonly applied as a treatment and methyl bromide alternatives for these.

[197] The TPPT provided input and listed the commodities, and potential alternatives for the MB uses in their regions to be forwarded to the Ozone Secretariat and the MBTOC.

[198] The TPPT:

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

(22) *asked* the Secretariat to forward their input on the list of pests and commodities for which methyl bromide is most commonly applied as a QPS treatment and the available methyl bromide alternatives to the Ozone Secretariat.

7. Overview of the TPPT Work Programme

[199] The Secretariat provided an overview of the Standard setting process and introduced the summary of the TPPT work programme[35] (see also *List of topics for IPPC standards*[36]).

[200] The TPPT work programme currently contains 26 PTs and 3 ISPMs (*Requirements for the use of chemical treatments as a phytosanitary measure* (2014-003) – priority 3, *Requirements for the use of modified atmosphere treatments as a phytosanitary measure* (2014-006) – priority 2, *Requirements for the use of irradiation as a phytosanitary measure* (revision to ISPM 18) (2014-007) – priority 3).

[201] It was highlighted that the 8 PTs that have been developed by the TPPT in 2018 are currently undergoing consultation and the comments of contracting parties will have to be addressed by the treatment leads and later discussed by the whole TPPT.

[202] TPPT felt that due to new technologies available the revision to ISPM 18 (*Requirements for the use of irradiation as a phytosanitary measure*) become more urgent so the technological advances could be included. The TPPT felt that the priority of the treatment should be changed to 1 and recommended to the SC to consider the TPPTs recommendation.

[203] **Treatment leads.** The TPPT reviewed the need to assign treatment leads for Phytosanitary Treatments (PTs) on the work programme and assigned new treatment leads accordingly to replace resigning members as provided below.

[34] 22_TPPT_2019_Jun

[35] 05_TPPT_2019_Jul

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

[204] **Next meeting.** The Secretariat informed the TPPT that the next meeting is scheduled for 22-26 June 2020 (see calendar on IPP: https://www.ippc.int/en/year/calendar/).

[205] The TPPT members discussed whether they could consider to have a meeting in February. Several members considered that it would be difficult in 2020 February, but possibly in 2021 February.

[206] The list of actions that arise from this meeting is presented in Appendix 8.

[207] The TPPT

(23) *assigned* Treatment Leads as follows:

- Mr Peter LEACH for the Cold treatment *Thaumatotibia leucotreta* on *Citrus* spp. (2017-029)
- Mr Walther ENKERLIN HOEFLICH for Irradiation treatment for *Sternochetus frigidus* (2017-036)
- Mr Walther ENKERLIN HOEFLICH for Phytosanitary irradiation treatment of fresh commodities against *Liriomyza sativa*, *L. trifolii* and *L. huidobrensis* (2018-001)
- Mr Scott MYERS for Irradiation treatment for *Carposina sasakii* (2018-026)
- Mr Peter LEACH for Irradiation treatment for *Bactrocera tau* (2017-025)
- Mr Walther ENKERLIN HOEFLICH for Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027)
- Mr Peter LEACH for Irradiation treatment for *Bactrocera dorsalis* (2017-015)

(24) *recommended* to the SC to change the priority of the following topic from 3 to 1: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007)

(25) *recommended* to the SC to assign Mr Walther ENKERLIN HOEFLICH as the assistant steward of the following topic: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007)

8. Recommendations to the SC

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

[209] The TPPT invited the Standard Committee (SC) to:

(26) *remove* from the TPPT work programme the following draft phytosanitary treatments:

- Irradiation treatment for *Drosophila suzukii* (2017-017) – priority 1
- Irradiation treatment for *Omphisa anastomosalis* (2018-042) – priority 2
- Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014) – priority 3

(27) *approve for first consultation* the following draft phytosanitary treatments:

- Irradiation treatment for Tortricidae in fruits (2017-011) – priority 1
- Cold treatment for *Thaumatotibia leucotreta* on *Citrus sinensis*. (2017-029) – priority 2
- Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013) – priority 2
- Vapour heat - modified atmosphere treatment for *Cydia pomonella* and *Grapholita molesta* in fruit of *Malus pumila* and *Prunus persica* (2017-038) – priority 3

(28) *change* the priority of the following topic from 3 to 1: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007)

(29) *assign* Mr Walther ENKERLIN HOEFLICH as the assistant steward of the following topic: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007)

(30) *consider* the response of the TPPT to the objection on the Heat treatment of wood using dielectric heating (2007-114) and the recommendation of the TPPT and

a. *decide* whether the draft PT should be withdrawn from adoption by the CPM and removed from the TPPT work programme *or*

b. *consider* how the issues with the operational implementation of dielectric heat treatments by contracting parties should be resolved and whether to submit the draft PT (Appendix 4) for adoption.

(31) *consider* the possible ways to streamline the TP processes (listed in the TPPT meeting report under agenda item 5.1)

(32) *consider* the study on the effects of low oxygen on irradiation efficacy and the recommendation of the TPPT to remove the restriction form irradiation PTs for Tephritidae fruit flies.

9. Other Business

9.1 Effects of low oxygen on irradiation efficacy

[210] Mr Guy HALLMAN presented the discussion paper[37] on the effects of low oxygen on irradiation efficacy. He highlighted that almost all currently adopted PTs for irradiation treatments restrict the use of the treatment to commodities that have not been stored in modified atmosphere environment. The TPPT decided to include a limitation as the studies available at the time (Hallman 2001b, 2004a, b) indicated that irradiation under low-oxygen conditions might reduce the efficacy of the treatment.

[211] The only exception is PT 11 (Irradiation treatment for *Grapholita molesta* under hypoxia), and although PT 10 (Irradiation treatment for *Grapholita molesta)* targets the same pest with the same irradiation dose, but the 2 PTs have different outcomes. For the purpose of applying the sterile insect technique (SIT) there is a difference in tolerance of pests when they were kept under low oxygen storage.

[212] The United States Department of Agriculture, Center for Plant Health Science and Technology (CPHST) reviewed some references describing the effects of low oxygen on irradiation efficacy. Multiple studies have shown a loss of irradiation treatment efficacy at very low oxygen levels (near 0%), and CPHST recommends that very low oxygen during irradiation should not be allowed. They proposed that fruit flies have been well studied at moderate oxygen levels and oxygen levels of 5-7% or higher did not cause a loss of irradiation treatment efficacy in the studied fruit flies (Hallman, 2004a, b; Follett *et al*., 2013; Srimartpirom *et al*., 2018; Follett *et al*., 2018). For this reason CPHST proposed to change the restriction to "no irradiation on commodity stored below 10 % oxygen environment".

[213] Ms Vanessa DIAS introduced her collaborative research on effect of MA on organisms and the physiology of this effect. She explained that Tephritid fruit flies may enhance their antioxidant defenses during low oxygen exposure which, in turn, reduces oxidative stress and increases the resilience of the cells to low doses of irradiation. However, at irradiation doses near those required for treatment schedules, this slight increase of resilience is not sufficient to reduce efficacy of the treatment. In laboratory trials, no difference in survival of four Tephritid fruit fly species was found whether stored in low oxygen before and during irradiation or not.

[214] The TPPT queried how many third instars were considered and the researcher explained that approximately 88,000 *Bactrocera dorsalis* and 26,000 *Ceratitis capitata* was tested, without correction in controls.

[215] The TPPT considered that fruit flies when inside the fruit are already in an environment that has limited oxygen. Some members queried if the raised CO_2 level would also be a factor to consider. However the TPPT noted that there is information available of trials that resulted in 5% survival of *Grapholita molesta* treated in phytsonitary irradiation doses and thus the restriction would need to be further considered for other insect group, like the Lepidoptera

[216] One member queried how the 6 hours of storage in low oxygen was determined and it was explained that SIT uses 1 hour of low oxygen storage in order to raise the competitiveness and enhance the

[37] 23_TPPT_2019_Jul

antioxidant defenses of Tephritids. The dose was established based on studies measuring the physiological changes in the insects under different low oxygen durations and was meant to model the worst case scenario.

[217] The TPPT considered whether to remove the restriction of using modified atmosphere storage for Tephritid fruit flies. Some members thought that it would be appropriate to make the recommendation to remove the restriction once the publication base on the above mentioned study is released. It was considered that the result of this study should be published possibly before the end of the year.

[218] The TPPT agreed to request the research to be summarized in a discussion paper to corroborate the evidence to remove the restriction of using irradiation on commodities stored in modified atmosphere storage and present this paper to the SC recommending the removal of the restriction.

[219] The TPPT

(33) *invited* the SC to consider the study on the effects of low oxygen on irradiation efficacy and the recommendation of the TPPT to remove the restriction form irradiation PTs for Tephritidae fruit flies.

10. Close of the Meeting

[220] The Secretariat thanked the TPPT for their work and asked to the members to provide feedback on the meeting process via an online survey. The TPPT and the Secretariat expressed their appreciation for the work of Mr Andrew PARKER at his last meeting and extended their gratitude to Mr Yuejin WANG and wished them both best of luck on their future endeavours.

[221] The Chairperson thanked the hosts of the meeting and the TPPT members for the good discussion, highlighting the excellent coordination of the host agency.

[222] The meeting was closed.

Appendix 1: Agenda

2019 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

8 – 12 July 2019

Vienna, Austria

AGENDA

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
1.	**Opening of the meeting**		
	- Opening remarks by the IPPC Secretariat		MOREIRA
	- Opening remarks by the Host Agency		IAEA representative
2.	**Meeting Arrangements**		
	- Election of the Chairperson		MOREIRA
	- Election of the Rapporteur		CHAIRPERSON
	- Adoption of the Agenda	01_TPPT_2019_Jul	CHAIRPERSON
3.	**Administrative Matters**		
	- Documents List	02_TPPT_2019_Jul	KISS
	- Participants List	03_TPPT_2019_Jul	KISS
	- Local Information	04_TPPT_2019_Jul	IAEA representative
4.	**Draft phytosanitary treatments (PTs) in the work program[38]**	Link to Call for treatments page Link to all TPPT reports	
	- Overview of the standard setting procedure - Review of treatment leads for Phytosanitary Treatments (PTs)	05_TPPT_2019_Jul	KISS / MOREIRA
	- Discussion paper on the wording of the scope of PTs	06_TPPT_2019_Jul	DOHINO
4.1	Irradiation treatment for *Drosophila suzukii* (2017-017) – priority 1	Link to the submission 2017-017	LEACH / SMYTH
	- Draft PT: 2017-017	2017-0217	
	- Treatment lead summary	07_TPPT_2019_Jul 08_TPPT_2019_Jul	
4.2	Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) – priority 2	Link to the submission 2017-028	WILLINK
	- Draft PT: 2017-028	2017-028	

[38] 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
	- Treatment lead summary (incl. additional information)	09_TPPT_2019_Jul	
4.3	Irradiation treatment for eggs and larvae of the family Tortricidae (generic) (2017-011) – priority 1 - Draft PT: 2017-011 - Treatment lead summary	Link to the submission 2017-011 2017-011 10_TPPT_2019_Jul	HALLMAN / SMYTH
4.4	Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) – priority 1 - Draft PT: 2017-012 - Treatment lead summary	Link to the submission 2017-012 2017-012 11_TPPT_2019_Jul	YU
4.5	Cold treatment for *Thaumatotibia leucotreta* on *Citrus* spp. (2017-029) – priority 2 - Draft PT: 2017-029 - Treatment lead summary	Link to the submission 2017-029 2017-029 12_TPPT_2019_Jul	LEACH
4.6	Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013) – priority 2 - Draft PT: 2017-013 - Treatment lead summary	Link to the submission 2017-013 2017-013 13_TPPT_2019_Jul 14_TPPT_2019_Jul	DOHINO
4.7	Irradiation treatment for *Sternochetus frigidus* (2017-036) – priority 2 - Draft PT: 2017-036 - Treatment lead summary	Link to the submission 2017-036 2017-036 15_TPPT_2019_Jul	PARKER
4.8	Irradiation treatment for *Omphisa anastomosalis* (2018-042) – priority 2 - Draft PT: 2018-042 - Treatment lead summary	Link to the submission 2018-042 2018-042 16_TPPT_2019_Jul	DOHINO
4.9	Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014) – priority 3 - Draft PT: 2017-014 - Treatment lead summary	Link to the submission 2017-014 2017-014 17_TPPT_2019_Jul	MYERS
4.10	Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027) – priority 3 - Draft PT: 2017-027 - Treatment lead summary	Link to the submission 2017-027 2017-027 18_TPPT_2019_Jul	PARKER

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
4.11	CATTS (Controlled Atmosphere/Temperature Treatment System) treatments against codling moth (*Cydia pomonella*) and western cherry fruit fly (*Rhagoletis indifferens*) in cherry (2017-037) and CATTS treatments against codling moth (*Cydia pomonella*) and oriental fruit moth (*Grapholita molesta*) in apple (2017-038) – priority 3 - Draft PT: 2017-037, 2017-038 (combined) - Treatment lead summary	Link to the submission 2017-037 Link to the submission 2017-038 2017-037/038_Rev1 19_TPPT_2019_Jul 20_TPPT_2019_Jul	ORMSBY
4.12	Heat treatment of wood using dielectric heating (2007-114) - Draft PT: 2007-114 - Evaluation of the objection	2007-114	ORMSBY
5.	**Updates from IPPC bodies** - SC November 2018 - CPM-14 (2019) - SC May 2019	 SC November 2018 report CPM- 14 report SC May 2019 report	
5.1	Strategic discussion on the TPPTs work - the impact of the new strategic framework - Streamlining TP processes - TPPT expertise needed and terms of reference	21_TPPT_2019_Jul Link to the IPPC Strategic Framework 2020-2030 Link to the IPPC Procedure Manual for Standard Setting Link to TPPT specification (TP3)	OPATOWSKI / MOREIRA
6.	**Liaison**		
6.1	Phytosanitary Measures Research Group (PMRG) - PMRG Research Guidelines: Cold Treatments and Vapour heat treatments	Link to PMRG page Link to PMRG update to the CPM	LEACH/ MYERS/ HALLMAN
6.2	Ozone Secretariat (Vienna Convention and Montreal Protocol / United Nations Environment Programme (UNEP)) - Update from the Methyl Bromide Technical Options Committee - List of pests for which methyl bromide is most commonly applied and treatment alternatives for these	Link to Ozone Secretariat website 22_TPPT_2019_Jul	MOREIRA / OPATOWSKI

	AGENDA ITEM	DOCUMENT NO.	PRESENTER
7.	**Overview of the TPPT work programme** - TPPT 2018-2019 work plan	Link to List of topics for IPPC standards 05_TPPT_2019_Jul	MOREIRA / KISS
8.	**Recommendations to the SC**		CHAIRPERSON
9.	**Other business**		CHAIRPERSON
9.1	Effects of low oxygen on irradiation efficacy	23_TPPT_2019_Jul	HALLMAN
10.	**Close of the meeting**		CHAIRPERSON
	- Evaluation of the meeting process - Close		MOREIRA / CHAIRPERSON

Appendix 2: Documents list

2019 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

08-12 July 2019, Vienna, Austria

DOCUMENTS LIST

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
Draft PTs			
2017-011	4.3	Irradiation Treatment for Tortricidae (2017-011)	2019-06-21
2017-012	4.4	Irradiation treatment against all stages of the family Pseudococcidae (Generic)	2019-06-21
2017-013	4.6	Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013)	2019-06-21
2017-014	4.9	Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014)	2019-06-21
2017-017	4.1	Irradiation treatment for *Drosophila suzukii* (2017-017)	2019-06-21
2017-027	4.10	Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027)	2019-06-21
2017-029	4.5	Cold treatment for *Thaumatotibia leucotreta* on Citrus spp	2019-06-21
2017-036	4.7	Irradiation treatment for *Sternochetus frigidus* (2017-036)	2019-06-21
2017-042	4.8	Irradiation treatment for *Omphisa anastomosalis* (2018-042)	2019-06-21
2017-028	4.2	Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028)	2019-06-24
2017-037/038_Rev1	4.10	Draft PT: Vapour heat and modified atmospheres for *Cydia pomonella,* and *Grapholita molesta* in fruit of Apples, Peaches and Nectarine (2017-037, 2017-038)	2019-06-24 2019-07-01
2007-114	4.12	Draft PT: Heat treatment of wood using dielectric heating (2007-114)	2019-06-24
Other Documents			
01_TPPT_2019_Jul	2.0	Provisional Agenda	2019-05-24 2019-06-21 2019-07-01
02_TPPT_2019_Jul	3.0	Documents List	2019-07-01
03_TPPT_2019_Jul	3.0	Participants list	2019-06-21 2019-07-01
04_TPPT_2019_Jul	3.0	Local information	2019-04-25
05_TPPT_2019_Jul	4.0	TPPT Work Programme	2019-06-21

DOCUMENT NO.	AGENDA ITEM	DOCUMENT TITLE	DATE POSTED / DISTRIBUTED
06_TPPT_2019_Jul	4.0	Discussion paper on wording of the scope of PTs	2019-06-21
07_TPPT_2019_Jul	4.1	Treatment Leads summary: 2017-017	2019-06-21
08_TPPT_2019_Jul	4.1	Efficacy calculation for 2017-017	2019-06-21
09_TPPT_2019_Jul	4.2	Treatment Leads summary: 2017-028	2019-06-21
10_TPPT_2019_Jul	4.3	Treatment Lead Summary: 2017-011	2019-06-21
11_TPPT_2019_Jul	4.4	Treatment Lead Summary: 2017-012	2019-06-21
12_TPPT_2019_Jul	4.5	Treatment Lead Summary: 2017-029	2019-06-21
13_TPPT_2019_Jul	4.6	Treatment leads notes: 2017-013	2019-06-21
14_TPPT_2019_Jul	4.6	Efficacy calculation for 2017-013	2019-06-21
15_TPPT_2019_Jul	4.7	Treatment Lead summary: 2017-036	2019-06-21
16_TPPT_2019_Jul	4.8	Treatment lead summary: 2018-042	2019-06-21
17_TPPT_2019_Jul	4.9	Treatment Lead Summary: (2017-014)	2019-06-21
18_TPPT_2019_Jul	4.10	Treatment Lead Summary: 2017-027	2019-06-21
19_TPPT_2019_Jul	4.11	Treatment Lead Summary: 2017-037/038	2019-07-01
20_TPPT_2019_Jul	4.11	Efficacy calculation for 2017-037/038	2019-06-21
21_TPPT_2019_Jul	5.1	Strategic discussion on the TPPTs work	2019-07-01
22_TPPT_2019_Jul	6.2	Update from the Methyl Bromide Technical Options Committee	2019-06-21

IPP LINKS:	Agenda item
Link to Call for treatments page	4
TPPT meeting reports	4
Link to the submission 2017-017	4.1
Link to the submission 2017-028	4.2
Link to the submission 2017-011	4.3
Link to the submission 2017-012	4.4
Link to the submission 2017-029	4.5
Link to the submission 2017-013	4.6
Link to the submission 2017-036	4.7
Link to the submission 2018-042	4.8
Link to the submission 2017-014	4.9
Link to the submission 2017-027	4.10
Link to the submission 2017-037	4.11
Link to the submission 2017-038	4.11

IPP LINKS:	Agenda item
Link to the IPPC Strategic Framework 2020-2030	5.1
Link to the IPPC Procedure Manual for Standard Setting	5.1
Link to TPPT specification (TP3)	5.1
Link to PMRG page	6.1
Link to PMRG update to the CPM	6.1
Link to Ozone Secretariat website	6.2
Link to List of topics for IPPC standards	7

Appendix 3: Participants list

2019 MEETING OF THE TECHNICAL PANEL ON PHYTOSANITARY TREATMENTS

08-12 July 2019

Vienna, Austria

PARTICIPANTS LIST

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

Confirmed	Participant role	Name, mailing, address, telephone	Email address	Term expires
✓	**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 Fax: 972-(0)3-9681571	dopatowski@yahoo.com; davido@moag.gov.il;	N/A
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✓	**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 Scott **MYERS** USDA APHIS 1398 W Truck Rd., Buzzards Bay, MA, **USA** Tel: 508-563-0959	scott.w.myers@aphis.usda.gov;	2023– 2nd 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

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✓	**IPPC Secretariat Support (Standard Setting Associate)**	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

Confirmed	Participant role	Name, mailing, address, telephone	Email address	Term expires
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Appendix 5: Efficacy calculation for the draft PT *Thaumatotibia leucotreta* on *Citrus sinensis* (2017-029)

Based on table 5 of Moore *et al.* 2017, the adjusted total for 19 day treatment is as follows:

Rep	Control Mort	Treated No	Adjusted
1	0.43%	35 999	35 844
2	0.63%	35 925	35 699
3	0.17%	37 380	37 316
			108,859
		Efficacy calculation (%) =	**99.9972**
		Probit number =	**9.03**

Based on table 3 of Moore *et al.* 2017, the adjusted total for 16 day treatment is as follows:

Rep	Control Mort	Treated No	Adjusted
1	2.41%	48 400	47 234
2	1.48%	51 644	50 880
			98 113
		Efficacy calculation (%) =	**99.9969**
		Probit number =	**9.01**

Appendix 6: Efficacy calculation for the draft PT Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013)

Based on Hallman et al. (2013) and the additional detailed data provided

Rep	Control				Treatment (1.7 °C for 18 days)			Adjusted count
	Number of fruit	Number of survivors	Number of dead	Mortality	Number of fruit	Number of survivors	Number of dead	
1	2	279	3	1.06%	38	0	2660	2632
2	1	166	0	0.00%	37	0	2135	2135
3	1	279	0	0.00%	29	0	2329	2329
4	1	81	2	2.41%	29	0	2279	2224
5	1	150	0	0.00%	29	0	2170	2170
6	1	69	5	6.76%	29	0	1455	1357
7	1	28	0	0.00%	34	0	766	766
8	1	34	1	2.86%	34	0	1400	1360
9	1	21	14	40.00%	22	0	1327	796
10	1	27	0	0.00%	33	0	1279	1279
11	1	22	1	4.35%	34	0	1408	1347
12	1	13	3	18.75%	33	0	1463	1189
13	1	47	0	0.00%	34	0	2063	2063
14	4	1	0	0.00%	31	0	196	196
15	3	9	0	0.00%	32	0	338	338
16	3	16	0	0.00%	32	0	278	278
17	3	2	0	0.00%	32	0	224	224
18	3	1	0	0.00%	32	0	244	244
19	3	2	0	0.00%	32	0	101	101
20	1	4	0	0.00%	34	0	206	206
21	1	2	0	0.00%	33	0	256	256
22	2	2	0	0.00%	33	0	72	72
23	2	1	0	0.00%	33	0	42	42
24	2	2	0	0.00%	33	0	86	86
25	1	2	0	0.00%	34	0	38	38
26	1	186	0	0.00%	34	0	2195	2195
27	1	34	0	0.00%	34	0	1508	1508
28	1	103	0	0.00%	34	0	1552	1552
29	1	30	0	0.00%	34	0	413	413
30	2	5	0	0.00%	34	0	871	871
31	1	71	0	0.00%	34	0	941	941
32	1	26	0	0.00%	34	0	823	823
33	1	14	0	0.00%	34	0	1196	1196
34	6	7	0	0.00%	29	0	680	680
35	2	12	0	0.00%	33	0	384	384

36	1	32	0	0.00%	34	0	968	968
37	1	6	0	0.00%	34	0	474	474
Total	61	1786	29		1208	0	36820	35733
						Calculated Efficacy =		**99.9916**
				Ave 2.06%			36820× 97.94%	= 36062
						Calculated Efficacy =		**99.9917**

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Appendix 7: Efficacy calculation for the draft PT Cold treatment for Vapour heat - modified atmosphere treatment for *Cydia pomonella* and *Grapholita molesta* in fruit of *Malus pumila* and *Prunus persica* (2017-038)

Table 10: Treatment efficacy calculations using confirmatory trial data and survival rates from control data for 4th and 5th instar larvae life-stage tolerance testing (from Neven *et al*. 2006b and supplementary data).

Replicate	No. Infested	No. Live			TOTAL # Live	Survival Rate
1	110	88			88	0.80
2	20	19			19	0.95
3	111	89			89	0.80
4	118	118			118	1.00
5	96	86			86	0.90
6	120	113			113	0.94
7	74	67			67	0.91
8	120	109			109	0.91
Total	**769**	**689**			**689**	**0.90**
			Average (± SE x (SQR(1+1/r)) =	**0.90 ±**	**0.07 =**	**0.83**
					Number of Exposed Larvae =	**31,331**
					Estimated Number of Treated Larvae (at 95% LoC) =	**25,882**
					Calculated Level of Efficacy =	**99.9884%**

Appendix 8: Action points arising from the July 2019 TPPT meeting

	Action	Agenda Item	Responsible	Deadline
1.	Update the *List of topics for IPPC standards* with the changes agreed to at the 2019-07 TPPT meeting (titles, Treatment Leads, priorities, deletions, status changes)		Secretariat	2019-08
2.	Present the following draft PTs to the SC for approval for consultation: - Irradiation treatment for Tortricidae in fruits (2017-011) – priority 1 - Cold treatment for *Thaumatotibia leucotreta* on Citrus sinensis. (2017-029) – priority 2 - Cold treatment for *Bactrocera zonata* on *Citrus sinensis* (2017-013) – priority 2 - Vapour heat - modified atmosphere treatment for *Cydia pomonella* and *Grapholita molesta* in fruit of *Malus pumila* and *Prunus persica* (2017-038) – priority 3	4.3, 4.5, 4.6, 4.11	Secretariat	TBD
3.	Present the recommendation of the TPPT to the SC on the removal of the following PTs from the TPPT work programme: - Irradiation treatment for *Drosophila suzukii* (2017-017) – priority 1 - Irradiation treatment for *Omphisa anastomosalis* (2018-042) – priority 2 - Irradiation treatment for ants (Hymenoptera: Formicidae) hitchhiking on fresh commodities (2017-014) – priority 3	4.1, 4.8, 4.9	Secretariat	SC November 2019
4.	To ask the submitter of the draft PT on Sulfuryl fluoride fumigation treatment for *Chlorophorus annularis* on bamboo articles (2017-028) to provide further information on egg tolerance at the lower end of the temperature ranges proposed in the schedule and determine the most tolerant life stage.	4.2	Mr Eduardo WILLINK	Next TPPT meeting
5.	To ask the submitter to consider to restructure the draft PT for the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012) targeting separately the important genera in the family or gather more data and attempt to cover more species with economic importance globally and identify the most resistant species in the group considering the discussion of the TPPT.	4.4	Mr Daojian YU	Next TPPT meeting
6.	To ask the submitter to provide more information on the cold treatment for *Thaumatotibia leucotreta* on litchis once the publication is released, and a more extensive data set on grapes including details and measurements of the temperature variation during the confirmatory trial to allow to establish a cold treatment schedule for these commodities.	4.5	Mr Peter LEACH	Next TPPT meeting
7.	To ask the submitter of the draft PT on the Irradiation treatment for *Sternochetus frigidus* (2017-036) to provide additional clarification on the issues specified in the 2019 July TPPT report.	4.7	Mr Walther ENKERLIN HOEFLICH	Next TPPT meeting

	Action	Agenda Item	Responsible	Deadline
8.	To ask the submitter of the draft PT for the Irradiation treatment for *Pseudococcus jackbeardsleyi* (2017-027) to provide further information on the raw data supporting the treatment and methods used in the trials as discussed in the July 2019 TPPT meeting report.	4.10	Mr Walther ENKERLIN HOEFLICH	Next TPPT meeting
9.	To review the submitted information again, draft the PT on draft PT on CATTS (Controlled Atmosphere/Temperature Treatment System) treatments against codling moth (*Cydia pomonella*) and western cherry fruit fly (*Rhagoletis indifferens*) in cherry (2017-037) and clarify any further details with the submitter as necessary before presenting it to the TPPT again	4.11	Mr Michael ORMSBY	Next TPPT meeting
10.	To invite the SC to consider the response of the TPPT to the objection to the Heat treatment of wood using dielectric heating (2007-114) and the recommendation of the TPPT	4.12	Secretariat	SC November 2019
11.	To invite the SC to consider the possible ways to streamline the TP processes (listed in the TPPT meeting report under agenda item 5.1)	5.1	Secretariat	SC November 2019
12.	To review of the submission form and the checklist for evaluating treatment submissions for phytosanitary treatments with the assistance of Mr Peter LEACH considering the PMRG guidelines	5.1	Mr Scott MYERS and Mr Peter LEACH	2019-11
13.	To consider providing input on the following topics: - Correcting sample sizes and estimating number of insects treated (reported under agenda item 6.8 of the 2018 June TPPT meeting) - Evaluation criteria for temperature treatment exposure parameters (reported under agenda item 11.1 of the 2018 June TPPT meeting) - If there are any possibility of conducting further research on of *Franklinella occidentalis*. (TPPT meeting in February 2019 discussing the Irradiation treatment for Frankliniella occidentalis on all fresh commodities (2017-019)) - To identify the economically important Pseudococcidae species especially the ones considered quarantine pests in their regions and gathering available studies covering Pseudococcidae species in order to establish the generic treatment for the family Pseudococcidae. (TPPT meeting in June 2019 discussing the Irradiation treatment for all stages of the family Pseudococcidae (generic) (2017-012)) - How to invite good quality treatment submissions - Guidelines for laboratory colony maintenance	6.1	PMRG	2019-10
14.	To forward the TPPT's input on the list of pests and commodities for which methyl bromide is most commonly applied as a QPS treatment and the available methyl bromide alternatives to the Ozone Secretariat.	6.2	Secretariat	2019-08
15.	To address the comments of contracting parties on the PTs under consultation	7	Corresponding Treatment Leads	2019-10-30

	Action	Agenda Item	Responsible	Deadline
16.	Present the recommendation of the TPPT to the SC on: - changing the priority of the following topic from 3 to 1: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007) - assigning Mr Walther ENKERLIN HOEFLICH as the assistant steward of the following topic: Requirements for the use of irradiation as a phytosanitary measure (Revision to ISPM 18) (2014-007)	7	Secretariat	SC November 2019
17.	To invite the SC to consider the study on the effects of low oxygen on irradiation efficacy and the recommendation of the TPPT to remove the restriction form irradiation PTs for Tephritidae fruit flies	9.1	Secretariat	SC November 2019
18.	To summarize the research in a discussion paper to corroborate the evidence to remove the restriction and present this paper to the SC.	9.1	Mr Guy HALLMAN, Mr Scott MYERS, MS Vanessa CASTRO DIAZ	SC November 2019