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International Plant Protection Convention
Protecting the world's plant resources from pests

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1. Opening of the Session

1.1 FAO Opening

[1] Ms Maria Helena Semedo, FAO Deputy Director-General Climate and Natural Resources (DDN), welcomed delegates to the 13th Session of the Commission on Phytosanitary Measures (CPM) and conveyed appreciation to the 183 Contracting Parties (CPs) and to the, soon-to-be, ten Regional Plant Protection Organizations (RPPOs) for their commitment to the International Plant Protection Convention (IPPC) work programme. The DDN recognized the importance of the IPPC's annual theme "Plant Health and Environment Protection". The DDN also welcomed the IPPC community's contribution and support to the FAO's Strategic Objectives, as well as the Sustainable Development Goals (SDGs). The development of the IPPC ePhyto hub and Generic ePhyto National System (GeNS) to increase the harmonized use of electronic certification was highlighted, as was the advancement of the International Year of Plant Health in 2020 (IYPH), a proposal championed by the Government of Finland, to be presented to the United Nations General Assembly (UNGA) in 2018, which would significantly increase awareness of plant health globally.

1.2 Statement of the Minister for Agriculture and Water Resources of Australia

[2] Mr Kim Ritman, Chief Plant Protection Officer of Australia, read a message on behalf of the Australian Minister for Agriculture and Water Resources, the Honourable David Littleproud. In his message, the Minister thanked the CPM for its work and efforts to limit the spread of plant pests and protect plant health, thereby contributing to the efforts in achieving food security. The Minister reiterated Australia's commitment to supporting the IPPC and preserving plant resources, having continuously increased its biosecurity investment since 2013. The Minister reiterated his government's willingness to share this knowledge and expertise with the IPPC and other relevant fora. In his message, the Minister thanked the IPPC Secretariat for its continued work and wished the CPM a week of fruitful discussions and deliberations.

2. Keynote Address on Plant Health and Environmental Protection

[3] Ms Cristiana Paşca Palmer, Executive Secretary of the Convention on Biological Diversity (CBD), gave the keynote address on Plant Health and Environmental Protection. Ms Palmer noted the timely opportunity to strengthen our joint commitment of the IPPC and the CBD to make 2020 the International Year on Plant Health (IYPH 2020). She reminded the CPM of the longstanding collaboration between the IPPC and CBD, commencing with the signing of a Cooperation Agreement[1] in 2002. Ms Palmer conveyed appreciation to the CPM for the support from the IPPC to manage the risks posed by invasive alien species and Living Modified Organisms (LMOs). This strong cooperation was emphasized, highlighting the signing of a new Joint Work Programme in 2017. In addition, the recent meeting to set a new standard on border controls on e-commerce, and CBD guidance setting on unintentional introduction pathways, was held between the World Customs Organization (WCO) and the Inter-Agency Liaison Group, of which the IPPC is a founding member, and which continues to work on pests and invasive alien species.

3. Adoption of the Agenda

[4] The Chairperson informed the session of changes to the provisional agenda[2], with agenda item 10.5 now following directly after 8.6.

[5] One CP, supported by other CPs of the same region, proposed a discussion of the "Fall Army Worm" as an emerging pest in Africa, to agenda item 19, "Any other business".

[6] The CPM:

(1) *Adopted* the Agenda with changes (Appendix 01) and noted the List of Documents[3]. (Appendix 02).

[1] Memorandum of Cooperation, http://www.cbd.int/doc/agreements/agmt-fao-ippc-2004-02-25-moc-web-en.pdf

[2] CPM 2018/01

[3] CPM 2018/CRP/01

3.1 European Union (EU) Statement of Competence

[7] The CPM was informed of the modification of the Declaration of Voting Rights for items on the Agenda.

[8] The CPM:

(1) *Noted* the Declaration of Competences and Voting Rights submitted by the European Union (EU) and its 28 member states[4].

4. Election of the Rapporteur

[9] The CPM:

(1) *Elected* Mr Rajesh Ramarathnam (CANADA) as Rapporteur.

(2) *Elected* Ms Hellen Mwarey Langat (KENYA) as Assistant-Rapporteur.

5. Establishment of the Credentials Committee

[10] The CPM:

(1) *Appointed* a Credentials Committee composed of seven members, one per FAO region and one CPM Bureau member, in conformity with FAO rules.

(2) *Elected* Mr Dili Ram Sharma (NEPAL) as its Chairperson. The Credentials Committee endorsed a list of 134 valid credentials and set the quorum for the Commission at 92.

6. Report by the Chairperson of the Commission on Phytosanitary Measures

[11] The Chairperson of the CPM presented her report[5] which highlighted several key milestones and challenges to be addressed. These included: the need to stabilize the core funding and staffing requirements of the Secretariat; the aim of the IPPC, as set out in its Strategic Framework 2020-2030, transitioning from a standards setting organization towards a global body on plant health; the first meeting of the Implementation and Capacity Development Committee (IC); and, the successful transmission of phytosanitary information through the ePhyto hub, a project that has taken important steps towards harmonization of electronic certification. With regard to the need to secure sustainable funding for the IPPC, the Chairperson encouraged consideration of alternative modes of funding of projects and extra-budgetary activities not funded from the FAO Regular Programme. Other important issues presented in the report included the phytosanitary risks presented by e-commerce and internet trade, the use of Next Generation Sequencing (NGS) as a diagnostic tool and emerging innovation, and the implications for IPPC from the ratification of the Trade Facilitation Agreement (TFA). The Chairperson concluded by thanking fellow Bureau members and the IPPC Secretariat for their support and commitment, as well as the generosity of CPs for contributing funds and other resources to IPPC activities.

[12] Some CPs conveyed their appreciation for the content of the report by the CPM Chairperson, and highlighted their strong support for the vision of the CPM Bureau and Secretariat to begin the transition of the IPPC from a standards setting organization to a world organization for plant health, and their endorsement of the Strategic Framework 2020-2030.

[13] Several CPs also noted the excellent report and in particular the focus on key topics being developed including ePhyto, e-commerce, and welcomed the IPPC Strategic Framework for 2020-2030.

[14] Responding to a CP question, the Chairperson indicated the IPPC Secretariat would investigate the procedure for changing name to "World Organization on Plant Health" and its impact in terms of WTO-SPS responsibilities.

[15] The CPM:

[4] CPM 2018/CRP/02

[5] CPM 2018/24

(1) *Noted* the report presented by the CPM Chairperson.

7. Report by the IPPC Secretariat

[16] The IPPC Secretary welcomed all participants to CPM-13, highlighting a record attendance of over 478 participants, representing 140 countries and 31 observer organizations to the event (List of Particpants – Appendix 03). The IPPC Secretary presented the 2017 Report[6] of the IPPC Secretariat, outlining the ten major highlights achieved by the Secretariat over the past year and the challenges and goals going forward. These highlights included: Implementation of the 2017 IPPC annual theme; organization of IPPC governance and strategic activities; strengthening of standard setting; strengthening of standards implementation; strengthening of IPPC trade facilitation actions; promotion of IPPC communications and advocacy; promotion of the International Year of Plant Health; promotion of the IPPC network and international cooperation; enhancement of resource mobilization; and enhancement of internal management.

[17] The Secretary also made a presentation outlining other key elements of activities and actions taken to improve the functionality and efficiency of the Secretariat. Key information provided in the presentation included:

Update on Implementation of Enhancement Evaluation Recommendations:

- Background - overall objective, problems identified, and recommendations proposed;
- Actions and outcomes - reshaping the IPPC internal structures, regrouping staff, renewing the operational mechanism. (an organogram was included);
- Proposed minimum staff for operation of the IPPC Secretariat; and
- Estimated expenditures for the IPPC Secretariat Staff;
- Important activities for 2018 such as, supporting IPPC strategic planning, coordination of standard setting and implementation etc.

[18] The Secretary expressed his appreciation to the IPPC Governing Bodies, including Regional Plant Protection Organizations (RPPOs) and the National Plant Protection Organizations (NPPOs), and to all partners and collaborators globally for their support and collaboration.

[19] One CP sought clarification on the criteria used to select countries to conduct Phytosanitary Capacity Evaluations (PCEs). The Secretariat indicated that PCEs are conducted through FAO, or other donor projects, and those donors often request that a PCE be a prerequisite for the granting of funds.

[20] In response to a question raised by a CP, the steward of the draft standard on International Movement of Grain, indicated that all relevant sources of information were considered, including CODEX standards on grain.

[21] The CPM:

(1) *Noted* the report presented by the Secretary of the IPPC Secretariat.

8. Governance

8.1 Recognition of CAHFSA as an RPPO

[22] The Chairperson informed CPM that at the 29th session of the Technical Consultation among RPPOs (TC-RPPO) (Paris, 30 October-3 November 2017), the Caribbean Agricultural Health and Food Safety Agency (CAHFSA) submitted a request to the IPPC Secretariat to initiate procedures for its recognition as an RPPO in line with the procedure adopted by the ICPM in 2002. Further to review by the FAO Legal Counsel that the minimum requirements to function as an RPPO had been fulfilled, the TC-RPPO recommended that the CPM recognize CAHFSA as an RPPO.[7]

[6] CPM 2018/37

[7] CPM 2018/16

[23] Several CPs congratulated and expressed their support for CAHFSA's pursuit for recognition as an RPPO. The recognition of CAHFSA would better coordinate and monitor the plant health activities in the Caribbean region.

[24] A representative of the newly recognized RPPO, expressed her gratitude to the CPM, IPPC Secretariat, and FAO Legal Counsel, and pledged to work closely with all parties to protect the plant resources of the Caribbean region.

[25] The CPM:

(1) *Recognized* CAHFSA as an RPPO under Article IX of the IPPC.

(2) *Congratulated* CAHFSA member countries for the initiative and welcomed the new RPPO to the IPPC.

8.2 Summary of the 2017 Strategic Planning Group (SPG) report and revision of the Terms of Reference (ToRs) of the SPG to include RPPOs representatives

[26] The Vice-Chairperson of the CPM presented the 2017 Report[8] of the Strategic Planning Group (SPG) report and proposed that its Rules of Procedure (RoPs) be amended to reflect the new IC, and that RPPOs be invited to participate in order to provide their input into strategic planning.

[27] One CP requested a further amendment to the RoPs. It was indicated that the current wording of bullet point 4 of Rule 3 (Membership), seemed to reduce the importance of CPs participation and proposed that it be the first bullet point of Rule 3, and amended to "*representatives of Contracting Parties*". It was further indicated that representatives of the RPPOs be nominated through the TC-RPPOs process.

[28] An RPPO and some CPs suggested that the RPPOs participation should not be limited to one representative.

[29] The CPM:

(1) *Approved* the Strategic Planning Group Rules of Procedure, as modified (Appendix 04).

8.3 IPPC Strategic Framework for 2020-2030

[30] One of the drafters presented the revised draft of the IPPC Strategic Framework (SF) for 2020-2030[9], with amendments reflecting comments and guidance proposed by CPM-12 and the SPG during its 2017 meeting. The CPM-13 was requested to discuss and give input on the key elements of the framework (vision, mission, goals, strategic objectives, and IPPC development agenda), and further provide input on the content of the document during country consultations. CPM-13 was reminded that the SF should be viewed as a target and not as a roadmap, and that it would remain a living document and that future modifications and improvements would be needed based on operational environment. It was further stated that this document should be seen as the political vision and aspirations of the IPPC.

[31] Some CPs provided written statements[10] regarding the draft SF and, amongst others, highlighted that the mandate of the IPPC to protect global plant resources must be emphasized in the SF.

[32] Several CPs congratulated the drafters on their efforts, enthusiasm and commitment on developing the draft SF. A number of CPs and RPPOs provided inputs and comments on the draft SF, which included:

- *General:*
  - that there may be possible confusion with the concept of "system approach", as defined by the CPM, and the technical term "integrated pest management";

[8] CPM 2018/30

[9] CPM 2018/28

[10] CPM 2018/CR/?07

- to clearly indicate if the draft SF is an IPPC or CPM document. To this end, reference to "Our" in the document's Mission, Vision, and Goal" statements confused the message being conveyed about the owner of the document, and, therefore, suggested removal of "our" in these titles;
- to align the "language" of the SF with previous frameworks;
- that cooperation with international organizations should be clearer in the document, and should focus on weaknesses of developing countries, such as technical capacity;
- that implementation of the activities proposed in the draft required support of RPPOs;
- to replace reference to "NPPOs" with "Contracting Parties" in Key Result Areas of Strategic Objective C, (C1 and C2) in the document.
- that strengthening of pest outbreak response systems was welcomed, but that resources needed to be made available to respond to such events.

- *Vision:*
  - to not limit the scope of the vision statement to the spread of pests through "human interaction" only, as this did not include all other means that pests are spread.

- *Strategic Objectives:*
  - that capacity building should be reflected as a strategic objective, as contained in the IPPC Strategic Framework 2012-2019;
  - that the order in which the strategic objectives were currently drafted should be amended to indicate that food and nutritional security is of greater importance.

- *IPPC Development Agenda 2020-2030*
  - some CPs suggested that more discussion and clarity regarding commodity and pathway specific International Standards for Phytosanitary Measures (ISPM) was required before it can be included in the Development Agenda;
  - the importance of audits was highlighted, and that phytosanitary audits should be included;
  - that the development agenda should not be limited to the development of two commodity standards, and that flexibility should be allowed to respond to future needs as they may arise;
  - to include the impact of climate change on pest management under this item;
  - to include risk management and risk based sampling;
  - to combine, "Strengthening Pest Outbreak Response Systems" and "Global Pest Alert Systems", respectively points 5 and 6;
  - to include international research cooperation and forest production;
  - integrate the proposed item "New Phytosanitary Treatments" into the item "Commodity and Pathway Specific ISPMs, respectively points 7 and 2.

[33] The IPPC Secretariat took note of all the comments and suggestions and conveyed their appreciation to CPs for their inputs.

[34] The CPM Chairperson indicated that a revised draft SF would be circulated to CPs, SC, IC, RPPOs and international organizations to provide comments during the country consultation from 15 June to 31 August 2018, therefore, allowing two and a half months for comments. Comments from regional workshops should then be channeled through the TC RPPOs (virtually). All comments and inputs will be provided to the SPG for finalization of a revised draft SF for timely presentation to CPM-14 in 2019. This would allow time for the CPs to engage their relevant internal processes for the draft SF 2020-2030 to be adopted at the Ministerial session of the CPM in 2020.

[35] The CPM:

(1) *Provided* substantive comments on the current draft of the IPPC Strategic Framework 2020-2030.

(2) *Agreed* to the consultation process and timelines provided.

8.4 Sustainable Funding for the IPPC work programme (concept and mechanism)

[36] The Chairperson of the IPPC Financial Committee (FC) introduced the paper[11] "*Sustainable funding for the IPPC work programme*", and highlighted the simplification of the supplementary contribution process and the critical need for the creation of a sustainable funding mechanism to cover budgetary shortfalls.

[37] CPs welcomed the proposed simplified mechanism to facilitate financial contributions for the extra-budgetary activities for the IPPC work programme.

[38] CPs also indicated that it was important to have a clearly defined process on the role of the Bureau, CPM and Secretariat in approving the work plan and budget of the Secretariat. It was proposed that the work plan and budget for the coming year be drafted by the Secretariat and submitted to the Bureau at their October or December meeting, for review and recommendation to CPM for approval. The Secretariat should implement the approved work plan and provide progress reports to the Bureau.

[39] The CPM indicated that long-term sustainable funding should come from the FAO Regular Programme Budget. The Secretariat clarified that decisions on additional funds from the FAO Regular Programme were not decided at CPM, but through an internal FAO process.

[40] Several CPs, requested that additional funds from the FAO Regular Programme, through the appropriate governing body, including the FAO Committee on Agriculture (COAG), the FAO Finance Committee, and the FAO Programme Committee, be allocated to the IPPC Secretariat's budget allocation.

[41] The Chairperson urged CPs to discuss this issue with their respective Permanent Representatives to FAO to support the request. It was also recommended that CPs mobilize efforts to have funds for emergency response allocated to the IPPC Secretariat.

[42] The Chairperson indicated that the work of the IPPC was critical to FAO's work. The Chairperson, along with unanimous agreement from CPM members, called on the FAO Council and Conference to recognize this and appropriately fund the IPPC Secretariat from the FAO Regular Programme Budget, sufficient to meet implementation demands from CPs to achieve the objectives of the Convention.

[43] It was highlighted in CPM that no food security is possible without plant health. Plant pests could destroy livelihoods, communities, economies and leave millions without food to eat. The IPPC was the leader in the global effort to promote and maintain plant health and therefore food security. This outcome was at the core of the FAO's mandate and fundamental work, and should be resourced from FAO's Regular Programme Budget.

[44] The CPM:

(1) *Considered* the simplified procedure for IPPC Multi-Donor Trust Fund (MDTF) contributions and noted the progress on the "improved and detailed sustainable funding mechanism".

(2) *Adopted* the CPM draft decision on the Supplementary Contribution Arrangement (Appendix 05).

(3) *Strongly encouraged* Contracting Parties to continue contributing to the IPPC MDTF and IPPC Projects until a permanent funding solution was defined and agreed.

(4) *Called* upon FAO to increasing the funding basis of the IPPC Secretariat through reallocation of funds from its Regular Programme Budget.

(5) *Requested* the IPPC Secretariat, with the assistance of the Bureau, to develop a concise information paper for the Committee on Agriculture that describes the role of the IPPC and the impact of its activities to promote and maintain plant health to achieve global food security, protect natural and agricultural

[11] CPM 2018/26_Rev_01

ecosystems from plant pests and facilitate safe trade for the benefit of the earth and its people, together with the business case for additional funding from the FAO Regular Programme, and,

(6) *Requested* the IPPC Secretariat, to advise CPs through IPPC Contact Points when and how they should engage with their FAO permanent representatives and other relevant authorities in their governments to actively encourage and support proposals under consideration by FAO bodies for additional funding for the IPPC Secretariat from the FAO Regular Programme.

8.5 ToRs of the Financial Committee

[45] The Chairperson of the IPPC FC introduced the paper[12] outlining the need to develop guidance on the participation of observers to FC meetings, proposing the revision of the FC ToRs (set out in Appendix 1 of CPM 2018/07) as approved by the CPM Bureau.

[46] CPs expressed their support for the revision.

[47] In responding to a CP, the Chairperson of the FC indicated that the CPM Bureau could consider reviewing the ToRs and more specifically provision 3(4) related to funding FC members' participation to its meetings if needed.

[48] The CPM:

(1) *Adopted* the revised Financial Committee Terms of Reference (Appendix 06).

8.6 CPM recommendations

[49] The CPM Chairperson informed CPM that as this agenda item was linked to agenda item 10.5 (SC Recommendations to the CPM), they would be addressed concurrently, and, consequently, also the relevant papers[13] and proposed CPM decisions related hereto. The Secretariat initiated the discussion reminding CPM of the CPM Recommendations process.

[50] The IPPC Secretariat informed CPM that it had received one topic proposal for a CPM recommendation on *"The application of NGS technologies for plant pest diagnostics in a phytosanitary context"*. At their May 2017 meeting, the SC noted the Technical Panel on Diagnostic Protocols (TPDP) recommendations and stressed that the issue was broader than diagnosis as it was also relevant for pest risk analysis and surveillance. Therefore, the SC invited the CPM to note the challenges associated with the use of the NGS technologies, and that further work was needed on NGS technologies before they could be considered as the sole method for pest detection.

[51] A CPM side session on "Gene sequencing and molecular technologies" was conducted.

[52] Some CPs expressed concerns on the process and on the content of the proposed CPM Recommendation and invited CPs to continue working on the phytosanitary impact of gene sequencing and NGS technologies in diagnostics, noting, however, that further clarification was needed on the impact of such technologies in phytosanitary regulations.

[53] Some CPs stressed that the focus should be placed on the interpretation of the results rather than in the use of NGS technologies. It was mentioned that in some cases NGS technologies could be used as a sole method of pest detection, as long as they could be technically justified. It was also suggested that country consultation should be undertaken before it was presented for adoption by the CPM. It was further indicated that the establishment of a task force to work on NGS technologies may be too early, and further detail was needed on the work of the task force and how it would be funded.

[54] One CP indicated that policy advice and guidance on NGS technology use was required.

[12] CPM 2018/07

[13] CPM 2018/04, CPM 2018/14, CPM 2018/CRP/04, and CPM 2018/38

[55] One CP indicated that NGS technologies had become a technology close to actual use, but may not suit everybody due to cost issues. It was further indicated that a pilot task force be established and the topic be discussed at the regional level and then globally.

[56] The Chairperson invited interested CPs to help with modifying the draft CPM Recommendation. Once modified the draft recommendation would be circulated for country consultation starting 15 May 2018 for a period of three months. CPs can submit comment through the online comments system.

[57] The CPM:

(1) *Noted* the challenges associated with the use of the Next Generation Sequencing (NGS) technologies as a diagnostic tool for phytosanitary purposes.

(2) *Agreed* to develop a CPM Recommendation on "Next Generation Sequencing technologies as a diagnostic tool for phytosanitary purposes".

(3) *Decided* that it was premature to convene a task force on Next Generation Sequencing technologies.

9. Cooperation between Standard Setting and Standards Implementation

9.1 Call for topics "Standards and Implementation"

[58] A Bureau member presented a report to CPM of the outcome of the Focus Group (FG) deliberations and proposals regarding "Call for Topics" as agreed by the CPM Bureau during their December 2017 virtual meeting as per SPG suggestions[14]. The Bureau agreed to the proposed new title of the Call - 'Call for topics: standards and implementation' and decided that a call for topics should be opened from 1 May 2018 until 31 August 2018. The FG recommended the establishment of a Task Force on Topics (TFT) to review submissions of topics and provide relevant recommendations to both the SC and the IC, a process that would further strengthen the collaboration between these two bodies. It was also agreed that, in exceptional circumstances, the IC, like the SC, could also recommend the addition of a topic.

[59] Some CPs submitted a written statement[15], which indicated amongst others, that strong cooperation between the SC and IC, particularly to screen the submitted topics and develop recommendations and priorities for CPM to address, was essential. They indicated that the tasks of discussing the topics recommended by the SC and IC, and the preparation of the final paper on recommended topics for adoption by CPM, should be added to the list of the functions of the TFT. Changes to the Rules of Procedure (RoPs) of the TFT were also proposed. This was supported by other CPs.

[60] Furthermore, CPs encouraged the Secretariat to analyze the possible impact of the forthcoming call on the Secretariat's work and presented proposals for possible changes to be approved by CPM. A CP proposed that the title, "Criteria for the Call for Topics: Standards and Implementation" be changed to "Criteria for the justification and prioritization of proposed topics". Furthermore, the CP sought clarity on the process in the event that the CPM did not agree to add a submitted topic. The Secretariat responded that the CPM would discuss and decide on a possible way forward, which was similar to how the CPM dealt with objections to standards.

[61] The CPM:

(1) *Confirmed* the title of the Call: "Call for topics: standards and implementation".

(2) *Confirmed* agreement to give the Implementation and Capacity Development Committee the same authority as the Standards Committee to recommend topics in exceptional circumstances to the CPM.

(3) *Agreed* to the proposed process for the Call for Topics, as amended (Appendix 07).

(4) *Agreed* that the call be made every two years, with the first beginning 1 May 2018 and ending 31 August 2018.

[14] CPM 2018/19 (Annex 1, 2, and 3)

[15] CPM 2018/CRP/08

(5) *Agreed* to the Criteria for the Justification and Prioritization of Proposed Topics, as modified (Appendix 08).

(6) *Agreed* to the Terms of Reference and Rules of Procedure for the Task Force on Topics, as modified to reflect proposed amendments to the process for the Call for Topics (Appendix 09).

(7) *Requested* that the Task Force on Topics use the Framework for standards and implementation when reviewing submissions in response to the Call for Topics.

(8) *Requested* the Bureau to establish the Task Force on Topics.

(9) *Acknowledged* the need to reflect these decisions in the IPPC Standard Setting Procedure or other CPM Procedures, as appropriate, and requested the IPPC Secretariat to analyze possible impacts and benefits, and to report to CPM.

9.2 Framework for standards and implementation

[62] The Secretariat presented the updated Framework for Standards and Implementation[16] to the CPM, which had been reviewed and updated by the CDC and SC at their May 2017 meeting, and which remained unchanged by the SPG at their October 2017 meeting. CPs and RPPOs were requested to use the Framework as a reference when responding to the Call for Topics.

[63] Some CPs endorsed the Framework as an important tool for driving the work of the CPM, and requested the Secretariat to update the Framework by progressively including adopted ISPMs as appropriate. They also requested that commodity standards be included in the Framework at the appropriate place.

[64] It was suggested that diagnostic protocols (DPs) be developed as manuals and not as ISPMs, considering the wide varieties of pests and less resources were needed to develop manuals.

[65] The Chairperson requested the Secretariat to make note of the discussions, work with the SC and IC to make the necessary amendments to the Framework, and present it to the SPG. Upon suggestion by a CP, it was noted that the IC assign a Framework Champion.

[66] The CPM:

(1) *Endorsed* the updated Framework for Standards and Implementation.

9.3 Conceptual challenges in standards development in terms of implementation

[67] The Chairperson introduced the paper[17] on commodity and pathway specific ISPMs, as prepared by the CPM Bureau members, with input from the SC and IC. The Chairperson outlined the difficulties associated with making progress on these types of ISPMs, as contained in the paper, and emphasized the need for discussion at CPM to progress this issue.

[68] After considering several views expressed by CPs, including written statements[18], the Chairperson suggested that interested CPs participate in a Friends of the Chair (FoC) meeting. The FoC meeting was attended by a large number of CPs representing all the FAO regions. A summary of the discussions from the FoC meeting was captured in a Conference Room Paper[19] (CRP).

[69] The CRP was presented in the plenary, further discussed and modified following inputs from CPM. The proposed modifications should be read in conjunction with CRP 2018/13 and are presented below:

- Section 1: "What do we gain?" changed to "What could we gain if we develop commodity and pathway standards?"

[16] CPM 2018/20

[17] CPM 2018/29

[18] CPM 2018/CRP/03

[19] CPM 2018/CRP/13

- New point added: Provide developing countries with the opportunity to participate in safe trade, both import and export, where capacity constraints may limit current access.

- Section 2: "What would we lose?" changed to "What could we lose if we did not develop commodity and pathway standards?"
  - "Credibility for the IPPC" changed to "The relevance of the IPPC"
  - New points added: Positive perception of the IPPC; Sovereignty of countries to define rules; The relevance of PRA in import decisions.

- Section 5: two new points added:
  - The development of harmonized phytosanitary measures to support the risk management of pests
  - Lessons learnt from previous and current attempts at developing commodity standards through the standard setting process.

[70] The CPM:

(1) *Noted* the outcomes of the Friends of Chair discussion.

(2) *Requested* the Bureau and Secretariat, in consultation with the Standards Committee and Implementation Committee, to develop Terms of Reference for a small focus group, with geographical representation, to be convened adjacent to the October 2018 Strategic and Planning Group meeting to:

i. analyze, and consequently define, the strategic value and purpose of commodity and pathway standards against the IPPC strategic objectives,
ii. capture principles and criteria for their development and its uses, with reference to practical examples,
iii. assess processes used to develop and use them,
iv. illustrate those aspects with examples of possible commodity or pathways standards, and,
v. evaluate the role of the pest risk analysis on this approach.

(3) *Requested* Contracting Parties and Regional Plant Protection Organizations to provide reference materials that could help the focus group with its tasks, including country comments on the questions posed by the Standards Committee[20].

(4) *Requested the SC to assign* "pending status" to the following topics on the development of standards:

- International movement of grain (2008-007)
- International movement of cut flowers and foliage (2008-005)

9.4 Implementation pilot surveillance

[71] The Secretariat presented its report[21] on the implementation pilot project on surveillance and emerging pests.

[72] Given the importance of the pilot, some CPs requested that corrective considerations and actions to improve the pilot, be undertaken, and in this regard, it was suggested that the IC carry out a detailed evaluation of the project and make a proposal, through the SPG, to the CPM-14 in 2019, on a way forward to allow the pilot to continue.

[73] One CP indicated that the lack of resources and participation of CPs in the implementation of the pilot, and suggested that an evaluation of the priority of the pilot by CPM should determine if it is to be terminated or continued. In the event that it continues, a concrete plan should be developed, and the necessary resources should be identified.

[20] CPM 2018/29

[21] CPM 2018/21 and CPM 2018/CRP/12

[74] One CP highlighted that draft ISPM 6 is to be adopted at CPM 13 and that it is the time to analyze the data collected from the pilot, and for the IC and SC to report to CPM-14 (2019) on the knowledge acquired. The CP also identified that the fall armyworm crisis in Africa should not be considered as a pilot but rather a project that needs collective expertise to tackle the pest.

[75] One CP suggested that the Secretariat indicate in its report-back, what component of the work plan of the pilot had been implemented and what level of success was achieved.

[76] The Chairperson informed CPM that there was a surveillance work plan in place, but that the project was largely under-funded and lacked feedback from CPs, which hampered effective progress of the project. The Chairperson further indicated that there was enormous value in assessing the benefits, impacts and success of the surveillance pilot, and that the experience of the RPPO that undertook a six year work plan, could inform surveillance work plans in other regions. The Chairperson emphasized that RPPOs needed to play an active role in identifying emerging pest issues and share information to allow adequate response to emergency pests.

[77] Several CPs and a RPPO stressed the emergency created by the spread of the fall armyworm in Africa and the destruction caused by the pest, and called upon the Secretariat and CPM to intervene as a matter of urgency. It was requested that this "crisis" be brought to the attention of FAO management and a meeting be arranged by the IPPC Secretariat during CPM-13 with the relevant FAO representatives and other interested parties to further discuss the fall armyworm situation, as raised by several CPs and a RPPO, and to attract the attention and support of donors to assist with the crisis.

[78] The CPM:

(1) *Noted* the efforts of Australia, Republic of Korea, EPPO and CIHEAM to champion the three pest initiatives of the programme;

(2) *Noted* the work of the contracting parties, RPPOs and Secretariat who contributed to the activities outlined in the report;

(3) *Thanked* Switzerland and Republic of Korea for their generous financial contributions;

(4) *Requested* the Implementation and Capacity Development Committee and the Standards Committee to review and evaluate the actions of the surveillance work plan that have been completed as well as the implementation pilot on the three priority pests. The review should identify lessons learnt, review the priorities in the work plan, clearly identify directions, outputs and outcomes and recommend revisions of the plan to CPM as necessary, taking into account the experience of the APPPC and the revised standard on surveillance (ISPM 6).

(5) *Encouraged* TC-RPPOs to complete the establishment of the process for identification, sharing information and providing advice on new emerging pests in their regions.

(6) *Encouraged* CPs to consider the roles and responsibilities of the IPPC in relation to detection and response to emerging pests in context to the Strategic Framework 2020-2030 during the country consultation.

(7) *Requested* the IPPC Secretariat, during this CPM meeting, to coordinate a meeting of the CPs, FAO and interested parties to discuss the Africa situation in relation to the Fall Armyworm, and identify the needs and activities of the IPPC community that could assist the region in responding to the pest.

(8) *Encouraged* contracting parties to contribute technical and financial resources to the implementation pilot on surveillance and to activities on emerging pests;

(9) *Encouraged CPs to provide* technical resources and expertise on emerging pests as well as methods to assess emerging pests to the IPPC Secretariat.

9.5 Implementation Review and Support Systems (IRSS)

[79] The IPPC Secretariat presented its report[22] on the Implementation Review and Support System (IRSS) 2018-20, noting it was in its third project cycle, and conveyed appreciation to the EU for its support and funding. Since its establishment in 2012, the IRSS had served as a tool to identify CP's challenges and opportunities in

[22] CPM 2018/22

implementing the Convention and International Standards for Phytosanitary Measures (ISPMs). The IRSS activities over the past six years had included surveys, desk studies, scanning for emerging issues, technical analyses, helpdesk, and the recent development of an IPPC Monitoring and Evaluation Framework (MEF).

[80] Some CPs reiterated that the MEF was an important element for the IC to carry out its oversight function for the IRSS project, and that the MEF would offer the proper tools to the IC to provide CPM with feedback on future IRSS activities. They also indicated that it may offer tools to the Secretariat for the delivery of its work programme and for to do an internal audit. They further indicated that the IRSS could play an important future role in the communications and co-functions of the SC and IC.

[81] Some CPs supported the IRSS project, but indicated that its results-should not be used to measure the level of national conformity.

[82] The IRSS as a tool to help CPs track successes and challenges was also emphasized.

[83] The CPM:

(1) *Thanked* the European Union and the Government of Switzerland for their financial support for the Second Cycle of the IRSS.

(2) *Noted* the progress made towards maintaining IRSS activities during 2017.

(3) *Thanked* the European Union for funding the third cycle of the IRSS 2018-2020.

(4) *Invited* Contracting Parties to support the activities of the IRSS.

10. Standard Setting

10.1 Report on the activities of the Standards Committee (SC)

[84] The Chairperson of the Standards Committee (SC) presented a summary of the activities carried out by the SC during 2017[23]. Among them, he highlighted the 13 draft ISPMs and 7 draft Specifications that were submitted for consultation; the 7 Diagnostic Protocols (DPs) adopted by the SC on behalf of the CPM and one Specification approved by the SC (number 66: Audit in the phytosanitary context); the recommended draft ISPMs for adoption by CPM-13; and decisions made by electronic means (12 e-decisions). He also recalled that the call to submit proposals for phytosanitary treatments was opened in 2017 and would remain open until resources were available. Twenty nine phytosanitary treatment submissions were received so far.

[85] The SC Chairperson stressed the challenge that the development of commodity standards and pathways could present if the CPM decided to move forward in that way. He recalled that the SC had already discussed some aspects of this concept when the draft ISPMs on *International Movement of Cut Flowers* and *International Grain Movement* were discussed. The SC Chairperson highlighted the start of cooperation activities between the SC and the IC.

[86] The SC Chairperson thanked all those involved in the standard setting process with regard to the comments received from CPs, RPPOs and international organizations; the support of the CPs to host meetings; and the input provided by technical panels and expert drafting group members and the stewards of draft ISPMs. Finally, he acknowledged the work of the Standard Setting Unit (SSU) of the IPPC Secretariat, noting their invaluable contribution.

[87] The CPM:

(1) *Noted* the Report on the activities of the Standards Committee in 2017.

[23] CPM 2018/12

10.2 Adoption of International Standards for Phytosanitary Measures

[88] The IPPC Secretariat introduced the full list of papers[24] outlining the various draft ISPMs submitted to the CPM-13 for adoption, as well as diagnostic protocols (DPs) adopted by the SC on behalf of the CPM, and activities related to the adopted standards. The SC requested the CPM to convey appreciation to the experts of the drafting groups for their active contribution in the development of the ISPMs (Appendix 10).

[89] The Secretariat informed the CPM that an objection was received[25] three weeks prior to the CPM-13 (2018), in line with the standard setting procedure rules. It was also informed that the objection submitted was on the Revision of Annex 1 and Annex 2 to ISPM 15, for inclusion of the phytosanitary treatment sulphuryl fluoride fumigation and revision of the dielectric heating section (2006-010A&B). The submitting CP had, however, withdrawn the objection.

[90] The Secretariat informed the CPM, that all 22 ISPMs in 2017 had been reviewed by the Language Review Groups (LRG) and posted on the IPPC website[26], except for French versions, as a French Coordinator was needed for the LRG.

[91] The CPM was also informed that the SC had recommended to the CPM to change the priority from 2 to 1 of the topic on "Audit in the phytosanitary context", as the SC had agreed that the development of this ISPM was important, as audits were required in many other ISPMs. It was also mentioned that as of March 2018, the List of Topics for IPPC Standards was available in an on-line format on the IPPC website[27]. The CPM was also reminded of the process for co-publishing agreements for unofficial translations of ISPMs and that any CP or RPPO that wished to sign a co-publishing agreement with FAO for the unofficial translation of ISPMs and other documents could find the necessary information on the IPP[28].

[92] One CP requested clarification on priority management of topics within the standard setting process. The Secretariat clarified that the priority setting was based on gradation with priority 1 topics completed before 2, 3 and 4.

[93] The CPM:

(1) *Adopted* the Revision of ISPM 6 (*Surveillance*) (2009-004) contained in CPM 2018/03_01. (Appendix 19)

(2) *Adopted* the 2015 and 2016 amendments to ISPM 5 (*Glossary of phytosanitary terms*) (1994-001) contained in CPM 2018/03_02 (Appendix 19).

(3) *Adopted* the Revision of Annex 1 and Annex 2 to ISPM 15, for inclusion of the phytosanitary treatment *sulphuryl fluoride fumigation* and *revision of the dielectric heating section* (2006-010A&B) contained in CPM 2018/03_03 (Appendix 19).

(4) *Adopted* ISPM 42 on the *Requirements for the use of temperature treatments as a phytosanitary measures* (2014-005) contained in CPM 2018/03_04 (Appendix 19).

(5) *Adopted*, as annexes to ISPM 28 (*Phytosanitary treatments for regulated pests*): PT 32 Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109) contained in CPM 2018/03_05 (Appendix 19).

(6) *Noted* that the SC adopted on behalf of CPM the following two diagnostic protocols (DPs) as Annexes to ISPM 27 (*Diagnostic protocols for regulated pests*)[29]:

- DP 23: *Phytophthora ramorum* (2004-013) (Appendix 19)

[24] CPM 2018/03 (attachments 01, 02, 03, 04 and 05)

[25] CPM 2018/INF/12_REV_01

[26] Adopted Standards (ISPMs) web page: https://www.ippc.int/en/core-activities/standards-setting/ispms/

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

[28] Co-publishing agreements: https://www.ippc.int/en/core-activities/governance/standards-setting/ispms/copublishing-agreements/

[29] Adopted DPs are made available officially at: https://www.ippc.int/en/core-activities/standards-setting/ispms/. Language versions of DPs are available only for download via the IPP (as they are translated).

- DP 24: *Tomato spotted wilt virus, Impatiens necrotic spot virus and Watermelon silver mottle virus* (2004-019) (Appendix 19)

(7) *Noted* that the following 22 ISPMs had been reviewed by the Arabic, Chinese, Russian and Spanish LRGs, as well as the FAO Translation Services and that the IPPC Secretariat incorporated the modifications accordingly and revoked previously adopted versions. These revised ISPMs were posted on the Adopted Standards page of the IPP and replaced previous versions.

- DP 10: Diagnostic protocol for *Bursaphelenchus xylophilus* (2016)
- DP 11: Diagnostic protocol for *Xiphinema americanum sensu lato* (2016)
- DP 12: Diagnostic protocol for *Phytoplasmas* (2016)
- DP 13: Diagnostic protocol for *Erwinia amylovora* (2016)
- DP 14: Diagnostic protocol for *Xanthomonas fragariae* (2016)
- DP 15: Diagnostic protocol for *Citrus tristeza virus* (2016)
- DP 16: Diagnostic protocol for *Genus Liriomyza* (2016)
- Annex 1 (*Arrangements for verification of compliance of consignments by the importing country in the exporting country*) of ISPM 20 (*Guidelines for a phytosanitary import regulatory system*)
- ISPM 38 (*International movement of seeds*)
- ISPM 39 (*International movement of wood*)
- ISPM 40 (*International movement of growing media in association with plants for planting*)
- ISPM 41 (*International movement of used vehicles, machinery and equipment*)
- PT 22: Sulfuryl fluoride fumigation treatment for insects in debarked wood
- PT 23: Sulfuryl fluoride fumigation treatment for nematodes and insects in debarked wood
- PT 24: Cold treatment for *Ceratitis capitata* on *Citrus sinensis*
- PT 25: Cold treatment for *Ceratitis capitata* on *Citrus reticulata x C. sinensis*
- PT 26: Cold treatment for *Ceratitis capitata* on *Citrus limon*
- PT 27: Cold treatment for *Ceratitis capitata* on *Citrus paradisi*
- PT 28: Cold treatment for *Ceratitis capitata* on *Citrus reticulata*
- PT 29: Cold treatment for *Ceratitis capitata* on *Citrus clementina*
- PT 30: Vapour heat treatment for *Ceratitis capitata* on *Mangifera indica*
- PT 31: Vapour heat treatment for *Bactrocera tryoni* on *Mangifera indica*

(8) *Revoked* all previously adopted versions of the above ISPMs (those that have been reviewed by the LRG and FAO Translation Services).

(9) *Noted* that the LRG for French was not operational and that a new Coordinator was needed.

(10) *Agreed* that the priority for *Audit in the phytosanitary context* (2015-014) be changed from Priority 2 to Priority 1.

(11) *Acknowledged* the contributions of Contracting Parties, Regional Plant Protection Organizations and organizations who hosted or helped organize standard setting meetings in 2017:

- Canada (Expert Working Group (EWG) on *Authorization of entities to perform phytosanitary actions* (2014-002)),
- Joint FAO/International Atomic Energy Agency (IAEA) Division of Nuclear Techniques in Food and Agriculture (Technical Panel on Phytosanitary Treatments),
- Vietnam (EWG Revision of ISPM8: (*Determination of pest status in an area*) (2009-005)), and
- Italy (Technical Panel for the Glossary).

(12) *Acknowledged* the contributions of the members of the Standards Committee (SC) who had left the SC in 2017:

- Thailand, Ms Walaikorn RATTANADECHAKUL
- China, Mr Lifeng WU

(13) *Acknowledged* the contributions of the member of the Technical Panel on Phytosanitary Treatments (TPPT) who had left in 2017:

- United States of America and the Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, Mr Guy HALLMAN

(14) *Acknowledged* the contributions of the member of the Technical Panel on Diagnostic Protocols (TPDP) who had left in 2017:

- The Netherlands, Mr Johannes DE GRUYTER

(15) *Acknowledged* the contributions of the member of the Technical Panel on Fruit Flies (TPFF) who had left in 2017:

- Japan, Mr Kenji TSURUTA

(16) *Acknowledged* the contributions of the member of the Technical Panel for the Glossary of Phytosanitary Terms (TPG) who had left in 2017:

- New Zealand, Mr John HEDLEY

10.3 Proposed amendments to the Standards Committee ToRs and Rules of Procedure

[94] The IPPC Secretariat presented its proposed amendments to the SC ToRs and RoPs[30].

[95] Some CPs welcome the revision of the ToRs and RoPs to include a member of the IC to participate in the SC.

[96] One CP requested revision of Appendix 1 of the CPM paper presented, as the addition to ToR *Point 3* was a repetition of the paragraph added to RoP Rule 7. The CP requested that this be reviewed for clarity to keep the documents consistent, which was duly noted by the Secretariat.

[97] The Chairperson suggested that the CPM adopt the changes as presented and indicated that the SC would review along the lines suggested by the CP.

[98] The CPM:

(1) *Adopted* the revised Standards Committee Terms of Reference and the Rules of Procedure (Appendix 11).

10.4 Ink Amendments to Adopted International Standards for Phytosanitary Measures (ISPMs)

[99] - ISPM 5 (*Glossary of phytosanitary terms*) and ISPM 12 (*Phytosanitary certificates*)

[100] The Secretariat introduced the full list of papers[31] for this agenda item indicating that for ISPM 5 the proposed ink amendment was on the term "detention".

[101] For ISPM 12, the ink amendments were made to Appendix 1 to update the web links as work was being done on the ePhyto Hub and GeNS. CPM was informed that in October 2017, the Bureau had asked the Secretariat to apply the ink amendments immediately, highlighting the urgency in supporting the implementation of the ePhyto pilot, and informed the SC and the CPM of these ink amendments.

[102] - Reorganization, Harmonization and Minor Technical Updates of the Fruit Fly ISPMs

[103] Regarding the reorganization, harmonization and minor technical updates of the fruit fly ISPMs, the Secretariat informed the CPM that the main objective of the reorganization was to ensure that the implementation of the suite of fruit fly standards be more logical and simple in order to prevent the introduction and spread of fruit flies and to facilitate trade.

[104] The Secretariat recalled that a first version of this reorganization had been proposed at the CPM-12 (2017), and that agreement could not be reached. Subsequently, COSAVE had volunteered to lead a virtual working

[30] CPM 2018/10

[31] CPM 2018/08 (and attachments 01 – 06) and CPM 2018/09

group to review the CPM-12 (2017) document on the proposed reorganization of the fruit fly standards. The CPM also invited Australia, Europe, and Japan to work together with COSAVE to work on building consensus for this proposal. A virtual meeting of the small CPM-12 (2017) working group was held in September 2017 and concerns were discussed, clarifications made and adjustments to the paper provided. The updated paper was submitted to the November 2017 SC meeting, and the SC members from COSAVE, in a compromise solution, agreed with moving ISPM 30 as an annex to ISPM 35. Additional changes to the text presented to CPM-12 (2017) were also suggested and the SC agreed to present the proposed reorganization of IPPC fruit fly standards as amended at the SC November 2017 meeting to CPM-13.

[105] The CPM was informed that the ink amendments did not change the content of the standards, but helped facilitate its reading and utilization. With regards to technical updates, the Secretariat informed CPM that over the last ten years some technical changes had occurred, specifically within taxonomy. The main technical update proposed in the reorganization was for the synonimization of four species of *Bactrocera* (*B. dorsalis, B. invadens, B. papaya* and *B. phillipinensis*) on a single species *B. dorsalis*, as supported by scientific evidence.

[106] The Secretariat further drew the CPM's attention to the fact that, in consultation with the FAO Legal Office, the level of obligation in the standards remained identical. It was also highlighted that, since 2004, the current TPFF members had worked to develop fruit fly standards under the auspices of the IPPC and the SC. These experts brought with them vast scientific knowledge and practical experience in managing pest risks pertaining to fruit flies. The proposal for reorganization was based on international practices and would facilitate the implementation of the fruit fly standards, which would consequently facilitate trade.

[107] Some CPs suggested that, in future, if changes were minor, and there was agreement on the changes, it would be better to follow the Standard Setting process. The Secretariat indicated that for transparency, it was always presented to CPM.

[108] Some CPs indicated that reaching consensus on the fruit fly amendment was the result of a lengthy process, which included compromises from their side.

[109] The Chairperson indicated that the number ISPM 30 would not be used in the future.

[110] The CPM:

(1) *Noted* the ink amendments to ISPM 5 (*Glossary of phytosanitary terms*) in relation to the term "detention" (Appendix 18) (Attached to the English version only);

(2) *Noted* the ink amendment to Appendix 1 (*Electronic phytosanitary certificates, information on standard XML schemas and exchange mechanisms*) of ISPM 12 (*Phytosanitary Certificates*) (Appendix 18) (Attached to the English version only).

(3) *Agreed* to the reorganization of the suite of fruit fly ISPMs as presented in Figure 2 of document CPM 2018/08, including:

a) *incorporation* of ISPM 30 into ISPM 35 as Annex 1, noting that the same level of prescriptiveness persists and consequently:

i. *Noted* that the text of former Annex 2 to ISPM 30 was integrated into Section 8 of Annex 1 to ISPM 35 (former ISPM 30).

ii. *Noted* that the former Appendix 1 to ISPM 30 is no longer relevant because ISPM 26 has an elaborated and recently adopted appendix on fruit fly trapping, and consequently this was not incorporated into ISPM 35. A reference is made to Appendix 1 of ISPM 26.

iii. *Noted* that former Appendix 2 of ISPM 30 has become Appendix 1 of Annex 1 of ISPM 35 (former ISPM 30).

b) *Revoked* ISPM 30.

(4) *Noted* that direct links between fruit fly standards and direct links between fruit fly standards, annexes to ISPM 28 and annexes to ISPM 27 have been included in the relevant fruit fly standards.

(5) *Noted* the consistency and editorial changes (ink amendments) in the standards (in attachments 1 to 6) (English version only).

(6) *Noted* that the ink amendments will be translated into all FAO languages. All ink amendments in all languages will be incorporated into the individual standards and the previous versions of the standards revoked.

10.5 Standards Committee recommendations to the Commission on Phytosanitary Measures

[111] This topic was addressed under Agenda item 8.6.

11. Implementation Facilitation

11.1 Activities of the Implementation and Capacity Development Committee

[112] The Chairperson of the IC presented a report on the activities of the IC and the composition of its membership[32]. The report outlined the items agreed upon to constitute the greater part of the committee's activities in the coming year, including; development of an IC procedural manual, creation of the NRO working group, embracing its dispute avoidance role, development of a project reporting template and development of technical resources. Emphasis was also placed on the collaboration between the IC and SC, and its participation in IYPH was welcomed as an excellent opportunity to raise awareness of the work of the IC. The CPM was informed of the need to avail regular programme funds to the IC for results to be delivered.

[113] CPs welcomed the appointment of the new lead of the Secretariat's Implementation and Facilitation Unit (IFU) and congratulated the IC on its work. CPs indicated that better coordination of resources was needed for the IC to implement the Convention and that its cooperation with the SC and RPPOs was important.

[114] The CPM discussed the composition of the IC sub-groups and, particularly, whether they should include members from the IC only, or also include regional experts based on prioritized issues.

[115] It was also highlighted that dispute settlement remained a pertinent component of the functions of the IPPC under the oversight of the IC, but that it did not seem prioritized in the IC report.

[116] One CP indicated that it was important that the initial focus of the IC be on its governance and establishing the operating process to fully implement its ToRs and RoPs to ensure efficiency. It was further indicated that the IC should focus on reviewing its capacity development framework to identify a smaller number of priority actions. A key input for this would be the Call for Topics in 2018. The CP indicated that CPM should approve the activities of the IC's work programme and budget at CPM-14 (2019). This should be incorporated into the Secretariat's budget and work plan. It was further indicated that IPPC regional workshops be utilized by the IC to receive feedback on possible implementation issues.

[117] A number of CPs indicated that the over-ambitious work programme of the IC might divert it from its primary mandate of overseeing the implementation of the Convention. The CPs suggested that the IC focus on priority projects and to develop a work programme closely reflecting the needs of the CPs. The example of NROs was provided, noting that CPs were now fully aware of their reporting obligations and that the IC only include awareness-raising projects if a significant reduction is observed..

[118] One CP indicated that the CPM be involved in setting the IC's priorities. It further indicated that other activities of the IC be put on hold until CPM approves the IC activities at CPM-14 (2019).

[119] One CP also raised concern with the lack of resource allocated to the IC to date.

[120] The CPM:

(1) *Noted* the report from the IC Chairperson.

[32] CPM 2018/11

(2) *Noted* the membership of the Implementation and Capacity Development Committee (Appendix 12).

11.2 National Reporting Obligations (NRO)

[121] The IPPC Secretariat presented its report[33] on National Reporting Obligations (NRO). The Secretariat informed CPM that the NRO Year of Regulated Pests Lists would start in April 2018.

[122] CPs welcomed the report and expressed strong support for the 2018 NRO Year of Regulated Pests List as a transparent and regulated pests list is an important element for the facilitation of safe trade.

[123] The CPM:

(1) *Noted* the update on activities related to National Reporting Obligations.

(2) *Noted* that the focus of NRO activities in 2018 would be creating, posting and updating regulated pest lists by NPPOs and IPPC contact points.

11.3 Status of ISPM 15 Symbol Registration

[124] Following a video of the STDF project on the implementation of ISPM 15 and its impact on the economy of a group of African countries[34], the FAO Legal Division provided a report[35] on the status of ISPM 15 Symbol Registration. The Secretariat intended initiating a new round of registration for the remaining 28 countries, identified as "IV round" (attachment 1 of CPM 2018/39), at a total estimated cost of USD 80,000.

[125] One CP sought clarity on the potential increase in costs, having split the registration "round IV" between 2018 and 2019. The CP was informed that there was no certainty regarding costs increases but that efforts would be made to contain them.

[126] One CP highlighted the need for a study on the implementation of ISPM 15 and the reduction in the interception of pests.

[127] CPs also indicated that the video would be beneficial to raise awareness on the importance of ISPMs during the Ministerial session of CPM 2020.

[128] The CPM:

(1) *Noted* the progress made in 2017 and the work plan for 2018 with regard to the registration of the ISPM 15 symbol;

(2) *Encouraged* CPs to continuously support the process of registration of the ISPM 15 symbol, including renewals of registrations that were due to expire;

(3) *Encouraged* CPs to reimburse the IPPC Secretariat for registration and registration renewal costs as soon as practically possible.

11.4 ePhyto

[129] The IPPC Secretariat made a presentation and presented its report[36] on the status of the ePhyto Solution project.

[130] Some CPs reiterated the call for CPs to support this project with resources into future years until the sustainable funding mechanism is in place. Some CPs indicated that they would continue to contribute resources to this project and to participate technically and take a lead role in ePhyto implementation.

[33] CPM 2018/18

[34] https://www.youtube.com/watch?v=kAQ-6RqRmVA

[35] CPM 2018/39

[36] CPM 2018/33

[131] CPs suggested that the Secretariat put a dedicated trust fund, or other arrangement, in place for donor countries to have confidence in supporting the ePhyto project moving forward.

[132] Some CPs indicated that there was a requirement for IT infrastructure, harmonized language, staff training and capacity building, for the project to be effective. This also included training to all role-players, including industry, on the benefits for trade. The Secretariat was also requested to provide a project cost analysis. The Secretariat indicated that cost estimates in the initial feasibility studies were still relevant. An additional decision point to capture the need for capacity development was requested.

[133] Some CPs expressed appreciation for being selected to take part in the pilot project and could see the benefits ePhyto would have on trade facilitation.

[134] One CP requested that the project, at the earliest time possible, move from the pilot phase and expand to all CPs and other administrative areas wishing to participate. Some CPs requested that the implementation guide be released as soon as possible to allow CPs to undertake their own implementation assessment. One CP indicated that due to national circumstances wishes that the ePhyto system can include two independent systems.

[135] One RPPO indicated their commitment to the project and informed CPM that they held a regional seminar conducted by the Steering Committee.

[136] The IPPC Secretariat confirmed, on request from some CPs, that the requirement for the digital signatures may, according to the IPPC and ISPMs, be set by the importing countries.

[137] The Chairperson reiterated the suggestion for CPs to investigate sources of funding to implement the hub and GeNS.

[138] Issues of a technical nature, such as certification, the need to prevent possible fraud or corruption of the system, data protection, amongst others, were also raised. The Secretariat held a special side-session during CPM-13 to discuss and provide clarification on these issues.

[139] Canada indicated that it will extend its in-kind contribution of the ePhyto project manager until March 2019.

[140] The CPM:

(1) *Noted* the work of the IPPC Secretariat and the ESG in advancing the development and implementation of the ePhyto Solution;

(2) *Supported* the continued work of the IPPC Secretariat and the ESG under the supervision and direction of the CPM Bureau.

(3) *Requested* the CPM Bureau, as the lead, together with the ESG, to develop a strategy for the sustained operation of the ePhyto Solution which would include a five-year implementation plan, with clear financial governance and suitable business model for approval to CPM-14.

(4) *Acknowledged* the support provided by Australia, Canada, the Peoples China, Japan, the Republic of Korea, Switzerland, the United States of America, Malaysia, APPPC as well as the member countries of the ESG who have provided significant contributions to advancing the development and implementation of the ePhyto Solution through funding and technical support,

(5) *Acknowledged* the contributions of the pilot countries who had participated in the ePhyto hub pilot, as well as the countries who had agreed to participate the GeNS pilot in 2018.

(6) *Supported* the ongoing progress in implementing the ePhyto Solution and in particular continued to urge countries to financially support the operation of the hub and generic system through donor funding.

(7) *Encourage* CPs to contribute to the capacity development to assist implementation of the ePhyto solution.

11.5 Sea Containers Task Force

[141] The Sea Containers Task Force (SCTF) Chairperson presented her report[37] on the activities of the SCTF to the CPM. The Chairperson conveyed appreciation to the CPs and industry organizations, especially to Maersk Line, who provided an in-kind contribution for the SCTF Coordinator, China for hosting the first meeting of the IPPC SCTF in China, and the United States of America for financial support. The Chairperson urged other CPs to provide financial support for the operation of the SCTF and implementation of its five-year action plan.

[142] The Secretariat indicated that the SCTF is a subgroup of the IC, and that the SCTF ToRs and RoPs are being adjusted accordingly to be approved by the IC.

[143] One CP suggested that the SCTF communication activities should have greater coverage to raise awareness of the risk of pests associated with the movement of sea containers, and to accelerate its work to allow for urgent follow up on the development of the ISPM on sea containers.

[144] Some CPs expressed appreciation for the increase in membership representation of the SCTF. They also indicated the availability of the guideline for sea containers cleanliness as soon as possible, and at least before the end of 2018.

[145] The CPM:

(1) *Noted* the reviewed Terms of Reference (ToR) and Rules of Procedure (RoP) of the SCTF (Appendix 13).

(2) *Noted* membership of the SCTF (Appendix 14).

(3) *Noted* the IPPC SCTF five-year action plan as presented in the (Appendix 15).

(4) Noted the IPPC SCTF Work Plan for 2018 (Appendix 16).

(5) Conveyed appreciation to Contracting Parties, in particular, to the Peoples Republic of China for hosting the first meeting of the IPPC SCTF in China, to the United States of America for their financial support, and to industry organizations, including Maersk Line, who had provided an in-kind contribution (for the SCTF Coordinator), and urged other Contracting Parties to provide financial support for the operation of the SCTF and implementation of the five-year action plan process.

11.6 e-Commerce

[146] The Secretariat presented a report[38] on e-commerce.

[147] Some CPs indicated that this topic was important, noting the increase in e-commerce trade. It was suggested that funding be identified before initiating work, and requested the CPM Bureau to present CPM-14 (2019) with a work plan.

[148] One CP indicated that the rapid increase in this form of trade in their country, obliged them to undertake further studies on the issue, strengthen cooperation with e-Commerce suppliers, and to enhance advocacy on plant pest risk involved. The CP suggested that a task force be created to deal with this topic.

[149] One CP requested that relevant advocacy materials be made available in one location on the IPP.

[150] The CPM:

(1) Noted the activities undertaken.

(2) *Requested* the Bureau to consider a work plan as project-based funded (if no extra-budgetary resources were made available, the Secretariat would not take any specific action in the area).

(3) *Requested* Contracting Parties to update the IPPC Secretariat with on related e-commerce actions in their region to the IPPC Secretariat.

[37] CPM 2018/23

[38] CPM 2018/17

11.7 Trade Facilitation Action Plan

[151] The Chairperson presented the draft Trade Facilitation Action Plan[39], as endorsed by the SPG at its October 2017 meeting, for submission and approval by the CPM. CPM was reminded that ePhyto and SCTF are funded, whereas e-Commerce and the International Trade Facilitation Conference needed project proposals developed and funding identified.

[152] CPs requested more time to consider the subject and that the draft Trade Facilitation Action Plan be presented for review and discussion at the next SPG.

[153] The CPM:

(1) Requested the SPG to further discuss and review the Trade Facilitation Action Plan related activities and recommend actions at CPM-14.

12. IPPC Communication and Advocacy

12.1 Main activities for 2017 and Action Plan for 2018 on Communication and Advocacy of the IPPC

[154] The IPPC Secretariat presented a report[40] on its communication and advocacy activities for 2017 and its plan for communication and advocacy activities in 2018, in particular for the new IPPC annual theme: "Plant Health and Environmental Protection".

[155] CPs expressed support and appreciation for the Secretariat's work in communication and advocacy activities and plan. A suggestion that the IPPC website be continuously improved, as it was practical and useful way for CPs to have easy access to technical resources, was noted by the Secretariat.

[156] The CPM:

(1) *Noted* the report on Communication and Advocacy activities of the IPPC Secretariat in 2017 and the action plan for 2018.

(2) *Agreed to consider* ways to effectively support communication and advocacy efforts by the IPPC Secretariat.

(3) *Agreed to contribute* to IPPC communication activities by providing, when possible, a focal point for communication within their NPPO/RPPO to the Secretariat, who would be tasked with providing information of major initiatives and contributions to the IPPC annual themes.

12.2 International Year of Plant Health in 2020 (IYPH 2020)

[157] A video describing the importance of plant health to support food security, environmental protection and to facilitate safe trade was shown before the Chairperson of the IPPC Steering Committee for the International Year of Plant Health in 2020 (IYPH StC) presented a report[41] to CPM on the progress, activities and outstanding requirements for 2020 to be proclaimed the International Year of Plant Health by the UNGA. The CPs were informed that at the 40th Session of the FAO Conference (June/July 2017), the proposal by the Government of Finland for the establishment of the IYPH, was approved and the FAO Conference consequently endorsed the Resolution requesting the Director-General of FAO to transmit the Resolution to UNGA. The Resolution is expected to be presented to the Second Committee of the UNGA scheduled from October to November 2018. It was highlighted that the requirement, in line with FAO guidelines with regard to international years, was to secure full financing from extra-budgetary resources for the proposed IYPH 2020, for which the estimated cost is at least USD 600 000, to promote the proclamation of the IYPH 2020 and to prepare a relevant programme.

[39] CPM 2018/34

[40] CPM 2018/13

[41] CPM 2018/32

[158] CPs thanked the IYPH StC and the IPPC Secretariat for their efforts to promote this important initiative, and fully supported the proposed IYPH skeleton programme. CPs indicated that they would support the proposed IYPH 2020 resolution at the UNGA. They reiterated the request made at CPM-12 to the IPPC Secretariat to analyze how to re-align its work plan to successfully coordinate IYPH 2020 activities.

[159] One CP informed CPM that IYPH 2020 was launched in their country in 2017 through a national awareness raising campaign.

[160] One RPPO reiterated the importance of having the Secretariat's involvement in the regions, especially in Africa, and invited the Secretariat to participate in high-level interactions with their governments at the African Ministerial Conference taking place in October 2018 to further raise awareness for this initiative. This proposal, and the importance of promoting the IYPH at ministerial meetings and with policy makers, was supported by CPs from the African region.

[161] One CP also informed CPM of plans to organize a scientific congress on plant health in their country in 2020.

[162] Some CPs requested that the IPPC Secretariat undertake an analysis of the staff needs in the IPPC Secretariat for the IYPH 2020 and suggestions on how to address potential lack of staff. They believed that it was necessary to undertake such an analysis in order to determine which activities of the IPPC Secretariat could be narrowed down or adjusted in order to free capacity for IYPH 2020 activities.

[163] One CP made a proposal to have an international day on plant health. The CPM Chairperson clarified that this had been discussed by the SPG, and was not supported at this time, but could be considered at another time.

[164] One CP requested advocacy and promotional material to be made available to promote this initiative.

[165] The CPM:

(1) *Noted* the report of the 2nd and 3rd meeting of the Steering Committee of the IYPH, including the revised communication work plan and potential partners for IYPH;

(2) *Agreed* to the skeleton of IYPH programme events and their associated estimated costs;

(3) *Encouraged* CPs to provide extra-budgetary contributions to enable promotional activities to support the IYPH proclamation process and subsequently the IYPH programme development;

(4) *Urged* CPs to contact their competent authorities in charge of United Nations affaires to support eh proposal for an IYPH in 2020 within the Second Committee of the United Nations General Assembly (October to November 2018);

(5) *Requested* CPs to share national and regional level activities relevant to IYPH with their regional representatives in the Steering Committee of the IYPH.

13. Reports on the IPPC Network Activities

13.1 The IPPC Regional Workshops for 2017

[166] The IPPC Secretariat presented its report[42] on the IPPC regional workshops held during 2017 and noted that the Bureau would take an in-depth look at the purpose of the regional workshops.

[167] One CP indicated there was need for flexibility in the workshops to reflect the regional differences and differences in funding mechanisms.

[168] The CPM:

(1) *Noted* the report and new organizational arrangements of the 2017 IPPC Regional Workshops;

(2) *Noted* the title "IPPC- Joint Regional Workshop" for consistency of visibility globally;

[42] CPM 2018/15

(3) *Noted* the Regional Workshops were not only aimed at commenting on draft ISPMs, but represented a unique opportunity for CPs to receive information directly from the IPPC Secretariat, and for the IPPC Secretariat to seek feedback directly from the countries and regions;

(4) *Encouraged* Contracting Parties to actively participate in the 2018 Regional Workshops;

(5) *Encouraged* Contracting Parties and other institutions to provide financial resources to increase attendance to 2018 Regional Workshops;

(6) *Requested* the Bureau to develop a process for formalizing the objectives, structure and funding of IPPC regional workshops, as forums convened jointly by the IPPC Secretariat, RPPOs and FAO Regional Offices, to progress outcomes of the Convention, including consultation on standards setting, capacity building and emerging risks, within the regional context and with regard to regional needs and priorities.

13.2 The 29th Technical Consultation (TC) among Regional Plant Protection Organizations (RPPOs)

[169] The Director-General of the European and Mediterranean Plant Protection Organization (EPPO) presented the report[43] of the 29th TC-RPPOs to the CPM.

[170] The CPM:

(1) *Noted* the report.

14. International Cooperation

14.1 Report from the IPPC Secretariat

[171] The IPPC Secretariat presented its report[44] on its cooperation activities with organizations in 2017.

[172] The CPM:

(1) *Noted* the report on the IPPC Secretariat's international cooperation activities in 2017 and its programmed international cooperation activities for 2018.

14.2 Oral reports from selected international organizations

[173] The following organizations provided oral presentations and written reports:

- Convention on Biodiversity[45]
- Joint Food and Agriculture Organization / International Atomic Energy Agency[46]
- International Seed Federation[47]
- World Trade Organization[48]
- Standards and Trade Development Facility[49]

[43] CPM 2018/INF/04
[44] CPM 2018/31
[45] CPM 2018/CRP/09
[46] CPM 2018/INF/02
[47] CPM 2018/INF/06
[48] CPM 2018/INF/14
[49] CPM 2018/INF/15

[174] The CPM:

(1) *Thanked* the speakers for their oral presentation and noted their written reports.

14.3 Written reports from relevant international organizations

[175] Written reports or statements were presented by the following international and regional organizations:

- CIHEAM policy in plant health to enhance food security in the Mediterranean Region – (CPM 2018/CRP/05)
- Inter-American Institute for Cooperation on Agriculture Report – (CPM 2018/CRP/06)
- International Advisory Group for Pest Risk Analysis – (CPM 2018/INF/05)
- International Forest Quarantine Research Group – (CPM 2018/INF/09)
- Ozone Secretariat – (CPM 2018/INF/03)
- Phytosanitary Measures Research Group – (CPM 2018/INF/01)

[176] The CPM:

(1) *Noted* the written reports.

15. Financial Report and Budget

15.1 Financial report of the IPPC Secretariat for 2017

[177] The IPPC Secretariat presented its financial report[50], which contained financial statements for resources available in 2017 from FAO's Regular Programme (RP) budget and the Extra-Budgetary (EB) sources that were administered by the IPPC Secretariat during the reporting period.

[178] Several CPs thanked the Secretariat for the transparent and comprehensive financial report.

[179] Some CPs requested the Secretariat to include estimates of in-kind contributions in the financial report for 2018.

[180] CPs informed CPM of their pledges to the IPPC MDTF in 2018: Republic of Korea – USD 150,000; Canada – USD 288,000; and the United States of America – USD 155,000.

[181] France pledged to renew its in-kind staff contribution to the IPPC Secretariat.

[182] On CP requested the Secretariat to analyze the cost associated with hosting CPM meetings outside Rome for financial and other aspects. In response, the Secretariat indicated that the cost has been estimated and could be made available.

[183] The CPM:

(1) *Noted* the Financial Report for 2017 of the IPPC Secretariat;

(2) *Adopted* the Financial report for 2017 of the IPPC Multi-Donor Trust Fund (Special Trust Fund of the IPPC) as presented.

(3) *Encouraged* Contracting Parties to contribute to the IPPC Multi-Donor Trust Fund (Special Trust Fund of the IPPC) and IPPC Projects, preferably on an on-going basis.

(4) *Conveyed appreciation* to the Contracting Parties which had contributed to the IPPC Work Programme in 2017.

[50] CPM 2018/27

15.2 Resource mobilization by the IPPC Secretariat for 2017

[184] The IPPC Secretariat presented a report[51] on its resource mobilization activities and achievements for 2017, led by the IPPC Secretariat Task Force for Resource Mobilization.

[185] Some CPs indicated that projects are valuable for supplementing the IPPC Secretariat's activities, however, they should be to the benefit of the entire IPPC community.

[186] The CPM:

(1) *Noted* the resource mobilization activities and outcomes of the IPPC Secretariat in 2017;

(2) *Encouraged* CPs to continuously support the IPPC Work Programme.

15.3 Work plan and budget of the IPPC Secretariat for 2018

[187] The IPPC Secretariat presented its work plan and budget[52] for 2018.

[188] Some CPs highlighted that projects should be assessed by the IC.

[189] The CPM:

(1) *Approved* the IPPC Secretariat "Work Plan and Budget for 2018".

15.4 Work plan and budget of the IPPC Secretariat for 2019

[190] The IPPC Secretariat presented the work plan and budget[53] of the IPPC Secretariat for 2019.

[191] The Chairperson suggested that the budget could be approved in principle, and Bureau, in its June meeting, will consider any input provided during CPM.

[192] The CPM:

(1) *Approved* the IPPC Secretariat "Work Plan and Budget for 2019".

16. Successes and Challenges of Implementation of the Convention

[193] CPs were invited to share their successes and challenges in implementing the IPPC:

- The NPPOs of North America (United States of America and Canada), reported on the successful launch of the North American Sea Containers Initiative[54].
- The NPPO of Sri Lanka reported on the Successful Biological Pest Management Protocol for Brassicaceae Crops[55].
- The NPPO of Georgia reported on the Georgian State Programme Against the Brown Marmorated Stink Bug[56].
- The FAO made a presentation on the Fall armyworm situation in Africa[57].

[51] CPM 2018/25

[52] CPM 2018/35

[53] CPM 2018/36

[54] CPM 2018/INF/10

[55] CPM 2018/INF/11

[56] CPM 2018/INF/13

[57] FAO Fall Armyworm presentation: https://www.ippc.int/static/media/files/publication/en/2018/05/03_Thur_12.1FAW_CPM_Short_Presentation_19_April_2018.pdf

17. Special Topics Session on Plant Health and Environmental Protection

[194] The Special Topics session aimed at promoting the IPPC 2018 annual theme "Plant Health and Environmental Protection". Four speakers briefed the CPM, clearly demonstrating the relevance and linkages between plant health, environmental protection, climate change, food security and human health.

17.1 Plant Health and Environmental Protection

[195] Professor Vernon H Heywood made a presentation on "Environmental protection, plant health and sustainability – pies and doughnuts".

17.2 Pine Wood Nematode and ISPM 15 implementation

[196] Ms Kyu-Ock Yim made a presentation on the "Impact of spread of pine wood nematode on forest environment and phytosanitary measures in the Republic of Korea".

17.3 Human and Plant Health Interaction, influenced by Climate Change

[197] Mr Geoffrey Donovan made a presentation on "Human and Plant Health Interaction, influenced by Climate Change.

17.4 Pacific Islands Climate Change Impact on Plant Health

[198] Mr Viliami Kami made a presentation on the "Impact of Climate Change in the Pacific Islands".

18. Confirmation of Membership and Potential Replacement Members for CPM Subsidiary Bodies

18.1 CPM Bureau members and potential replacement members

[199] The IPPC Secretariat provided the CPM with the list of nominated Bureau members and potential replacement members[58] as revised during CPM.

[200] As the African nominee was being put forward under exceptional circumstances for a fourth term, the Africa region requested the CPM for an exemption.

[201] The CPM:

(1) *Granted* the African region an exception to nominate a member for a fourth consecutive term, in accordance with the CPM Rules of Procedure (Rule 2).

(2) *Elected* the Chairperson, Mr Francisco Javier Trujillo Arriaga (Latin America and Caribbean), for the CPM Bureau;

(3) *Elected* the Vice-Chairperson, Mr Lucien Kouame Konan (Africa), for the CPM Bureau;

(4) *Elected* members for the CPM Bureau from the FAO regions not represented by the Chairperson and Vice-Chairperson, and e*lected* replacements for the members of the CPM Bureau. (Appendix 17)

18.2 SC members and potential replacement members

[202] The IPPC Secretariat provided the CPM with the list of SC members and potential replacement members[59], with the revised document presented[60].

[58] CPM 2018/CRP/14

[59] CPM 2018/05

[60] CPM 2018/CRP/14

[203] The CPM:

(1) *Noted* the current membership of the Standards Committee and the potential replacements for the Standards Committee (Appendix 17);

(2) *Confirmed* new members and potential replacements;

(3) *Confirmed* the order in which potential replacements would be called upon for each region.

19. Any Other Business

[204] Fall armyworm: The CPM discussed the issue under agenda item 9.4. The Secretariat organized a meeting adjacent to CPM-13 between CPs, RPPOs, and the FAO Officers from AGP and FAO Regional Offices.

[205] Five side-sessions were held during CPM[61], covering a range of pertinent themes and issues. The side-sessions held included:

- Plant Health and Environmental Protection[62]
- Gene Sequencing and Molecular Technologies[63]
- Collaboration with Research Organizations[64]
- Resource Mobilization for Plant Health[65]
- International Year of Plant Health 2020[66]

20. Date and Venue of the Next Session

[206] It was agreed that CPM-14 (2019) would take place from 1 to 5 April 2019 at FAO headquarters in Rome.

21. Adoption of the Report

[207] The report was adopted.

22. Closing of the Session

[208] The session was closed.

[61] CPM 2018/INF/07_Rev_01

[62] https://www.ippc.int/en/news/cpm-13-side-session-on-plant-health-and-environmental-protection-held-at-fao-hqs/

[63] https://www.ippc.int/en/news/cpm-13-side-session-on-gene-sequencing-and-molecular-technologies/

[64] https://www.ippc.int/en/news/cpm-13-side-session-on-collaboration-with-research-organizations-held-at-fao-hqs/

[65] https://www.ippc.int/en/news/cpm-13-delegates-deepen-their-knowledge-on-resource-mobilization-for-plant-health/

[66] https://www.ippc.int/en/news/cpm-13-side-session-on-the-2020-international-year-of-plant-health-held-at-fao-hq/

Appendix 01 – Agenda

1. Opening of the Session

1.1 FAO Opening

1.2 Statement of the Minister of Agriculture of Australia

2. Keynote Address on Plant Health and Environment Protection

3. Adoption of the Agenda

3.1 EU Statement of Competence

4. Election of the Rapporteur

5. Establishment of the Credential Committee

6. Report from the CPM Chairperson

7. Report from the IPPC Secretariat

8. Governance

8.1 Recognition of CAHFSA as an RPPO

8.2 Summary of the 2017 Strategic Planning Group report and Revision of ToRs of the SPG to include RPPOs representatives

8.3 IPPC Strategic Framework for 2020-2030

8.4 Sustainable funding for the IPPC work programme (concept and mechanism)

8.5 ToRs of the Finance Committee

8.6 CPM recommendations

9. Cooperation between Standard Setting and Standards Implementation

9.1 Call for topics "Standards and Implementation"

9.2 Framework for standards and implementation

9.3 Conceptual challenges in standards development in terms of implementation

9.4 Implementation pilot surveillance

9.5 Implementation Review and Support System (IRSS)

10. Standards Setting

10.1 Report of the activities of the Standards Committee (SC)

10.2 Adoption of International Standards for Phytosanitary Measures

10.3 Proposed amendments to the Standards Committee ToRs and Rules of Procedure

10.4 Ink Amendments to Adopted International Standards for Phytosanitary Measures (ISPMs)

- *ISPM 5 (Glossary of phytosanitary terms) and ISPM 12 (Phytosanitary certificates)*

- *Reorganization, Harmonization and Minor Technical Updates of the Fruit Fly ISPMs*

10.5 Standards Committee recommendations to the Commission on Phytosanitary Measures *(Merged and discussed under agenda item 8.6)*

11. Implementation Facilitation

11.1 Activities of the Implementation and Capacity Development Committee (IC)

11.2 National Reporting Obligations (NRO)

11.3 Status of ISPM 15 Symbol Registration

11.4 ePhyto

11.5 Sea Containers Task Force

11.6 e-Commerce

11.7 Trade Facilitation Action Plan

12. IPPC Communication and Advocacy

12.1 Main activities for 2017 and Action plan for 2018 on Communication and Advocacy of the IPPC Secretariat

12.2 International Year of Plant Health in 2020 (IYPH 2020)

13. Reports of IPPC Network Activities

13.1 The IPPC Regional Workshops for 2017

13.2 The 29th Technical Consultation (TC) among Regional Plant Protection Organizations (RPPOs)

14. International Cooperation

14.1 Report from the IPPC Secretariat

14.2 Oral reports from selected international organizations

14.3 Written reports from relevant international organizations

15. Financial Report and Budget

15.1 Financial report of the IPPC Secretariat for 2017

15.2 Resource mobilization of the IPPC Secretariat for 2017

15.3 Work plan and budget of the IPPC Secretariat for 2018

15.4 Work plan and budget of the IPPC Secretariat for 2019

16. Successes and Challenges of Implementation of the Convention

17. Special Topics Session on Plant Health and Environment Protection

17.1 Plant Health and Environment Protection

17.2 Pine Wood Nematode and ISPM 15 implementation

17.3 Human and Plant Health Interaction, influenced by Climate Change

17.4 Pacific Islands Climate Change Impact on Plant Health

18. **Confirmation of Membership and Potential Replacements Members for CPM Subsidiary Bodies**

18.1 CPM Bureau members and potential replacements members

18.2 SC members and potential replacements members

19. Any Other Business

20. Date and Venue of the Next Session

21. Adoption of the Report

22. Closing of the Session

Appendix 02 – List of Documents

Doc number	Title	Agenda	Available Languages
01	Provisional Agenda	03	EN/FR/ES/AR/RU
02	Detailed Agenda	03	EN/FR/ES/AR/RU/ZH
03	Adoption of International Standards for Phytosanitary Measures	10.2	EN/FR/ES/AR/RU/ZH
03_01	Revision of ISPM 6 (Attachment)	10.2	EN/FR/ES/AR/RU/ZH
03_02	Amendments to ISPM 5 (Attachment)	10.2	EN/FR/ES/AR/RU/ZH
03_03	Revision of Annex 1 and Annex 2 to ISPM 15 (Attachment)	10.2	EN/FR/ES/AR/RU/ZH
03_04	Req for the use of temperature treatment (Attachment)	10.2	EN/FR/ES/AR/RU/ZH
03_05	Vapour heat treatment for Bact. Dorsalis (Attachment)	10.2	EN/FR/ES/AR/RU/ZH
04	CPM recommendations	08.6	EN/FR/ES/AR/RU/ZH
05	SC members and potential replacements members	18.2	EN/FR/ES/AR/RU/ZH
06	CPM Bureau members and potential replacements members	18.1	EN/FR/ES/AR/RU/ZH
07	ToRs of the Finance Committee - Revision of the Terms of Reference for the Financial Committee to include an Observer Clause	08.5	EN/FR/ES/AR/RU/ZH
08	Ink Amendments to adopted international standards for phytosanitary measures (ISPMs) - Reorganization, Harmonization and Minor Technical Updates of the Fruit Fly ISPMs	10.4	EN/FR/ES/AR/RU/ZH
09	Ink Amendments to adopted international standards for phytosanitary measures (ISPMs) - ISPM 5 (Glossary of phytosanitary terms) and ISPM 12 (Phytosanitary certificates)	10.4	EN/FR/ES/AR/RU/ZH
10	Proposed amendments to the Standards Committee Terms of Reference and Rules of Procedure	10.3	EN/FR/ES/AR/RU/ZH
11	Activities of the Implementation and Capacity Development Committee (IC) - Report	11.1	EN/FR/ES/AR/RU/ZH
12	Report of the activities of the Standards Committee (SC)	10.1	EN/FR/ES/AR/RU/ZH
13	Main activities for 2017 and Action plan for 2018 on Communication and Advocacy - Communication and advocacy work plan of the IPPC Secretariat for 2018	12.1	EN/FR/ES/AR/RU/ZH
14	CPM recommendations - The application of Next Generation Sequencing technologies for plant pest diagnostics in a phytosanitary context	08.6	EN/FR/ES/AR/RU/ZH
15	The IPPC Regional Workshops for 2017	13.1	EN/FR/ES/AR/RU/ZH
16	Recognition of CAHFSA as an RPPO	08.1	EN/FR/ES/AR/RU/ZH
17	e-Commerce - IPPC Activities on e-Commerce	11.6	EN/FR/ES/AR/RU/ZH
18	National Reporting Obligations (NRO) - Report	11.2	EN/FR/ES/AR/RU/ZH
19	Call for topics "Standards and Implementation"	09.1	EN/FR/ES/AR/RU/ZH
20	Framework for standards and implementation	09.2	EN/FR/ES/AR/RU/ZH
21	Implementation pilot surveillance - The implementation pilot project on surveillance and emerging pests	09.4	EN/FR/ES/AR/RU/ZH
22	Implementation Review and Support System (IRSS)	09.5	EN/FR/ES/AR/RU/ZH
23	Sea Containers Task Force	11.5	EN/FR/ES/AR/RU/ZH
24	Report from the CPM Chairperson	06	EN/FR/ES/AR/RU/ZH

Doc number	Title	Agenda	Available Languages
25	Resource mobilization of the IPPC Secretariat for 2017	15.2	EN/FR/ES/AR/RU/ZH
26_Rev_01	Sustainable funding for the IPPC work programme (concept and mechanism)	08.4	EN/FR/ES/AR/RU/ZH
27	IPPC Secretariat Financial Report for 2017	15.1	EN/FR/ES/AR/RU/ZH
28	IPPC Strategic Framework for 2020-2030	08.3	EN/FR/ES/AR/RU/ZH
29	Conceptual challenges in standards development in terms of implementation - Commodity and pathway specific International Standards for Phytosanitary Measures	09.3	EN/FR/ES/AR/RU/ZH
30	Summary of the 2017 Strategic Planning Group report and Revision of ToRs of the SPG to include RPPOs representatives - Amendment to the Rules of Procedure for the Strategic Planning Group (SPG)	08.2	EN/FR/ES/AR/RU/ZH
31	Report from the IPPC Secretariat - Report on the International Cooperation	14.1	EN/FR/ES/AR/RU/ZH
32	International Year of Plant Health in 2020 (IYPH 2020)	12.2	EN/FR/ES/AR/RU/ZH
33	ePhyto - Report	11.4	EN/FR/ES/AR/RU/ZH
34	Trade Facilitation Action Plan	11.7	EN/FR/ES/AR/RU/ZH
35	Work plan and budget of the IPPC Secretariat for 2018	15.3	EN/FR/ES/AR/RU/ZH
36	Work plan and budget of the IPPC Secretariat for 2019	15.4	EN/FR/ES/AR/RU/ZH
37	Report from the IPPC Secretariat	07	EN/FR/ES/AR/RU/ZH
38	Standards Committee recommendations to the Commission on Phytosanitary Measures	10.5	EN/FR/ES/AR/RU/ZH
39	Status of ISPM 15 Symbol Registration	11.3	EN/FR/ES/AR/RU/ZH

Information Papers (INF)

Doc number	Title	Agenda	Available Languages
CPM 2018/INF/01	Written reports from relevant international organizations - Phytosanitary Measures Research Group (PMRG)	14.3	EN only
CPM 2018/INF/02	Written reports from relevant international organizations - Report from the Joint Food and Agriculture Organization / International Atomic Energy Agency Division of Nuclear Techniques in Food and Agriculture	14.3	EN only
CPM 2018/INF/03	Written reports from relevant international organizations - Ozone Secretariat	14.3	EN only
CPM 2018/INF/04	The 29th Technical Consultation (TC) among Regional Plant Protection Organizations (RPPOs) - Summary Report	13.2	EN only
CPM 2018/INF/05	Written reports from relevant international organizations - The International Advisory Group for Pest Risk Analysis (IAGPRA) Report	14.3	EN only
1) CPM 2018/INF/06	2) Written reports from relevant international organizations - The International Seed Federation (ISF) Report	14.3	EN only

Doc number	Title	Agenda	Available Languages
CPM 2018/INF/07_Rev_01	Any Other Business - Time table of CPM-13 Side Sessions	19	EN only
CPM 2018/INF/08	Special Topics Session on Plant Health and Environment Protection - Information Note	17	EN only
CPM 2018/INF/09	Written reports from relevant international organizations - International Forestry Quarantine Research Group Report	14.3	EN only
CPM 2018/INF/10	Successes and Challenges of Implementation of the Convention - The North American Sea Containers Initiative: A Successful Launch	16	EN only
CPM 2018/INF/11	Successes and Challenges of Implementation of the Convention - Successful Biological Pest Management Protocol for Brassicaceae Crops	16	EN only
CPM 3) 2018/INF/12_Rev_01	Adoption of International Standards for Phytosanitary Measures -Objections to draft ISPMs presented for adoption by CPM-13 (2018)	10.2	EN only
CPM 2018/INF/13	Successes and Challenges of Implementation of the Convention - Georgian State Programme Against Brown Marmorated Stink Bug	16	EN only
CPM 2018/INF/14	Written reports from relevant international organizations - Report by the WTO Secretariat	14.3	EN/FR/ES only
CPM 2018/INF/15	Written reports from relevant international organizations - Report by the STDF Secretariat	14.3	EN/FR/ES only

Conference room papers (CRP)

Doc number	Title	Agenda	Available Languages
CPM 2018/CRP/01	List of Documents	3	EN only
CPM 2018/CRP/02	EU Statement of Competence	3.1	EN only
CPM 2018/CRP/03	COSAVE Comments	8.3; 9.3	EN only
CPM 2018/CRP/04	The application of Next Generation Sequencing technologies for plant pest diagnostics in a phytosanitary context	8.6	EN only
CPM 2018/CRP/05	Written reports from relevant international organizations – CIHEAM Policy in plant health to enhance food security in the Mediterranean Region	14.3	EN only
CPM 2018/CRP/06	Written reports from relevant international organizations - Inter-American Institute for Cooperation on Agriculture Report	14.3	EN only
CPM 2018/CRP/07	4) EU written statement on IPPC Strategic Framework for 2020-2030	5) 8.3	6) EN only

Doc number	Title	Agenda	Available Languages
CPM 2018/CRP/08	7) EU written statement on Call for topics "Standards and Implementation"	9.1	EN only
CPM 2018/CRP/09	8) Written reports from relevant international organizations - Report of the 9) Secretariat of the Convention on Biological Diversity	14.3	EN only
CPM 2018/CRP/10	10) Successes and Challenges of Implementation of the Convention – Georgia - Official 11) Program against Brown Marmorated Stink Bug (BMSB)	16	EN only
CPM 2018/CRP/11	12) Successes and Challenges of Implementation of the Convention - Successful Biological Pest Management Protocol for Brassicaceae Crops - Sri Lanka	16	EN only
CPM 2018/CRP/12	13) Implementation pilot surveillance - Implementation pilot project on 14) surveillance and emerging pests	9.4	EN only
CPM 2018/CRP/13	15) Conceptual challenges in standards development in terms of 16) implementation - Commodity and pathway standards	9.3	EN only
CPM 2018/CRP/14	17) Confirmation of Membership and Potential Replacements Members for CPM Subsidiary Bodies - CPM Bureau and SC members and potential 18) replacement members	18.1; 18.2	EN/FR/ES only

Appendix 03 – List of Participants

MEMBER COUNTRIES (CONTRACTING PARTIES) PAYS MEMBRES (PARTIES CONTRACTANTES) PAÍSES MIEMBROS (PARTES CONTRATANTES)

ALBANIA - ALBANIE

Mr Artur BARDHI
Third Secretary
Alternate Permanent Representative to FAO
Embassy of the Republic of Albania
Via Asmara, 5
00199 Rome, Italy
Phone: (+39) 06 86224111
Email: embassy.rome@mfa.gov.al

Ms Anila BITRI LANI
Ambassador
Permanent Representative to FAO
Embassy of the Republic of Albania
Via Asmara, 5
00199 Rome, Italy
Phone: (+39) 06 86224111
Email: embassy.rome@mfa.gov.al

Ms Gentiana MBURIMI
Minister Counsellor
Deputy Permanent Representative to FAO
Embassy of the Republic of Albania
Via Asmara, 5
00199 Rome, Italy
Phone: (+39) 06 86224111
Email: embassy.rome@mfa.gov.al

ALGERIA - ALGÉRIE - ARGELIA

Représentant

M. Khaled MOUMENE
Directeur de la Protection des Végétaux et des contrôles Techniques (DPVCT)
Ministère de l'Agriculture, du Développement Rural et de la Pêche
12 Boulevard Colonel Amirouche
16000 Alger, Algeria
Phone: (+213) 23503177
Fax: (+213) 23503177
Email: moumenekhaled63@gmail.com

ARGENTINA - ARGENTINE

Representante

Sr. Ezequiel FERRO
Ing. Agr.
Dirección Nacional de Protección Vegetal
Av. Paseo Colón 315, 4° Piso
1063 Buenos Aires, Argentina
Phone: (+54) 1141215091
Email: eferro@senasa.gov.ar

Sr. Diego QUIROGA
Ing. Agr.
Director Nacional de Protección Vegetal
Punto de Contacto Oficial de la CIPF
Servicio Nacional de Sanidad y Calid ad Agroalimentaria (SENASA)
Av. Paseo Colón 315 4° Piso
1063 Buenos Aires, Argentina
Phone: (+54) 1141215495
Email: dquiroga@senasa.gov.ar

ARMENIA - ARMÉNIE

Representative

Mr Artur NIKOYAN
Head of Phytosanitary Inspection of State Service for Food Safety
Ministry of Agriculture
4012 Komitas St.
Yerevan, Armenia
Phone: (+374) 94554585
Email: nikoyanartur@mail.ru

AUSTRALIA - AUSTRALIE

Representative

Mr Kim RITMAN
Chief Plant Protection Officer
Department of Agriculture and Water Resources
18 Marcus Clarke Street
Canberra ACT 2601, Australia
Phone: (+61) 3 83186700
Email: kim.ritman@agriculture.gov.au

Ms Lois RANSOM
Assistant Secretary
Plant Import Operations
Chair of the Commission on Phytosanitary Measures Bureau
Department of Agriculture and Water Resources
18 Marcus Clarke Street,
Canberra ACT 2601, Australia
Phone: (+61) 3 83186700
Email: lois.ramson@agriculture.gov.au

Alternate(s)

Mr Bruce HANCOCKS
Plant Health Policy
International Plant Protection Convention Standards Committee
Department of Agriculture and Water Resources
18 Marcus Clarke Street
Canberra ACT 2601, Australia
Phone: (+61) 3 83186700
Email: bruce.hancocks@agriculture.gov.au

Observers

Mr Satendra KUMAR
Director Plant Biosecurity & Product Integrity
New South Wales Department of Primary Industries
Orange, NSN Australia
Phone: (+61) 419 437 676
Email: satendra.kumar@dpi.nsw.gov.au

AUSTRIA - AUTRICHE

Representative

Mr Michael KURZWEIL
Federal Ministry of Sustainability and Tourism
Sector Plant Protection
Stubenring 1
1010 Vienna, Austria
Phone: (+43) 171100602819
Email: michael.kurzweil@bmnt.gv.at

Alternate(s)

Mr Robert STEFFEK
Head of Sector Official Plant Protection Service
Austrian Agency for Health and Food Safety
Spargelfeldstraße 191
Vienna, Austria
Phone: (+43) 5055533301
Email: robert.steffek@ages.at

BAHAMAS

Representative

Mr Mark HUMES
Chairman
Bahamas Agricultural Health and Food Safety Authority
Island Traders Building
West Bay Street
Nassau, Bahamas
Phone: (+242) 8263108
Email: markhumes@bahamas.gov.bs

Alternate(s)

Ms Josefina ADDERLEY
Technical Advisor
Department of Agriculture
Ministry of Agriculture and Marine Resources
Manx Building, West Bay Street
Nassau, Bahamas
Phone: (+242) 3765069
Email: josefinaadderleycurry@bahamas.gov.bs

BANGLADESH

Representative

Mr Md Anwar Hossain KHAN
Deputy Director Export
Plant Quarantine Wing
Department of Agricultural Extension
Ministry of Agriculture
Kharmabari, Farmgate
1215 Dhaka, Bangladesh
Phone: (+88) 029131296
Email: anwarhk60@live.com

BELARUS - BÉLARUS - BELARÚS

Representative

Mr Aliaksandr PISKUN
Director
Main State Inspectorate for Seed Breeding, Quarantine for Seed Breeding and Plant Protection
Krasnozvezdnaya, 8 str.
220034 Minsk, Belarus
Phone: (+375) 17 2844061
Fax: (+375) 17 2845357
Email: labqbel@tut.by

Alternate(s)

Mr Aliaksandr PAULOVICH
Deputy Director, Chief Plant Quarantine
Main State Inspectorate for Seed Breeding, Quarantine for Seed Breeding and Plant Protection
Krasnozvezdnaya, 8 str.
220034 Minsk, Belarus
Phone: (+375) 17 2844061
Fax: (+375) 17 2845357
Email: labqbel@tut.by

BELGIUM - BELGIQUE - BÉLGICA

Représentant

Mr Lieven VAN HERZELE
Conseiller
Federal Public Service of Public Health
Food Chain Safety and Environment
DG Animals, Plant and Food
Sanitary Policy regarding Animals and Plants
Division Plant protection
Eurostation II (7° Floor)
Place Victor Horta 40 box 10
1060 Brussels, Belgium
Phone: (+32) 25247323
Fax: (+32) 25247349
Email: lieven.vanherzele@gezondheid.belgie.be

BELIZE - BELICE

Representative

Mr Francisco GUTIERREZ
Technical Director
Plant Health Services of the Belize Agricultural Health Authority
Belmopan City, Belize
Phone: (+501) 6040319
Email: francisco.gutierrez@baha.org.bz

BHUTAN - BHOUTAN - BHUTÁN

Representative

Mr Namgay WANGCHUK
Director General
Bhutan Agriculture and Food Regulatory
Ministry of Agriculture and Forest
Phone: (+975) 232 7031/ 32 5790/ 32 5993
Email: nwangchuk@moaf.gov.bt

BRAZIL - BRÉSIL - BRASIL

Representative

Mr Marcus Vinicius SEGURADO COELHO
Director of Plant Health Department
Ministry of Agriculture, Livestock and Food Supply
Esplanada dos Ministérios
Bloco D - Brasília/DF - CEP: 70.043-900, Brazil
Phone: (+61) 32182716
Email: marcus.coelho@agricultura.gov.br

Alternate(s)

Ms Lucianara ANDRADE FONSECA
Alternate Permanent Representative to FAO
Permanent Delegation of Brazil to the Food and Agriculture Organization of the United Nations
Via di Santa Maria dell'Anima 32
00186 Rome, Italy
Phone: (+39) 06 68307576
Fax: (+39) 06 68398802
Email: rebrasfao@itamaraty.gov.br

Ms Erika MANGILI ANDRE
Technical Assistant
Ministry of Agriculture, Livestock and Food Supply
Esplanada dos Ministérios, Bloco D - Brasília/DF - CEP: 70.043-900, Brazil
Phone: (+61) 32182943
Email: erika.mangili@agricultura.gov.br

Ms Mariana TEIXEIRA FILIPPUTTI
Plant Quarantine Coordinator
Ministry of Agriculture, Livestock and Food Supply
Esplanada dos Ministérios, Bloco D - Brasília/DF - CEP: 70.043-900, Brazil
Phone: (+61) 32182258
Email: mariana.teixeira@agricultura.gov.br

BULGARIA - BULGARIE

Representative

Mr Petio PETEV
Ambassador
Permanent Representative to FAO
Permanent Representation of the Republic
of Bulgaria to FAO
Via Pietro Paolo Rubens, 21
00197 Rome, Italy
Phone: (+39) 06 3224640
Email: bg_fao@bulemb.it

Ms Mariya TOMALIEVA-TODOROVA
Chief Expert
Plant Protection & Quality Control of Fresh Fruits and Vegetables Directorate
Bulgarian Food Safety Agency
Phone: (+359) 2 9173739
Email: m.tomalieva@bfsa.bg/ fsk@bfsa.bg

Ms Antoaneta GINOVA
Second Secretary
Agriculture & Fishery Sector
Permanent Representation of Bulgaria to the European Union
Brussels, Belgium
Phone: (+39) 06 3224640
Email: antoaneta.ginova@bg-permrep.eu

Ms Doroteya CHAVDAROVA
Chief Inspector
Plant Protection Unit, Regional Food Safety Directorate
Plovdiv, Bulgaria
Phone: (+359) 889767656
Email: d_chavdarova@bfsa.bf

Mr Guido SALA CHIRI
Political Administrator
Council of the European Union - General Secretariat
Directorate General B Agriculture, Fisheries, Social Affairs and Health
Directorate 2 Fisheries, Food Chain and Veterinary Questions
Unit B Veterinary and Plant Health Questions, Food Chain, Forestry
Rue de la Loi 175
1048 Brussels, Belgium
Phone: (+32) 2 2815734
Email: guido.salachiri@consilium.europa.eu

BURKINA FASO

Représentant

Mme Mariam SOME DAMOUE
Ingénieur d'Agriculture
Chargée du contrôle phytosanitaire
Direction de la Protection des Végétaux et du Conditionnement
01 B.P. 5362 Ouagadougou, Burkina Faso
Phone: (+226) 25361915/70278524
Email: mariamsome@yahoo.fr

Suppléant(s)

Mme Alice Gisele SIDIBE ANAGO
Conseillère
Représentante permanente adjointe auprès de la FAO
Ambassade du Burkina Faso
Via XX Settembre, 86
00187 Rome, Italie
Phone: (+39) 06 42010611
Email: ambabf.roma@tin.it

BURUNDI

M. Eliakim SAKAYOYA
Direction de la Protection des Végétaux
Ministère de l'Agriculture et de l'Elevage
B.P. 114 Gitega, Burundi
Phone: (+257) 22402036/ (+257) 79976214
Fax: (+257) 22402104
Email: esakayoya@gmail.com/sakayoyaeliakim@yahoo.fr

CAMBODIA - CAMBODGE - CAMBOYA

Mr Op PICH
Deputy Director
Department of Plant Protection, Sanitary and Phitosanitary
General Directorate of Agriculture
Phone: (+855) 12 17 152
Email: oppich1970@gmail.com

CAMEROON - CAMEROUN - CAMERÚN

Représentant

M. Charles Shey NYING
Directeur de la Réglementation et du Contrôle de la Qualité des Intrants et Produits Agricoles
Ministère de l'Agriculture et du Développement Rural
P.O. Box 1639
Yaoundé, Cameroun

Suppléant(s)

M. Moungui MEDI
Deuxième Conseiller
Représentant Permanent Adjoint
auprès de la FAO
Ambassade de la République du
Cameroun
Viale Regina Margherita 42
00198 Rome, Italie
Phone: (+39) 06 44232313
Email:
segreteriaambacam@virgilio.it

M. Ekata MVONDO
Chef du Poste phytosanitaire
Port de Douala
Email: ekatamvondo@yahoo.fr

CANADA - CANADÁ

Representative

Mr Gregory WOLFF
Director
Phytosanitary Division
Canadian Food Inspection Agency
59 Camelot Drive
K1A 0Y9 Ottawa, Canada
Email: greg.wolff@inspection.gc.ca

Alternate(s)

Ms Marie-Claude FOREST
National Manager and International
Standards Adviser
Phytosanitary Division
Canadian Food Inspection Agency
59 Camelot Drive
K1A 0Y9 Ottawa, Canada
Phone: (+1) 613 773 7235
Email: marie-
claude.forest@inspection.gc.ca

Mr Mark BURGHAM
Executive Director
International Affairs and Market
Access Directorate
Canadian Food Inspection Agency
1400 Merivale RD
K1A 0Y9 Ottawa, Canada
Email:
mark.burgham@inspection.gc.ca

Mr Rajesh RAMARATHNAM
Senior Specialist, International
Phytosanitary Standards
Phytosanitary Division
Canadian Food Inspection Agency
59 Camelot Drive
K1A 0Y9 Ottawa, Canada
Email:
rajesh.ramarathnam@inspection.gc.c
a

Mr Dominique PELLETIER
Senior International Plant Standards
Officer
Phytosanitary Division
Canadian Food Inspection Agency
1400 Merivale RD
K1A 0Y9 Ottawa, Canada
Phone: (+1) 6137736492
Email:
dominique.pelletier@inspection.gc.c
a

Ms Jennifer FELLOWS
Alternate Permanent Representative
to FAO
Permanent Mission of Canada to the
Food and Agriculture Agencies of
the U.N.
Via Zara 30
00198 Rome, Italy
Phone: (+39) 06 85 444 3601
Email:
jennifer.fellows@international.gc.ca

CHILE - CHILI

Representante

Sr. Rodrigo ASTETE ROCHA
Jefe
División de Protección Agrícola y
Forestal del Servicio Agricola y
Ganadero
Ministerio de Agricultura
Av. Presidente Bulnes 140
Santiago de Chile, Chile
Phone: (+56) 2 23451201
Fax: (+56) 2 23451203
Email: rodrigo.astete@sag.gob.cl

Suplente(s)

Sra. Tamara VILLANUEVA
Primer Secretario
Representante Alterno ante la FAO
Embajada de Chile
Viale Liegi 21
00198 Roma, Italy
Phone: (+39) 06 844091
Fax: (+39) 06 8841452

Sr. Marco MUÑÓZ FUENZALIDA
Jefe
Departamento Sanidad Vegetal del
Servicio Agricola y Ganadero
Ministerio de Agricultura
Av. Bulnes 140, 3° Piso
Santiago de Chile, Chile
Phone: (+56) 223451201/ (+56) 993263535
Email: marco.munoz@sag.gob.cl

Sr. Alvaro SEPÚLVEDA
Encargado Temas Agricolas Multilaterales DPAF
División Protección Agrícola y Forestal
Servicio Agrícola y Ganadero
Av. Presidente Bulnes 140
Santiago de Chile, Chile
Phone: (+56) 2 2345 1454
Email: alvaro.sepulveda@sag.gob.cl

Sra. Margarita VIGNEAUX
Asesora Asuntos Multilaterales
Mision Permanente ante la FAO
Embajada de Chile
Viale Liegi 21
00198 Roma, Italy
Phone: (+39) 06 844091
Fax: (+39) 06 8841452
Email: mvigneaux@minrel.gov.cl

Sr. Fernando AYALA
Embajador
Representante Permanente ante la FAO
Embajada de la República de Chile
Viale Liegi, 21
00198 Roma, Italy
Phone: (+39) 06 844091
Email: fpratico@minrel.gob.cl

CHINA - CHINE

Representative

Mr Wang FUXIANG
Deputy Director
National Agri-Tech Extension and Service Center
Ministry of Agriculture and Rural Affairs
Beijing 100714, China
Phone: (+86) 1013701330221
Email: wangfuxiang@agri.gov.cn

Alternate(s)

Mr Minghui NING
Director
Plant Protection and Quarantine Division
Crop Production Department
Ministry of Agriculture and Rural Affairs
11 Nongzhanguannanli
Beijing 100025, China

Mr Fan SHU
Division Consultant
Financial and Accounting Division
Department of Financial
Ministry of Agriculture
No.11 Nongzhanguan Nanli,
Beijing, 100125, China

Mr Xiaodong FENG
Deputy Director
Plant Quarantine Division
National Agro-Tech Extension and Service Centre
Ministry of Agriculture and Rural Affairs
No.20 Mai Zi Dian Street
Beijing, China
Email: fengxdong@agri.gov.cn

Mr Yong ZHU
First Secretary, Ministry of Foreign Affairs, the People's Republic of China
No.2, Chaoyangmen Nandajie, Chaoyang District
Beijing, China

Ms Shuang QIU
Principal Staff Member
Department of Afforestation and Greening
State Forestry Administration
No.18 Hepingli dongjie,
Beijing 100714, China
Phone: (+86) 10 84238513
Email: xiaozhuzhu0733@sina.cn

Mr Clive Siu-Ki LAU
Senior Agricultural Officer
Agriculture, Fisheries and Conservation Department
The Government of the Hong Kong Special Administrative Region
Rm 627, Cheung Sha Wan Government Offices
303 Cheung Sha Wan Road
Kowloon, Hong Kong
Phone: (+852) 21507039
Fax: (+852) 21520319
Email: clive_sk_lau@afcd.gov.hk

Ms Yu Fen CHEN
Director
Civic and Municipal Affairs Bureau
Seac Pai Van Park, Coloane
Macao, China

Mr Quan AN
Deputy Division Director of CICOS
Ministry of Agriculture and Rural Affairs
11 Nongzhanguannanli
Beijing 100025, China
Email: anquan@agri.gov.cn

Mr Huijie HOU
Project Officer of Agriculture Department
Ministry of Finance
Sanlihe, Xicheng District
Beijing 100820, China

Ms Xiaoxia WU
Deputy Division Director of DIC
Ministry of Agriculture and Rural Affairs
11 Nongzhanguannanli
Beijing 100025 China

COLOMBIA - COLOMBIE

Representante

Sr. Emilio AREVALO PEÑARANDA
Director Técnico de Epidemiologia Vigilancia Sanitaria del Instituto Colombiano Agropecuario (ICA)
Bogotá, Colombia
Phone: (+57) 13323767
Email: emilio.arevalo@ica.gov.co

COMOROS - COMORES - COMORAS

Représentant

M. Issimaila MOHAMED
Directeur Adjoint des Stratégies Agricoles et de l'Elevage et point de contact de la CIPV

Suppléant(s)

M. Ahamada DJOUBEIRE
Technicien de l'Institut National de Recherche pour l'Agriculture, la Pêche et l'Environnement

CONGO

Représentant

Mme Alphonsine LOUHOUARI TOKOZABA
Chef de Service de la Protection des Végétaux
Point de Contact Officiel de la CIPV
Ministère de l'Agriculture et de l'Elevage (MAE)
6, rue Louis Tréchot
B.P. 2453 Brazzaville, Congo
Phone: (+242) 04 005 5705
Email: louhouari@yahoo.fr

Mr Marc MANKOUSSOU
Conseiller
Représentation Permanente de la République du Congo auprès des Institutions des Nations Unies pour l'Alimentation et l'Agriculture (OAA, PAM, FIDA)
Corso del Rinascimento, 52
00186 Rome, Italy

COOK ISLANDS - ÎLES COOK - ISLAS COOK

Representative

Mr Ngatoko Ta NGATOKO
Director
IPPC Official Contact Point
Biosecurity Service
Ministry of Agriculture
P.O.Box 96
Rarotonga, Cook Islands
Phone: (+682) 28711
Fax: (+682) 21881
Email: nngatoko@agriculture.gov.ck

COSTA RICA

Representante

Sr. Marco Vinicio VARGAS PEREIRA
Embajador
Representante Permanente ante la FAO
Misión Permanente de Costa Rica ante los organismos de Naciones Unidas con sede en Roma
Via Alberico II, 33 Int. 12
00193 Roma, Italy
Phone: (+39) 06 80660390
Email: miscr-fao@rree.go.cr

Suplente(s)

Sr. Gerardo Alberto CASTRO SALAZAR
Jefe de la Unidad de Asuntos Jurídicos
Servicio Fitosanitario del Estado
Ministerio de Agricultura y Ganadería
San José, Costa Rica
Email: gcastro@sfe.go.cr

Sr. Luis Fernando CECILIANO PIEDRA
Consejero
Representante Permanente Alterno ante la FAO
Misión Permanente de Costa Rica ante los organismos de Naciones Unidas con sede en Roma
Via Alberico II, 33 Int. 12
00193 Roma, Italia
Phone: (+39) 06 80660390
Email: miscr-fao@rree.go.cr

Sr. Hernando MORERA GONZALEZ
Analista de Riesgo de Plagas
Servicio Fitosanitario del Estado
Ministerio de Agricultura y Ganadería
San José, Costa Rica
Email: hmorera@sfe.go.cr

CROATIA - CROATIE - CROACIA

Representative

Ms Ksenija BISTROVIC
Directorate of Food and
Phytosanitary Policy
Department for Plant Health
Ministry of Agriculture
Phone: (+385) 1 6109 126
Email: ksenija.bistrovic@mps.hr

CUBA

Representante

Sr. Jose Carlos RODRIGUEZ RUIZ
Embajador
Representante Permanente ante la FAO
Via Licinia 7
00153, Roma, Italia
Phone: (+39) 06571724222
Fax: (+39) 065745445
Email: embajada@ecuitalia.it

Sr. Gilberto Hilario DIAZ LOPEZ
Director De Sanidad Vegetal
Ministerio de Agricultura
Ayuntamiento No. 231
Plaza de la Revolución
La Habana, Cuba
Phone: (+537) 8791 339
Fax: (+537) 8703 277
Email: direccion@sanidadvegetal.cu

Suplente(s)

Sra. Rebeca CUTIE CANCINO
Consejera
Representante Permanente Adjunta ante la FAO
Via Licini, 7
00153, Roma, Italia
Phone: (+39) 06571724304
Fax: 065745445
Email: adjuntocuba@ecuitalia.it

Sra. Ileana Dolores HERRERA CARRICARTE
Especialista
Centro Nacional Sanidad Vegetal
Ministerio de Agricultura
Ayuntamiento No. 231
Plaza de la Revolución
La Habana, Cuba
Phone: (+53) 78815089
Fax: (+53) 78703277
Email: r.internacionales@sanidadvegetal.cu

CYPRUS - CHYPRE - CHIPRE

Mr George POULIDES
Ambassador
Permanent Representative to FAO
Embassy of the Republic of Cyprus
Piazza Farnese, 44
00186 Rome, Italy
Phone: (+39) 06 6865758
Email: faoprcyp@tin.it

Mr Ellinas SPYRIDON
Agricultural Attaché
Alternate Permanent Representative to FAO
Permanent Representative to FAO
Embassy of the Republic of Cyprus
Piazza Farnese, 44
00186 Rome, Italy
Phone: (+39) 06 6865758
Email: faoprcyp@tin.it

CZECHIA - TCHÉQUIE - CHEQUIA

Representative

Mr Michal HNIZDIL
Director of Section of Plant Health Care
Central Institute for Supervising and Testing in Agriculture
Zemedelska 1752/1a
61300 Brno, Czechia
Email: michal.hnizdil@ukzuz.cz

CÔTE D'IVOIRE

Représentant

M. Gnénéyéri SILUE
Representative NPPO Cote d'Ivoire
Directeur de la Protection des Végétaux
Ministère de l'Agriculture
B.P. V7 Abidjan, Côte d'Ivoire
Phone: (+225) 08526152
Fax: (+225) 20222260
Email: gnesilue54@gmail.com

Suppléant(s)

M. Kouamé KANGA
Conseiller
Représentant permanent adjoint auprès de la FAO
Représentation permanente de la République de Côte d'Ivoire auprès de la FAO, du FIDA et du PAM
Via di Santa Costanza 21
00198 Rome, Italie
Phone: (+39) 0644258249
Fax: (+39) 06 44 11 85 42
Email: cotedivoirerep@yahoo.com

M. Eloi Victor KAMBOU
Représentation permanente de la République de Côte d'Ivoire auprès de la FAO, du FIDA et du PAM
Via di Santa Constanza 21, int 14
00198 Rome, Italie
Phone: (+39) 06 44258249
Email: cotedivoirerep@yahoo.com

M. Lucien KOUAME KONAN
Inspecteur
Ministère de l'Agriculture
B.P. V7 Abidjan, Côte d'Ivoire
Phone: (+225) 07 903754
Fax: (+225) 20 212032
Email: l_kouame@yahoo.fr

M. Seydou CISSÉ
Ambassadeur
Représentant permanent auprès de la FAO
Représentation permanente de la République de Côte d'Ivoire auprès de la FAO, du FIDA et du PAM
Via di Santa Costanza 21
00198 Roma, Italie
Phone: (+39) 06 44 25 82 49
Fax: (+39) 06 44 11 85 42
Email: cotedivoirerep@yahoo.com

Mme Wroly Danielle SEPE NEE SERY
Conseillère
Représentante permanente suppléante auprès de la FAO
Représentation permanente de la République de Côte d'Ivoire auprès de la FAO, du FIDA et du PAM
Via di Santa Constanza 21, int 14
00198 Rome, Italy
Phone: (+39) 06 44258249
Email: cotedivoirerep@yahoo.com

DEMOCRATIC REPUBLIC OF THE CONGO - RÉPUBLIQUE DÉMOCRATIQUE DU CONGO - REPÚBLICA DEMOCRÁTICA DEL CONGO

Représentant

M. Damas MAMBA MAMBA
Chef de Division de la Protection des Végétaux
Point de Contact Officiel de la CIPV
Ministère de l'Agriculture, de la Peche et de l' Elevage
Croisement Boulevard du 30 juin et Avenue Batetela
Commune de la Gombe Kinshasa
Ville de Kinshasa, The Democratic Republic of the Congo
Phone: (+243) 812959330
Email: damasmamba@yahoo.fr

DENMARK - DANEMARK - DINAMARCA

Representative

Ms Lise Kjærgaard STEFFENSEN
Academic Officer
Danish Agricultural Agency
Ministry for Environment and Food
Landbrugsstyrelsen
Nyropsgade 30
1780
København V, Denmark
Phone: (+45) 61 88 78 96
Email: likste@lbst.dk

DOMINICA - DOMINIQUE

Mr Ryan Lucas ANSELM
Botanical Gardens
Roseau, Dominica
Phone: (+767) 2663803
Email: anselmr@dominica.gov.dm; rlanselm@gmail.com

DOMINICAN REPUBLIC - RÉPUBLIQUE DOMINICAINE - REPÚBLICA DOMINICANA

Representante

Sr. Mario ARVELO CAAMAÑO
Embajador
Representante Permanente ante la FAO
Representación Permanente de la República Dominicana ante la FAO
Lungotevere dei Sangallo, 1
00186 Roma, Italia
Phone: (+39) 380 2504006
Email: embajador@rdroma.org

Suplente(s)

Sra. Julia VICIOSO VARELAS
Ministra Consejera
Representante Permanente Alterno ante la FAO
Representación Permanente de la República Dominicana ante la FAO
Lungotevere dei Sangallo, 1
00186 Roma, Italia
Phone: (+39) 338 9899634
Email: julia.vicioso@rdroma.org

Sra. Diana INFANTE QUINONES
Consejera
Representante Permanente Alterno ante la FAO
Representación Permanente de la República Dominicana ante la FAO
Lungotevere dei Sangallo, 1
00186 Roma, Italia
Phone: (+39) 380 2504006
Email: marialaureano313@gmail.com

Sra. Liudmila KUZMICHEVA
Consejera
Representante Permanente Alterno ante la FAO
Representación Permanente de la República Dominicana ante la FAO
Lungotevere dei Sangallo, 1
00186 Roma, Italia

ECUADOR - ÉQUATEUR

Representante

Sr. Milton Fernando CABEZAS GUERRERO
Director Ejecutivo
Agencia de Regulación y Control Fito y Zoosanitaria

Suplente(s)

Sra. Diana Carolina ARMENDARIZ ABRIL
Analista de Relaciones Internacionales
Agencia de Regulación y Control Fito y Zoosanitaria

Sra. Jhenny Marlene CAYAMBE TERÁN
Coordinadora General de Sanidad Vegetal
Agencia de Regulación y Control Fito y Zoosanitaria

Sr. Edison Paul VALLEJO MADRID
Secretario
Representante Permanente Alterno ante la FAO
Embajada de la República del Ecuador
Via Antonio Bertoloni, 8
00197 Roma, Italy
Phone: (+39) 06 89672820
Email: mecuroma@ecuador.it

EGYPT - ÉGYPTE - EGIPTO

Representative

Mr Ahmed KAMAL EL-ATTAR
Head of Central Administration of Plant Quarantine
Ministry of Agriculture and Land Reclamation, Egypt
1 Nadi El-said st., Dokki
Giza, Egypt
Phone: (+20) 100 660 2373
Email: ippc@capq.gov.eg

EL SALVADOR

Representante

Sr. Douglas Ernesto ESCOBAR VASQUEZ
Director de la Dirección General de Sanidad Vegetal
Punto de Contacto Oficial de la CIPF
Final 1a. Avenida Norte y 13 Calle Oriente
Avenida Manuel Gallardo
Santa Tecla, El Salvador
Phone: (+503) 2202 0835
Fax: (+503) 2534 9911
Email: douglas.escobar@mag.gob.sv

Sra Maria Abelina TORRES DE MEILLIEZ
Ministra Consejera
Representante Permanente Alterno ante la FAO
Embajada de la República de El Salvador
Via Gualtiero Castellini, 13
00197 Roma, Italia
Phone: (+39) 06 8076605
Email: embajadaroma@tiscali.it

EQUATORIAL GUINEA - GUINÉE ÉQUATORIALE - GUINEA ECUATORIAL

Representante

Sra. Cecilia NDONG NCHAMA
Embajadora
Representante Permanente ante la FAO
Embajada de la República de Guinea Ecuatorial
Via Bruxelles, 59A
00198 Roma, Italy
Phone: (+39) 06 8845575
Email: obono.repfao@gmail.com

Sr. Agustin MANANA ELA ANDEME
Ingeniero Fitopatólogo
Jefe de Sección de Protección Vegetal
Ministerio de Agricultura y Bosques
Sección de Protección Vegetal
B'N Apdo No. 51 c/Luba
Malabo, Equatorial Guinea
Phone: (+240) 222 246511
Email: elandeme240@igmail.com

Suplente(s)

Sr. Mateo Nsogo NGUERE MICUE
Consejero
Representante Alterno ante la FAO
Embajada de la República de Guinea Ecuatorial
Via Bruxelles, 59 A
00198 Roma, Italy
Phone: (+39) 06 8845575
Email: mateonsogo@gmail.com

Sra. Mercedes SERICHE WIABUA
Segunda Secretaria
Representante Alterno ante la FAO
Embajada de la República de Guinea Ecuatorial
Via Bruxelles, 59A
00198 Roma, Italy
Phone: (+39) 06 8845575
Email: mercedes.seriche@gmail.com

Sr. Cipriano PANADES GARCIA
Ingeniero Agrónomo

ERITREA - ÉRYTHRÉE

Representative

Mr Tekleab MESGHENA KETEMA
Director General
Regulatory Services Department
Ministry of Agriculture
Asmara, Eritrea
Email: tekleabketema@gmail.com

Alternate(s)

Mr Asmerom KIDANE TECLEGHIORGHIS
Counsellor
Alternate Permanent Representative to FAO
Embassy of Eritrea
Via Boncompagni, 16
00187 Rome, Italy
Phone: (+39) 393512717528
Email: asmeromk2016@gmail.com

ESTONIA - ESTONIE

Representative

Ms Olga LAVRENTJEVA
Adviser of the Plant Health Department
Ministry of Rural Affairs
39/41 Lai Street
15056 Tallinn, Republic of Estonia
Phone: (+372) 6256535
Email: olga.lavrentjeva@agri.ee

ETHIOPIA - ÉTHIOPIE - ETIOPÍA

Mr Weldehawariat ASSEFA
Director General
Plant Health and Regulatory Directorate General, Ministry of Agriculture and Natural Resources
Addis Abeba, Ethiopia
Phone: (+251) 116462417
Fax: (+251) 116462311
Email: hapruassefaze@gmail.com

EUROPEAN UNION (MEMBER ORGANIZATION) - UNION EUROPÉENNE (ORGANISATION MEMBRE) - UNIÓN EUROPEA (ORGANIZACIÓN MIEMBRO)

Representative

Mr Harry ARIJS
Deputy Head of Unit - Plant health
Directorate General for Health and Food Safety
European Commission
Rue de la Loi
Brussels, Belgium
Phone: (+32) 2 2987645
Email: harry.arijs@ec.europa.eu

Alternate(s)

Mr Roman VAGNER
Policy Officer - Plant health
Directorate General for Health and Food Safety
European Commission
Rue de la Loi, 149
Brussels, Belgium
Phone: (+32) 022959664
Email: roman.vagner@ec.europa.eu

FIJI - FIDJI

Representative

Mr Hillary Joseph KUMWENDA
Chief Executive Officer
Biosecurity Authority of Fiji
Level 3, PNPF Provident Plaza 1,
Ellery Street
Suva, Fiji
Phone: (+679) 331 2512
Fax: (+679) 3305043
Email: hkumwenda@baf.com.fj

Alternate(s)

Mr Nitesh DATT
Chief Plant Protection Officer
Biosecurity Authority of Fiji
Level 3, PNPF Provident Plaza 1,
Ellery Street
Suva, Fiji
Phone: (+679) 3312512
Fax: (+679) 3305043
Email: ndatt@baf.com.fj

Mr Apaitia Ravaga MACANAWAI
Director Research
Ministry of Agriculture
Suva, Fiji
Phone: (+679) 3384233
Email:
apaitia.macanawai@govenet.gov.fj

FINLAND - FINLANDE - FINLANDIA

Representative

Mr Ralf LOPIAN
Senior Advisor Intrenational
Affaires
IPPC Official Contact Point
Food Department/ Animal and Plant
Health Unit
Ministry of Agriculture and Forestry
Mariankatu 23,
Helsinki, Finland
Phone: (+358) 295 162329
Fax: (+358) 9 16052443
Email: ralf.lopian@mmm.fi

FRANCE - FRANCIA

Représentant

M. Alain TRIDON
Chef du service des actions
sanitaires en production primaire
Direction Générale de l'Alimentation
251 Rue de Vaugirard
75732 Paris, France
Phone: (+33) 1 49 55 54 46
Email:
alain.tridon@agriculture.gouv.fr

Suppléant(s)

Mme Delphine BABIN-PELLIARD
Conseillère agricole et sécurité
alimentaire
Représentante Permanente
Suppléante Auprès de la FAO
Représentation Permanente de la
France auprès des Institutions des
Nations Unies pour l'Alimentation et
l'Agriculture (OAA, PAM, FIDA)
Corso del Rinascimento, 52
00186 Rome, Italie
Phone: (+39) 06 68405212
Email: delphine.babin-
pelliard@diplomatie.gouv.fr

Mme Laurence BOUHOT-DELDUC
Responsable de la Coordination des
Activités et du Suivi des Affaires
Internationales en Santé des
Végétaux, Bureau de la Santé des
Végétaux
Ministère de l'Agriculture, de
l'Agroalimentaire et de la Forêt
251 Rue de Vaugirard
75732 Paris, France
Phone: (+33) 149 55 58 80
Email: laurence.bouhot-
delduc@agriculture.gouv.fr

Mme Claire GEROUDET
Cheffe de l'Unité d'appui aux exportateurs
Mission des Affaires Européennes et Internationales
FranceAgriMer
12 rue Henri Rol Tanguy 92555
Montreuil, France
Phone: (+33) 1 73 30 30 00
Email: claire.geroudet@franceagrimer.fr

M. Jean-Christophe NAUDIN
Responsable du pôle végétal export
Mission des affaires européennes et internationales
FranceAgriMer
12 rue Henri Rol Tanguy 92555
Montreuil, France
Phone: (+33) 73 30 30 00
Email: jean-christophe.naudin@franceagrimer.fr

Mme Clara PACHECO
Adjointe au chef
du Bureau exportation
pays tiers
Ministère de l'agriculture
Direction Générale de l'Alimentation
251 Rue de Vaugirard
75732 Paris, France
Phone: (+33) 149554317
Email: clara.pacheco@agriculture.gouv.fr

M. Benjamin PETITEAU
Chargé de mission
Unité d'appui aux exportateurs
Mission des Affaires Européennes et Internationales
FranceAgriMer
12 rue Henri Rol Tanguy 92555
Montreuil, France
Phone: (+ 33) 1 73 30 30 00
Email: benjamin.petiteau@franceagrimer.fr

Mme Aline VINCK
Expert National Réglementation Phytosanitaire à l'Exportation
Ministère de l'Agriculture
Direction Générale de l'Alimentation
251 Rue de Vaugirard
75732 Paris, France
Phone: (+33) 1 49 55 58 80
Email: aline.vinck@agriculture.gouv.fr

GAMBIA - GAMBIE

Representative

Mr Landing SONKO
Director
Plant Protection Services and IPPC Focal Point
Ministry of Agriculture
Email: sonkokebba@gmail.com

Alternate(s)

Mr Sariyang M.K. JOBARTEH
Ag. Director General
Department of Agriculture
Cape Point, Bakau
Email: sariyangmkj@gmail.com

GEORGIA - GÉORGIE

Representative

Mr Zurab CHEKURASHVILI
LEPL
Head of National Food Agency
Georgia

GERMANY - ALLEMAGNE - ALEMANIA

Alternate(s)

Ms Christine HERMENING
Plant Health Department
Federal Ministry for Food and Agriculture
Rochusstr. 1
D 53123
Bonn, Germany
Phone: (+49) 228 99 529 4484
Email: 513@bmel.bund.de

GHANA

Representative

Ms Felicia ANSAH-AMPROFI
Director
National Plant Protection Organization (NPPO)
Ministry of Food and Agriculture
P.O.Box M37
Accra, Ghana
Phone: (+233) 244951912
Email: fampronge@yahoo.com

Alternate(s)

Mr Nii QUAYE-KUMAH
Alternate Permanent Representative to FAO
Embassy of the Republic of Ghana
Via Ostriana, 4
00199 Rome, Italy
Phone: (+39) 3890165333
Email: nii.quaye.kumah@gmail.com

GREECE - GRÈCE - GRECIA

Representative

Ms Annoula MAVRIDOU
Head of the National Plant Protection Organization (NPPO)
Hellenic Ministry of Rural Development and Food
150, Syggrou Aven. 17671
Athens, Greece
Phone: (+30) 210 9287221
Email: amavridou@minagric.gr

Alternate(s)

Ms Stavroula IOANNIDOU
Regulatory Expert on Plant Health
Hellenic Ministry of Rural Development and Food
150, Syggrou Aven. 17671
Athens, Greece
Phone: (+30) 210 9287133
Email: stioannidou@minagric.gr

Mr Christos ARAMPATZIS
Head of the Department of Phytosanitary Control
Hellenic Ministry of Rural Development and Food
150, Syggrou Aven. 17671
Athens, Greece
Phone: (+30) 210 9287235
Email: charampatzis@minagric.gr

GUATEMALA

Representante

Sra. Sylvia WOHLERS DE MEIE
Ministro Consejero
Representante Permanente Adjunto ante la FAO
Embajada de la República de Guatemala
Via Giambattista Vico, 20
00196 Roma, Italia
Phone: (+39) 06 36381143
Email: swohlers@minex.gob.gt

GUINEA-BISSAU - GUINÉE-BISSAU

Représentant

Mr Luis Antonio TAVARES
Chef de la Division de Contrôle Phytosanitaire
Point de Contact Officiel de la CIPV
Ministère de l'Agriculture
MADR / DSPV.Box 844
Guinea-Bissau
Phone: (+245) 663 82 08/5547553
Email: luistavares@1954@gmail.com

HUNGARY - HONGRIE - HUNGRÍA

Representative

Mr Lajos SZABÓ
Senior Adviser
Ministry of Agriculture
Department of Food Chain Control,
Unit of Plant and Soil Protection
Kossuth tér 11
1055 Budapest, Hungary
Phone: (+36) 1 79 53 792
Fax: (+36)1 795 00 94
Email: lajos.szabo@fm.gov.hu

INDIA - INDE

Representative

Mr Devdutt Kumar SHARMA
Plant Protection Advisor
Directorate of Plant Protection,
Quarantine and Storage
Ministry of Agriculture & Farmer's
Welfare
Faridabad (Haryana) 121001
New Delhi, India
Phone: (+91) 129 2413985
Fax: (+91) 129 2412125
Email: ppa@nic.in

Mr H.K SUANTHANG
Director (IC)
Department of Agriculture,
Cooperation & Farmer's Welfare
Krishi Bhawan
New Delhi, India
Email: hk.suanthang@nic.in

INDONESIA - INDONÉSIE

Representative

Ms Banun HARPINI
Center for Plant Quarantine and
Biosafety
Indonesia Agricultural Quarantine
Agency
Ministry of Agriculture
Building 5, 5th floor, Room 508
Jl. Harsono RM No. 3 Ragunan
Jakarta, Indonesia
Phone: (+62)217816482
Fax: (+62)217816482
Email: banun234@yahoo.com

Alternate(s)

Mr Antarjo DIKIN
Center for Plant Quarantine and
Biosafety
Indonesia Agricultural Quarantine
Agency
Ministry of Agriculture
Building 5, 5th floor, Room 508
Jl. Harsono RM No. 3 Ragunan
Jakarta, Indonesia
Phone: (+62)217816482
Fax: (+62)217816482
Email: antarjo.dikin@yahoo.com

Mr Yusral TAHIR
Agricultural Attachè
Alternate Permanent Representative
to FAO
Embassy of the Republic of
Indonesia
Via Campania, 55
00187 Rome, Italy
Phone: (+39)064200911
Fax: (+39)064880280
Email:
indorom@indonesianembassy.it

IRAN (ISLAMIC REPUBLIC OF) - IRAN (RÉPUBLIQUE ISLAMIQUE D') - IRÁN (REPÚBLICA ISLÁMICA DEL)

Representative

Mr Mohammed Hossein EMADI
Ambassador
Permanent Representative to FAO
Permanent Representation of the Islamic Republic of Iran to FAO
Via Aventina, 8
00153 Rome, Italy
Phone: (+39) 06 5754493
Email: secretary1@iranrepfao.org

Alternate(s)

Mr Shahin GHORASHIZADEH
Chargé d'affaires
Permanent Representative to FAO
Permanent Representation of the Islamic Republic of Iran to FAO
Via Aventina, 8
00153 Rome, Italy
Phone: (+39) 06 5754493
Email: secretary1@iranrepfao.org

IRELAND - IRLANDE - IRLANDA

Representative

Mr Barry DELANY
Chief Plant Health Officer
Horticulture and Plant Health Division
Department of Agriculture Food and the Marine
Backwston Campus
Celbridge Co.
Kildare, Ireland
Phone: (+35) 315058759
Email: barry.delany@agriculture.gov.ie

ISRAEL - ISRAËL

Representative

Mr Abed GERA
Director
Plant Protection and Inspection Services
Ministry of Agriculture
P.O. Box 30, Beit Dagan
Beit Dagan 50250
5 Inland Fisheries
Phone: (+972) 3 9485800
Email: mankal@moag.gov.il

Alternate(s)

Mr David OPATOWSKI
Minister Counsellor Agricultural Affairs
Ministry of Agriculture
P.O. Box 30, Beit Dagan
Beit Dagan 50250
5 Inland Fisheries
Phone: (+972) 3 9485800
Email: mankal@moag.gov.il

ITALY - ITALIE - ITALIA

Representative

Mr Bruno Caio FARAGLIA
Director of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

Mr Federico SORGONI
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

Mr Carlo Francesco CESARONI
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

Alternate(s)

Ms Lina CAMPUS
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

Mr Michele GHEZZI
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651/4824702
Email: rapp.ita.onu.rm@esteri.it

Mr Alessandro CASANO
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

Mr Ciro IMPAGNATIELLO
Officials of the International Relationships and SCA Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651/4824702
Email: rapp.ita.onu.rm@esteri.it

Ms Elisabetta LANZELLOTTO
Officials of the International Relationships and SCA Office
MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651/4824702
Email: rapp.ita.onu.rm@esteri.it

Ms Sabrina PINTUS
Official of the Central Phytosanitary Office MiPAAF
Ministry of Agriculture, Food and Forestry
Permanent Representation of the Republic of Italy to FAO
Palazzo della Farnesina, Piazzale della Farnesina, 1
00186 Rome, Italy
Phone: (+39) 06 46651 4824702
Email: rapp.ita.onu.rm@esteri.it

JAMAICA - JAMAÏQUE

Representative

Ms Sanniel WILSON
Chief Plant Quarantine Officer
Ministry of Industry, Commerce, Agriculture and Fisheries
193 Old Hope Road
Kingston, Jamaica
Phone: (+1876) 2797687/9776401
Email: sswilson@micaf.gov.jm

JAPAN - JAPON - JAPÓN

Representative

Mr Yukio YOKOI
Director
Research Division
Yokohama Plant Protection Station
Ministry of Agriculture, Forestry and Fisheries
1-16-10 Shin-yamashita, Naka-ku
Yokohama, 282-0004, Japan
Phone: (+81) 456228692
Email: yokoiy@pps.maff.go.jp

Alternate(s)

Ms Natsumi YAMADA
Section Chief
International Affairs Office, Plant Protection Division, Food Safety and Customer Affairs Bureau
Ministry of Agriculture, Forestry and Fisheries
1-2-1 Kaumigaseki, Chiyoda-ku
Tokyo, 100-8950, Japan
Phone: (+81) 3 35028111
Email: natsumi_yamada740@maff.go.jp

Mr Takashi MISUMI
Deputy Director
International Affairs Office
Plant Protection Division
Food Safety and Consumers Affairs Bureau
Ministry of Agriculture, Forestry and Fisheries
1-2-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-8950, Japan
Phone: (+81) 3 35028111
Email: takashi_misumi650@maff.go.jp

KAZAKHSTAN - KAZAJSTÁN

Representative

Mr Almabek MARS
Deputy Chairman
State Inspection Committee
Ministry of Agriculture
36 Kenesary str.
473000 Astana, Kazakhstan
Phone: (+7) 7172555855
Email: mars.a@minagri.gov.kz

KENYA

Representative

Ms Esther KIMANI
Managing Director
Kenya Plant Health Inspectorate Service (KEPHIS)

Alternate(s)

Ms Hellen Chepngeno LANGAT
Senior Inspector
Technical Personal Assistant to the Managing Director
Kenya Plant Health Inspectorate Service (KEPHIS)
P.O. Box 49592
00100 GPO Nairobi, Kenya
Phone: (+254) 020 3536171/2
Email: hmwarey@kephis.org

KUWAIT - KOWEÏT

Representative

Mr Yousef JUHAIL
Permanent Representative to FAO
Permanent Representation to FAO
Via della Fonte di Fauno, 26
00153 Rome, Italy
Phone: (+39) 06 5754598
Email: juhail@hotmail.com

Alternate(s)

Mr Salah AL BAZZAZ
Technical Advisor
Permanent Representation to FAO
Via della Fonte di Fauno, 26
00153 Rome, Italy
Phone: (+39) 06 5754598
Email: mc8975@mclink.it

Ms Manar AL SABAH
Attaché
Alternate Permanent Representative to FAO
Permanent Representation to FAO
Via della Fonte di Fauno, 26
00153 Rome, Italy
Phone: (+39) 06 5754598
Email: mc8975@mclink.it

LAO PEOPLE'S DEMOCRATIC REPUBLIC - RÉPUBLIQUE DÉMOCRATIQUE POPULAIRE LAO - REPÚBLICA DEMOCRÁTICA POPULAR LAO

Mr Phithaksoun SIRIPHONH
Director of the Plant Protection Center
Department of Agriculture
Ministry of Agriculture and Forestry
Lane Xang Avenue, P.O Box 811
Vientiane Capital
Email: syriphonh@gmail.com

Mr Phommasak SITTHIPHONE
Head of Administration and Internal Cooperation Unit
Plant Protection Centre
Department of Agriculture
Ministry of Agriculture and Forestry
Km 13, Thadeau Rd. Salakham Village
Hadsayfong District,
Vientaine, Lao PDR
Phone: (+856) 21 812164
Email: psitthiphone@yahoo.com

Mr Khanxay SOMCHINDA
Deputy Director
Plant Protection Center
Department of Agriculture
Ministry of Agriculture and Forestry
Lane Xang Avenue, P.O Box 811
Vientiane, Lao PDR
Phone: (+856) 21412342
Email:
dic.multilateral.cooperation@gmail.com

LATVIA - LETTONIE - LETONIA

Representative

Ms Kristine LIFANOVA
Director of State Plant Protection Service
Lielvardes str. 36, LV 1006
Riga, Latvia
Phone: (+371) 67027098
Fax: (+371) 67027302
Email:
kristine.lifanova@vaad.gov.lv

LEBANON - LIBAN - LÍBANO

Représentant

Ms Sylvana GERGES
Head of Plant Protection Service
Ministry of Agriculture
Rue des Ambassades
Bir Hassan, Henri Chehab Caserne
Beyrouth, Lebanon
Phone: (+961) 1 849 639/3810377

Suppléant(s)

Mr Youssef AL MASRI
Head of Plant Protection Department
IPPC Contact Point
Ministry of Agriculture
Rue des Ambassades
Bir Hassan, Henri Chehab Caserne
Beyrouth, Lebanon
Phone: (+961) 3 957 482

LIBERIA - LIBÉRIA

Representative

Mr Augustus B. G. FAHNBULLEH
Director NPPO
Plant and Animal Quarantine Services
IPPC Contact Point
Ministry of Agriculture
Gardnersville, Monrovia

Mr Haruna-Rashid KROMAH
Second Secretary
Alternate Representative to FAO
Embassy of the Republic of Liberia
Piazzale delle Medaglie d'Oro, 7
00136 Rome, Italy
Phone: (+39) 06 35453399
Email:
ambaliberia.roma@gmail.com

LIBYA - LIBYE - LIBIA

Representative

Mr Ali Amin KAFU
Advisor in Phytosanitary Control
IPPC Contact Point
Ministry of Agriculture, Animal and Marine Wealth
Tripoli, Libya
Phone: (+218) 925022980
Email: benkafu@yahoo.com

Mr Esam Omar BENZITUN
Counsellor at the Ministry of Foreign Affair
Department of International Organizations
Ministry of Foreign Affairs
Tripoli, Libya
Phone: (+218) 925158027/915158027
Email: esamzituon@yahoo.com

LITHUANIA - LITUANIE - LITUANIA

Representative

Mr Sergejus FEDOTOVAS
Director of the State Plant Service
Ministry of Agriculture
Gedimino Av.19 LT-01103
Vilnius, Lithuania
Phone: (+370) 5 237 5631
Fax: (+370) 5 273 0233
Email:
sergejus.fedotovas@vatzum.lt

MADAGASCAR

Représentant

Mme Saholy RAMILIARIJAONA
Directeur de la Protection des Végétaux
Madagascar

M. Lucien RANARIVELO
Directeur Général de l'Agriculture
Madagascar

Suppléant(s)

M. Suzelin RATOHIARIJAONA RAKOTOARISOLO
Conseiller
Représentant permanent adjoint auprès de la FAO
Ambassade de la République de Madagascar
Via Riccardo Zandonai, 84/A
00194 Rome, Italie
Phone: (+39) 06 66620089
Email: ambamad@hotmail.com

MALAWI

Representative

Mr David KAMANGIRA
Senior Deputy Director of Agricultural Research Services and IPPC Contact Point
Department of Agricultural Research Services
Ministry of Agriculture, Irrigation and Water Development
P.O.Box 30779
Lilongwe 3, Malawi
Phone: (+265) 999122199
Email:
davidkamangira1@gmail.com

MALAYSIA - MALAISIE - MALASIA

Representative

Mr Ahmad Kamil MOHD YUNUS
Director of Plant Biosecurity Division
Department of Agriculture
Aras 7-17, Wisma Tani, No. 30
Persiaran Perdana, Persint 4,
Pusat Pentadbiran Kerajaan Persekutuan, 62624
Putrajaya, Malaysia
Phone: (+03) 20301400/1401
Email: kamilyunus@yahoo.com.ny

Alternate(s)

Mr Muhammad Suhail MUHAMMAD
Assistant Agriculture Attaché
Alternate Permanent Representative to FAO
Embassy of Malaysia
Via Nomentana, 297
00162 Rome, Italy
Phone: (+39) 06 8415808/8419296
Fax: (+39) 06 8555040
Email:
agrimoa.rome@ambasciatamalaysia.it

MALI - MALÍ

Représentant

M. Bruno MAIGA
Ambassadeur
Représentante permanente auprès de la FAO
Ambassade de la République du Mali
Via delle Cave Fiscali, 21
00141 Rome, Italie
Phone: (+39) 0644254068
Fax: (+39) 0644254029
Email: amb.malirome@tiscalinet.it

M. Mamadou SOGODOGO
Premier Conseiller
Représentante permanente suppléante auprès de la FAO
Ambassade de la République du Mali
Via delle Cave Fiscali, 21
00141 Rome, Italie
Phone: (+39) 06 44254068
Email: amb.malirome@tiscalinet.it

M. Demba DIALLO
Directeur General de l'Office de la Protection des Végétaux
Phone: (+223) 76339198
Fax: (+223) 20 22 48 12
Email: demba.diallom@gmail.com

Suppléant(s)

Mme Halimatou TRAORE KONE
Deuxième Conseiller
Représentante permanente suppléante auprès de la FAO
Ambassade de la République du Mali
Via delle Cave Fiscali, 21
00141 Rome, Italie
Phone: (+39)0644254068
Fax: (+39)06 44254029
Email: amb.malirome@tiscalinet.it

MALTA - MALTE

Representative

Ms Marica GATT
Director General
Veterinary and Phytosanitary Regulation Division
Ministry for the Environment, Sustainable Development and Climate Change
Abattoir Street, Albertown
Marsa, Malta
Phone: (+356) 22925222
Email: marica.gatt@gov.mt

Alternate(s)

Ms Melanie CAMILLERI
Research Scientific Officer
Plant Protection Directorate
Ministry for the Environment, Sustainable Development and Climate Change
Plant Biotechnology Centre
Annibale Precci Street, 1915
Lija, Malta
Phone: (+356) 22926544
Email: melanie.d.camilleri@gov.mt

Ms Vanessa FRAZIER
Ambassador
Permanent Representative to FAO
Embassy of the Republic of Malta
Lungotevere Marzio, 12
00186 Rome, Italy
Phone: (+39)06 6879990/47
Fax: (+39)06 6892687
Email: malta-un.rome@gov.mt

Mr Mauro SAMMUT
Alternate Permanent Representative to FAO
Embassy of the Republic of Malta
Lungotevere Marzio, 12
00186 Rome, Italy
Phone: (+39) 06 6879990/47

Mr Ivan VASSALLO
First Secretary
Alternate Permanent Representative to FAO
Embassy of the Republic of Malta
Lungotevere Marzio, 12
00186 Rome, Italy
Phone: (+39) 3286726829
Fax: (+39)066892687
Email: ivan.a.vassallo@gov.mt

MEXICO - MEXIQUE - MÉXICO

Representante

Sr. Mario ARRIOLA WOOG
Embajador
Representante Permanente Adjunto ante la FAO
Misión Permanente de México ante las Agencias de la Organización de las Naciones Unidas
Via Bartolomeo Eustachio 15
00161 Roma, Italia
Phone: (+39) 06 441606220
Email: marriola@sre.gob.mx

Sra. Martha BARCENA COQUI
Embajadora
Representante Permanente ante la FAO
Misión Permanente de México ante las Agencias de la Organización de las Naciones Unidas
Via Bartolomeo Eustachio 15
00161 Roma, Italia
Phone: (+39) 06 441606220
Email: mbarcena@sre.gob.mx

Sr. Francisco Javier TRUJILLO ARRIAGA
Director General de Sanidad Vegetal
Punto de Contacto Oficial de la CIPF
Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria
Sagarpa, Mexico
Phone: (+52) 55 59051000
Email: trujillo@senasica.gob.mx

Suplente(s)

Sra. Maria de los Angeles GOMEZ AGUILAR
Secretaria
Representante Permanente Alterno ante la FAO
Misión Permanente de México ante las Agencias de la Organización de las Naciones Unidas
Via Bartolomeo Eustachio 15
00161 Roma, Italia
Phone: (+39) 06 441606220
Email: mision.italia@sre.gob.mx

Sr. Rene HERNANDEZ RUIZ
Director de Proyectos y Desarrollo Institucional
Servicio Nacional de Sanidad, Inocuidad y Calidad Agroalimentaria
Sagarpa, Mexico

MOROCCO - MAROC - MARRUECOS

Représentant

M. Jamila WADJINNY
Ingenieur en Chef, Chef de Service de la Protection des Végétaux
Morocco
Phone: (+212) 673997953
Email: wadjinnypv@gmail.com

MOZAMBIQUE

Representative

Ms Antonia VAZ TOMBOLANE
Head of NPPO
Plant Protection Technician
National Directorate of Agriculture and Silviculture
Ministry of Agriculture and Food Security
P.O. Box 1406
Maputo, Mozambique
Phone: (+258) 21 462036
Email: avaz5099@gmail.com

NEPAL - NÉPAL

Representative

Mr Dilli Ram SHARMA
Director General
Department of Agriculture
Hariharbhawan
Kathmandu, Nepal
Phone: (+977) 015521323
Email: sharmadilli.2018@gmail.com

NETHERLANDS - PAYS-BAS - PAÍSES BAJOS

Representative

Mr Corné VAN ALPHEN
Coordinating Policy Officer
Phytosanitary Affairs
Plant Supply Chain and Food Quality Department
Ministry of Agriculture, Nature and Food Quality
Netherlands
Phone: (+31) 70 3785552
Email: c.a.m.vanalphen@minez.nl

Alternate(s)

Mr Nico HORN
Senior Officer
Plant Health
Netherlands Food and Consumer Product Safety Authority
Netherlands
Email: n.m.horn@nvwa.nl

Mr Philip DE JONG
Chief Phytosanitary Officer
Plant Supply Chain and Food Quality Department
Ministry of Agriculture, Nature and Food Quality
Netherlands
Email: p.j.m.dejong@minez.nl

Observers

Mr Wim VAN DER SANDE
Director National Plant Protection Organisation
Netherlands Food and Consumer Product Safety Authority
Netherlands
Email: w.j.h.vandersande@nvwa.nl

NEW ZEALAND - NOUVELLE-ZÉLANDE - NUEVA ZELANDIA

Representative

Mr Stephen BUTCHER
Manager Import & Export Plants
Regulation & Assurance
Ministry for Primary Industries
New Zeland

Alternate(s)

Mr Matthew HOOPER
Ambassador
Permanent Representative to FAO
Embassy of New Zealand
Via Clitunno, 44
00198 Rome, Italy
Phone: (+39) 06 8537501
Email: rome@nzembassy.it

Ms Sally JENNINGS
Senior Policy Analyst
International Policy
Policy & Trade
New Zeland
Ministry for Primary Industries
New Zeland

NICARAGUA

Representante

Sr. Ricardo José SOMARRIBA REYES
Director Ejecutivo
Instituto de Proteción y Sanidad Agropecuaria
Nicaragua
Email: ricardo.somarriba@ipsa.gob.ni

Suplente(s)

Sr. Junior ESCOBAR FONSECA
Agregado
Representante Permanente Alterno ante la FAO
Embajada de la República de Nicaragua
Via Ruffini, 2/A
00195 Roma, Italy
Phone: (+39) 0632110020

Sra. Monica ROBELO RAFFONE
Embajadora
Representante Permanente ante la FAO
Embajada de la República de Nicaragua
Via Ruffini, 2/A
00195 Roma, Italy
Phone: (+39) 0632110020

NIGER - NÍGER

Représentant

M. Yahaya BOUNIA
Directeur General de la Protection des Végétaux
Niger
Phone: (+227) 97320925

Suppléant(s)

Mme Alimatou Douki ABDOU
Directrice de la Réglementation Phytosanitaire et du suivi Environmental
Phone: (+227) 96979501
Email: douki_a@yahoo.fr

NIGERIA - NIGÉRIA

Representative

Mr John Abah OBAJE
Head of Plant Quarantine
Department of NAQS
Phone: (+234) 8035059047
Email: edwardsonobj2009@yahoo.com

Alternate(s)

Mr Vincent ISEGBE
Coordinating Director
Nigeria Agricultural Quarantine Service
Phone: (+234) 8093540848
Email: visegbe@gmail.com

NORWAY - NORVÈGE - NORUEGA

Representative

Ms Hilde PAULSEN
Senior Advisor
IPPC Official Contact Point
Norwegian Food Safety Authority
P.O. Box 383
N-2381 Brumunddal, Norway
Phone: (+47) 23216800/ 64944346
Email: hilde.paulsen@mattilsynet.no

Alternate(s)

Ms Tone Holthe SVENSEN
Senior Advisor
Ministry of Agriculture and Food
Department of Food Policy
P.O. Box 8007 Dep
N-0030 Oslo, Norway
Phone: (+47) 22249250/ 22249415
Email: tone-holthe.svensen@lmd.dep.no

Ms Eva GRENDSTAD
Deputy Director General
Norwegian Ministry of Agriculture and Food
Department of Food Policy
P.O. Box 8007 Dep
N-0030 Oslo, Norway
Phone: (+47) 22249250/ 22249417
Email: eva.grendstad@lmd.dep.no

PAKISTAN - PAKISTÁN

Representative

Mr Muhammad Sohail SHAHZAD
Deputy Director
Quarantine DPP
Department of Plant Protection
Jinnah Avenue, Malir Halt,
Karachi, Pakistan
Phone: (+92) 21 99248118
Fax: (+92) 2199248673
Email: sohaiiil@yahoo.com

PANAMA - PANAMÁ

Representante

Sr. Yuri John Patricio HUERTA VÁSQUEZ
Administrador General de la Autoridad Panameña de Seguridad de Alimentos (AUPSA)
Ricardo J. Alfaro Avenue
Sun Towers Mall, Panamá
Phone: (+507) 522 0005
Fax: (+507) 522 0014
Email: yhuerta@aupsa.gob.pa

Suplente(s)

Sr. Luis BENAVIDES
Jefe
Unidad de Normas de la Autoridad Panameña de Seguridad de los Alimentos (AUPSA)
Ricardo J. Alfaro Avenue
Sun Towers Mall, Panamá
Phone: (+507) 522 0003
Fax: (+507) 522 0014
Email: lbenavides@aupsa.gob.pa

Sr. Dario E. GORDON B.
Director Nacional de Sanidad Vegetal
Ministerio de Desarrollo Agropecuario
Ave. Manuel E. Melo
Curundu, Panamá
Phone: (+507) 5070605/2904081
Email: dgordon@mida.gob.pa

Sr. Edwin GOTY
Subdirector de la Dirección Ejecutiva de Cuarentena Agropecuaria
Ministerio de Desarrollo Agropecuario
Ave. Manuel E. Melo
Curundu, Panamá
Email: egoty@mida.gob.pa

Sr. Rubén SERRACÍN
Jefe del Departamento de Certificación Fitosanitaria de la Agroexportación,
Ministerio de Desarrollo Agropecuario
Ave. Manuel E. Melo
Curundu, Edif. 572 Panamá
Phone: (+507) 5070605/5240934
Email: rserracin@mida.gob.pa

PAPUA NEW GUINEA - PAPOUASIE-NOUVELLE-GUINÉE - PAPUA NUEVA GUINEA

Representative

Mr Pere KOKOA
Chief Plant Protection Officer
National Agriculture Quarantine and Inspection Authority
Papua New Guinea
Phone: (+657) 3112100
Fax: (+657) 325 1674
Email: pkokoa@nagia.gov.pg

PARAGUAY

Representante

Sr. Mirko SOTO SAPRIZA
Representante Permanente Alterno ante la FAO
Embajada de la República del Paraguay
Via Firenze, 43 Scala A, int 17
00184 Roma, Italia
Phone: (+39) 06 4741715
Email: msotosapriza@mre.gov.py

PERU - PÉROU - PERÚ

Representante

Sr. Pablo Antonio CISNEROS ANDRADE
Ministro Consejero
Representante Permanente Adjunto ante la FAO
Embajada de la República del Perú
Via Francesco Siacci, 2/B, int. 5
00197 Roma, Italia
Phone: (+39) 06 80691510

Suplente(s)

Sra. Diana CALDERÓN VALLE
Tercera Secretaria
Representante Permanente Alterna ante la FAO
Embajada de la República del Perú
Via Francesco Siacci, 2/B, int. 5
00197 Roma, Italia
Phone: (+39) 06 80691510

Sra. Claudia E. GUEVARA DE LA JARA
Ministra Consejera
Representante Permanente Alterna ante la FAO
Embajada de la República del Perú
Via Francesco Siacci, 2/B, int. 5
00197 Roma, Italia
Phone: (+39) 06 80691510

Sra. Vilma Aurora GUTARRA GARCÍA
Directora
Subdirección de Cuarentena Vegetal de la Dirección General de Sanidad Vegetal del Servicio Nacional de Sanidad Agraria (SENASA)
Peru
Phone: (+511) 3133300
Email: vgutarra@sanasa.gob.pe

PHILIPPINES - FILIPINAS

Representative

Mr George CULASTE
Director
Bureau of Plant Industry
692 San Andres Street
1004 Malate
Manila, Philippines
Email: gculaste.bpi@gmail.com

Mr Lupino, JR. LAZARO
Agricultural Attaché
Deputy Permanent Representative to FAO
Embassy of the Republic of the Philippines
Viale delle Medaglie d'Oro, 112-114
00136 Rome, Italy
Phone: (+39) 06 39749717
Email: lupino.lazaro@yahoo.com

Alternate(s)

Mr Theodore Andrei BAUZON
Third Secretary
Alternate Permanent Representative to FAO
Embassy of the Republic of the Philippines
Viale delle Medaglie d'Oro, 112-114
00136 Rome, Italy
Phone: (+39) 06 39746621

Mr Gerald Glenn PANGANIBAN
Assistant Division Chief
National Plant Quarantine Services Division
Bureau of Plant Industry
692 San Andres Street
1004 Malate
Manila, Philippines
Email: gerald_glenn97@hotmail.com

Mr Marion REYES
Attaché
Alternate Permanent Representative to FAO
Embassy of the Republic of the Philippines
Viale delle Medaglie d'Oro, 112-114
00136 Rome, Italy
Phone: (+39) 06 39746621
Email: romepe2007@gmail.com

Ms Maria Luisa GAVINO
Assistant
Office of the Agriculture Attaché
Embassy of the Republic of the Philippines
Viale delle Medaglie d'Oro, 112-114
00136 Rome, Italy
Phone: (+39) 06 39746621

POLAND - POLOGNE - POLONIA

Representative

Ms Sylwia JURKIEWICZ
Senior Specialist
Phytosanitary Supervision and International Affairs Department
Main Inspectorate of Plant Health and Seeds Inspection
Al. Jana Pawla 11
00828 Warsaw, Poland
Phone: (+48) 22 6529294
Email: s.jurkiewicz@piorin.gov.pl

PORTUGAL

Alternate(s)

Mr Luis Alberto CAIANO
Deputy Permanent Representative to FAO
Embassy of the Portuguese Republic
Via Guido d'Arezzo, 5
00135 Roma, Italy
Phone: (+39) 06 844801
Email: luis.caiano@mne.pt

QATAR

Representative

Mr Adel Zain H A ALYAFEI

Alternate(s)

Mr Salem Nasser M H ALSAADI
Head of Plant Quarantine Unit
IPPC Official Contact Point
Plant Protection and Quarantine Department
Ministry of Municipality Environment
Doha, Qatar
Phone: (+974) 44207364
Fax: (+974) 55005633
Email: snsaadi@mme.gov.qa

REPUBLIC OF KOREA - RÉPUBLIQUE DE CORÉE - REPÚBLICA DE COREA

Representative

Ms Kyu-Ock YIM
Senior Researcher
Department of Plant Quarantine
Animal and Plant Quarantine Agency
Ministry of Agriculture, Food and Rural Affairs
177, Hyeoksin 8-ro, Gimcheon-si
Gyeongsangbuk-do, 39660
Republic of Korea
Phone: (+82) 548120627
Email: koyim@korea.kr

Alternate(s)

Mr Hyokin LEE
Deputy Director
Department of Plant Quarantine
Animal and Plant Quarantine Agency
Ministry of Agriculture, Food and Rural Affairs
177, Hyeoksin 8-ro
Gimcheon-si
Gyeongsangbuk-do, 39660
Republic of Korea
Phone: (+82) 549120631
Email: clavibacter@korea.kr

Ms Hongsook PARK
Assistant Director
Department of Plant Quarantine
Animal and Plant Quarantine Agency
Ministry of Agriculture, Food and Rural Affairs
177, Hyeoksin 8-ro
Gimcheon-si
Gyeongsangbuk-do 39660
Republic of Korea
Phone: (+82) 549120628
Email: hspark101@korea.kr

REPUBLIC OF MOLDOVA - REPUBLIQUE DE MOLDOVA - REPÚBLICA DE MOLDOVA

Representative

Ms Svetlana LUNGU
Head of the Department for Plant Protection, National Food Safety Agency
Embassy of the Republic of Moldova
Via Francesco Cherubini, 27
00185 Rome, Italy
Phone: (+39)3285587705
Email: andrian.popescu@mfa.md

ROMANIA - ROUMANIE - RUMANIA

Représentant

Ms Ramona POPA
Email: ramona.popa@madr.ro

RUSSIAN FEDERATION - FÉDÉRATION DE RUSSIE - FEDERACIÓN DE RUSIA

Representative

Ms Yulia SHVABAUSKENE
Deputy Head
Federal Service for Veterinary and Phytosanitary Surveillance
1/11, Orlikov pereulok, 107139
Moscow, Russian Federation
Phone: (+7) 499 975 43 47
Email: info@svfk.mcx.ru

Alternate(s)

Mr Kirill ANTYUKHIN
First Secretary
Alternate Permanent Representative to FAO
Permanent Mission of the Russian Federation to FAO and other UN Agencies in Rome
Via Gaeta, 5 - 00185
Rome, Italy
Phone: (+39) 3475075937
Email: kirill.888@mail.ru

Ms Elena ERMAKOVA
Deputy Head
International Markets Analysis Department, FGBI
"Centre of Grain Quality Assurance"
1/11, Orlikov pereulok, 107139
Moscow, Russian Federation
Phone: (+7) 499 267-30-15
Email: elena.peatona@gmail.com

Ms Yulia KOROLEVA
Director
Federal Governmental Budgetary Institution "Federal Centre of Grain and Grain Products Safety and Quality Assurance" (FGBI)
1/11, Orlikov pereulok, 107139
Moscow, Russian Federation
"Centre of Grain Quality Assurance"
Moscow, Russian Federation
Phone: (+7) 499 267-30-15
Email: msk.centr@fczerna.ru

Observers

Ms Snezhana USACHEVA
Interpreter
Department of Phytosanitary Risks and International Cooperation with International Organizations,
Federal State Budgetary Institution "All-Russian Plant Quarantine Center"
32, Pogranichnaya str., Bykovo,
Ramensky District, Moscow Region
Russian Federation
Phone: (+7) 499 707 22 27
Email: intervniikk@gmail.com

SAMOA

Representative

Mr Pine PAENOA
Samoa Quarantine Officer Specialist
Ministry of Agriculture and Fisheries
Phone: (+685) 21171/20924

SAO TOME AND PRINCIPE - SAO TOMÉ-ET-PRINCIPE - SANTO TOMÉ Y PRÍNCIPE

Représentant

Mme Idalina Jorge PAQUETE DE SOUSA
CIPV
Email: idaquete@gmail.com; idasousa@yahoo.fr

SAUDI ARABIA - ARABIE SAOUDITE - ARABIA SAUDITA

Representative

Mr Abdelaziz bin Mohammed AL SHRIDI
Contact Point in the IPPC
Ministry of Environment, Water and Agriculture
King Abdulaziz Rd 11195
Riyadh, Saudi Arabia

Mr Talal bin Abdallah AL METAIRI
Agricultural Researcher
Phytosanitary Department
Ministry of Enviroment, Water and Agriculture
King Abdulaziz Rd 11195
Riyadh, Saudi Arabia

Mr Ossama Bin AL SALEH
Director General
General Department of Quarries
Ministry of Enviroment, Water and Agriculture
King Abdulaziz Rd 11195
Riyadh, Saudi Arabia

Mr Abdelhakim ALYOUSSEF
Director of Plant Quarantine Division
Ministry of Enviroment, Water and Agriculture
King Abdulaziz Rd 11195
Riyadh, Saudi Arabia

SENEGAL - SÉNÉGAL

Représentant

M. Mamadou Saliou DIOUF
Ambassadeur
Représentante permanente auprès de la FAO
Ambassade de la République du Sénégal
Via Antonio Stoppani 7/1
00197 Rome, Italie
Phone: (+39) 3890047440
Email: saliougnilan@gmail.com

M. Abdoulaye NDYAYE
Chef de la Division Legislation Phytosanitaire et Quarantaine des Plantes (DPV)
Ministère de l'Agriculture et de l' Équipement Rural
Avenue Léopold Sédar Senghor
Dakar, Senegal
Phone: (+221) 776111175
Email: layedpv@gmail.com

Suppléant(s)

M. Baye Mayoro DIOP
Premier Secrétaire
Représentante permanente suppléante auprès de la FAO
Ambassade de la République du Sénégal
Via Antonio Stoppani 7/1
00197 Rome, Italie
Phone: (+39) 3898833898
Email: bayemayorodiop@gmail.com

M. Ely Sy BEYE
Ministre Conseiller
Représentant permanent adjoint auprès de la FAO
Ambassade de la République du Sénégal
Via Antonio Stoppani 7/1 00197
Rome, Italie

SEYCHELLES

Mr Marc NAIKEN
Chief Executive Officer
National Biosecurity Agency
Ministry of Fisheries and Agriculture
Bel Air Complex, P. O. Box 464
Victoria, Mahé, Seychelles
Email: ceo@nba.gov.sc

SIERRA LEONE - SIERRA LEONA

Ms Raymonda AB JOHNSON
Head Crop Protection Service
Ministry of Agriculture, Forestry and Food Security
1st floor, Youyi Building, Brookfields
Freetown, Sierra Leone
Phone: (+232) 76271030
Email: raymonda.johnson@yahoo.com

SLOVAKIA - SLOVAQUIE - ESLOVAQUIA

Representative

Ms Katarina BENOVSKA
Senior Specialist
Crop Production Department
Ministry of Agriculture and Rural Development
Dobrovicova 12 81266
Bratislava, Slovakia
Email: katarina.benovska@land.gov.sk

Alternate(s)

Ms Zora WEBEROVA
Counsellor
Permanent Representative to FAO
Embassy of the Slovak Republic
Via dei Colli della Farnesina, 144, lotto 6
00135 Rome, Italy
Email: zora.weberova@mzv.sk

SLOVENIA - SLOVÉNIE - ESLOVENIA

Representative

Ms Simona PERME
Expert
Plant Health and Plant Reproductive Material Division
Ministry of Agriculture, Forestry and Food, Administration for Food Safety, Veterinary Sector and Plant Protection
Dunajska, 22
1000 Ljubljana, Slovenia
Phone: (+386) 1 300 1356
Email: simona.perme@gov.si

SOUTH AFRICA - AFRIQUE DU SUD - SUDÁFRICA

Ms Rorisang MAHLAKOANA
Scientist Production: Pest Risk Analysis
Directorate Plant Health
Department of Agriculture, Forestry and Fisheries
c/o Embassy of the Republic of South Africa
Via Tanaro, 14
00198 Rome, Italy
Email: rorisangm@daff.gov.za

Mr Kgabo MATLALA
Manager: International Plant Health Standards
Directorate Plant Health
Department of Agriculture, Forestry and Fisheries
South Africa
Email: kgaboma@daff.gov.za

SPAIN - ESPAGNE - ESPAÑA

Suplente(s)

Sra. Carmen DIAZ GARCIÁ
Subdirección General de Sanidad e Higiene Vegetal y Forestal
Ministerio de Agricultura, Alimentación y Medio Ambiente
C/ Almagro, 33 28010
Madrid, España
Phone: (+34) 91 3478287
Email: mdiazgar@mapama.es

Sra. Belen MARTINEZ MARTÍNEZ
Subdirección General de Sanidad e Higiene Vegetal y Forestal
Ministerio de Agricultura, Alimentación y Medio Ambiente
C/ Almagro, 33
28010
Madrid, España
Email: bmartin@mapama.es

SRI LANKA

Representative

Mr Daya S.J PELPOLA
Ambassador
Permanent Representative to FAO
Embassy of the Democratic Socialist Republic of Sri Lanka
Via Salaria, 322
00198 Rome, Italy
Phone: (+39) 06 8554560/18/493
Email: embassy@srilankaembassyrome.org

Alternate(s)

Mr Somasena MAHADIULWEWA
Deputy Permanent Representative to FAO
Embassy of the Democratic Socialist Republic of Sri Lanka
Via Salaria, 322
00198 Rome, Italy

Mr Jayantha Bandara SENANAYAKE
Additional Director
National Plant Quarantine Service
Katunayake, Sri Lanka
Phone: (+94) 718003289
Email: jsenanayake@gmail.com

SUDAN - SOUDAN - SUDÁN

Representative

Mr Khidir Gibril MUSA EDREES
Director General of Plant Protection Directorate
Sudan
Phone: (+24) 9912138939
Email: khidirgme@gmail.com

Mr Abdelmahmoud Amein BAKR KAMAL EL DIN
Executive Director of the Minister Office
Embassy of the Republic of the Sudan
Via Panama, 48
00198 Rome, Italy
Phone: (+39) 0633222138
Email: permrepoffice_sudanembassyrome@yahoo.it

Ms Saadia Elmubarak Ahmed DAAK
Agricultural Counsellor
Alternate Permanent Representative to FAO
Embassy of the Republic of the Sudan
Via Panama, 48
00198 Rome, Italy
Phone: (+39) 0633222138
Email: permrepoffice_sudanembassyrome@yahoo.it

SWEDEN - SUÈDE - SUECIA

Representative

Ms Johanna BLOMSTRÖM
Deputy Director
Ministry of Enterprise and Innovation
Mäster Samuelsgatan 70
SE-111 21 Stockholm, Sweden
Email: johanna.blomstrom@gov.se

Ms Karin NORDIN
Plant Health Chief
Swedish Board of Agriculture
Jönköping, Sweden
Email: karin.nordin@jordbruksverket.se

Mr Fredrik ALFER
Deputy Permanent Representative to FAO
Embassy of Sweden
Via Serchio, 9-11
00198 Rome, Italy
Email: fredrik.alfer@gov.se

SWITZERLAND - SUISSE - SUIZA

Représentant

Mme Gabriele SCHACHERMAYR
Responsable du secteur
Santé des végétaux et variétés
Unité de direction Systèmes de production et ressources naturelles
Office fédéral de l'agriculture
Mattenhofstrasse 5
3003 Berne, Switzerland
Phone: (+41) 58 462 22 75
Email: gabriele.schachermayr@blw.admin.ch

Suppléant(s)

M. François PYTHOUD
Ambassadeur
Représentante permanente auprès de la FAO
Représentation permanente de la Suisse auprès de la FAO, du FIDA et du PAM
Via Aventina, 32
00153 Rome, Italy
Phone: (+39) 06 895 81 51
Email: francois.pythoud@eda.admin.ch

SYRIAN ARAB REPUBLIC - RÉPUBLIQUE ARABE SYRIENNE - REPÚBLICA ÁRABE SIRIA

Representative

Mr Fiher AL MOUSHREF
Plant Protection Director
Plant Protection Directorate
Ministry of Agriculture and Agrarian Reform
Sabe Bahrat Square, Damascus
Syrian Arab Republic
Phone: (+963) 112220187
Email: Fhrr955@hotmail.com

THAILAND - THAÏLANDE - TAILANDIA

Representative

Mr Thanit ANEKWIT
Deputy Permanent Secretary
Ministry of Agriculture and Cooperatives (MOAC)
3 Rajdamnoen Nok Road, Pranakorn
10200 Bangkok, Thailand
Email: thanit@moac.go.th

Alternate(s)

Mr Prateep ARAYAKITTIPONG
Standards Officer
National Bureau of Agricultural Commodity and Food Standards
Ministry of Agriculture and Cooperatives
3 Rajdamnoen Nok Road, Pranakorn
10200 Bangkok, Thailand
Email: prateep@acfs.go.th

Mr Uthai NOPPAKOONWONG
Deputy Director-General
Department of Agriculture
Ministry of Agriculture and Cooperatives
3 Rajdamnoen Nok Road, Pranakorn
10200 Bangkok, Thailand
Email: cmrarc@gmail.com

Ms Chonticha RAKKRAI
Senior Agricultural Research Specialist
Plant Protection Research and Development Office
Ministry of Agriculture and Cooperatives
3 Rajdamnoen Nok Road, Pranakorn
10200 Bangkok, Thailand
Email: rakkrai@yahoo.com

Mr Sarute SUDHI-AROMNA
Senior Entomology Specialist
Plant Protection Research and Development Office
Ministry of Agriculture and Cooperatives
3 Rajdamnoen Nok Road, Pranakorn
10200 Bangkok, Thailand
Email: sarutes@yahoo.com

TONGA

Representative

Mr Viliami KAMI
IYPH Steering Committee Member
Head of Quarantine
Head of Quality Management Division
Tonga
Phone: (+676) 24922/24257
Email: maf-ento@kalianet.to

TUNISIA - TUNISIE - TÚNEZ

M. Mohamed Lahbib BEN JAMÂA
Directeur Général de la Protection et du Contrôle de la Qualité des Produits Agricoles
30, Rue Alain Savary 1002
Tunis, Tunisie
Phone: (+216) 71788979
Fax: (+216) 71784419
Email: benjamaaml@gmail.com; bo.dgpcqpa@iresa.agrinet.tn

TURKEY - TURQUIE - TURQUÍA

Representative

Mr Yunus BAYRAM
Acting Deputy Director General
General Directorate of Food and Control
Ministry of Food Agriculture and Livestock
Eskisehir Yolu 9. Km. - Lodumlu
Ankara, Turkey
Phone: (+90) 3122587611
Fax: (+90) 3122587682
Email: yunus.bayram@tarim.gov.tr

Alternate(s)

Mr Murat SAHIN
Head of Plant Health and Quarantine Department
General Directorate of Food and Control
Ministry of Food Agriculture and Livestock
Eskisehir Yolu 9. Km. - Lodumlu
Ankara, Turkey
Phone: (+90) 312 258 7711
Fax: (+90) 312 258 7789
Email: murat.sahin@tarim.gov.tr

Mr Serkan SOYKAN
Agricultural Engineer
General Directorate of Food and Control
Ministry of Food Agriculture and Livestock
Eskisehir Yolu 9. Km. - Lodumlu
Ankara, Turkey

UGANDA - OUGANDA

Alternate(s)

Mr Robert SABIITI
First Secretary
Alternate Permanent Representative to FAO
Embassy of the Republic of Uganda
Salita del Poggio Laurentino 7
00144 Rome, Italy
Phone: (+39) 063225220
Fax: (+39) 063213688
Email: robertsabiiti47@gmail.com

UKRAINE - UCRANIA

Representative

Mr Andrii CHELOMBITKO
Director
Chief State Phytosanitary Inspector
1, B.Hrinchenko str. 01001
Kyiv, Ukraine
Phone: (+380) 3895652852
Email: andriy.chelombitko@consumer.gov.ua

Alternate(s)

Mr Igor MELNYK
Head of the Protocol Unit of the International Cooperation
Directorate of the State Service of Ukraine on Food Safety and Consumer Protection
1, B.Hrinchenko str. 01001
Kyiv, Ukraine
Phone: (+380) 3895652852
Email: i.melnyk@consumer.gov.ua

UNITED ARAB EMIRATES - ÉMIRATS ARABES UNIS - EMIRATOS ÁRABES UNIDOS

Representative

Ms Alia Humaid AHMAD BIN HARIB ALMHEIRI
Acting Director
Agriculture Development & Health Department
Ministry of Climate Change and Environment
United Arab Emirates
Phone: (+97) 142148440
Email: ahharib@moccae.gov.ae

Mr Khaled Abdulla ALI ALMARZOOQI
Policies and Risk Analysis Division Director
Abu Dhabi Food Control Authority
United Arab Emirates
Phone: (+97) 1503211142
Email: khaled.almarzouqi@adfca.ae

UNITED KINGDOM - ROYAUME-UNI - REINO UNIDO

Representative

Ms Nicola SPENCE
UK Chief Plant Health Officer
Plant and Animal Health
Department for the Environment, Food and Rural Affairs
Sand Hutton, York, YO41 1LZ
United Kingdom
Phone: (+44) 20800262480
Email: nicola.spence@defra.gsi.gov.uk

Alternate(s)

Ms Denise A'HARA
Head of Plant Health Branch
Chief Plant Health Officer Plant Health
Scottish Government
Roddinglaw Road
Edinburgh, United Kingdom

Mr Samuel BISHOP
Team Leader of International Plant Health Policy
IPPC Official contact Point
Animal and Plant Health
Department for the Environment, Food and Rural Affairs
Sand Hutton, York, YO41 1LZ
United Kingdom
Phone: (+44) 2080262506
Email: sam.bishop@defra.gsi.gov.uk

UNITED STATES OF AMERICA - ÉTATS-UNIS D'AMÉRIQUE - ESTADOS UNIDOS DE AMÉRICA

Representative

Mr Osama EL-LISSY
Deputy Administrator
APHIS, USDA
Email: osama.a.el-lissy@aphis.usda.gov

Alternate(s)

Ms Patricia ABAD
PPQ's NAPPO Technical Director
Plant Protection and Quarantine,
APHIS, USDA

Ms Stephanie DUBON
IPS Deputy Technical Director
Plant Protection and Quarantine,
APHIS, USDA

Mr John GREIFER
Assistant Deputy Administrator
APHIS, USDA
Phone: (+1) 202 7207677

Ms Marina ZLOTINA
IPPC Technical Director
Plant Protection and Quarantine
APHIS, USDA

URUGUAY

Representante

Sr. Federico MONTES
Director General de Servicios Agrícolas - DGSA
Ministerio de Ganadería, Agricultura y Pesca
Representación Permanente de Uruguay
Via Vittorio Veneto, 183
00187 Roma, Italia
Phone: (+39) 064821776
Fax: (+39) 064823695
Email: uruit@ambasciatauruguay.it

Suplente(s)

Sr. Ernesto MESSANO
Segundo Secretario
Representante Permanente Alterno ante la FAO
Representación Permanente de Uruguay
Via Vittorio Veneto, 183
00187 Roma, Italia
Phone: (+39) 064821776
Fax: (+39) 064823695
Email: uruit@ambasciatauruguay.it

VANUATU

Representative

Mr Esra Tekon TUMUKON
Director
Department of Biosecurity
Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity
Private Mail Bag 9039
Port Vila, Vanuatu

VENEZUELA (BOLIVARIAN REPUBLIC OF) - VENEZUELA (RÉPUBLIQUE BOLIVARIENNE DU) - VENEZUELA (REPÚBLICA BOLIVARIANA DE)

Representante

Sr. Joan Jose MONTILLA MOTA
Director Nacional de Salud Integral
Instituto Nacional de Salud Agricola Integral (INSAI)
Venezuela
Phone: (+584) 265951717/243084572
Email: joan.montilla@insai.gob.ve

Suplente(s)

Sra. Marycel PACHECO GUTIERREZ
Primer Secretario
Representante Permanente Alterno ante la FAO
Representación Permanente de la República
Bolivariana de Venezuela ante la FAO
Via G. Antonelli, 47
00197 Roma, Italia
Email: embavenefao@iol.it

Sr. Luis Geronimo REYES VERDE
Primer Secretario
Representante Permanente Alterno ante la FAO
Representación Permanente de la República
Bolivariana de Venezuela ante la FAO
Via G. Antonelli, 47
00197 Roma, Italia
Phone: (+39) 06 8081407
Fax: (+39) 06 80690022
Email: luis.reyes@embavenefao.org

VIET NAM

Mr Le Son HA
Head of Plant Quarantine Division
Plant Protection Department
Ministry of Agriculture and Rural Development
No. 2 Ngoc Ha street, Ba Dinh
Hanoi, Vietnam
Phone: (+84) 24 38518192
Email: kdtv.bvtv@mard.gov.vn

YEMEN - YÉMEN

Representative

Mr Gamil ANWAR MOHAMMED
IPPC Contact Point
Director General of Plant Protection Department
Member of Steering Committee IYPH
Yemen
Email: abuameerm21@gmail.com

ZAMBIA - ZAMBIE

Representative

Mr Kenneth Kajarayekha MSISKA
Principal Agriculture Research Officer
IPPC Official Contact Point
Plant Quarantine And Phytosanitary Service
Zambia Agriculture Research Institute
P/B 07, Mount Makulu Research Station
MB 07 Chilanga, Zambia
Phone: (+260) 211 278141/130
Fax: (+260) 211 278141/130
Email: msiska12@yahoo.co.uk

Alternate(s)

Mr Kayoya MASUHWA
First Secretary
Alternate Permanent Representative to FAO
Embassy of the Republic of Zambia
Via Ennio Quirino Visconti, 8 00193
Rome, Italy
Phone: (+39) 3662761856
Email: kayoyamasuhwa@gmail.com

ZIMBABWE

Alternate(s)

Ms Louisa Delfin MAKUMBE
Plant Quarantine Officer
Plant Quarantine Services
P. Bag 2007
Mazowe, Zimbabwe
Phone: (+263) 772 675 986
Fax: (+263) 4 700339
Email: makumbelouisa@gmail.com

Ms Providence MUGARI
Plant Quarantine Officer
Plant Quarantine Services
P. Bag 2007
Mazowe, Zimbabwe
Phone: (+263) 733 825 676
Fax: (+263) 4 700339
Email: peeanne@gmail.com

OBSERVER COUNTRIES (NON-CONTRACTING PARTIES)
PAYS OBSERVATEURS (PARTIES NON CONTRACTANTES)
PAÍSES OBSERVADORES (PARTES NO CONTRATANTES)

UZBEKISTAN - OUZBÉKISTAN - UZBEKISTÁN

Observers

Mr Ibrohim ERGASHEV
Head of the State Plant Quarantine Inspection
Under the Cabinet of the Ministers of Republic of Uzbekistan
Navoi Street, 4 100004
Tashkent, Uzbekistan

Mr Sultan-Makhmud SULTANOV
Head of the Department for International Affairs of Innovations and Innovative Development of the State Plant Quarantine Inspectorate under the Cabinet of Ministers
Navoi Street, 4 100004
Tashkent, Uzbekistan

OBSERVERS
REGIONAL PLANT PROTECTION ORGANIZATIONS
ORGANISATIONS RÉGIONALES DE PROTECTION DES VÉGÉTAUX
ORGANIZACIONES REGIONALES DE PROTECCIÓN FITOSANITARIA

ASIA AND PACIFIC PLANT PROTECTION COMMISSION
COMMISSION PHYTOSANITAIRE POUR L'ASIE ET LE PACIFIQUE
COMISIÓN DE PROTECCIÓN VEGETAL PARA ASIA Y EL PACÍFICO

Mr Yongfan PIAO
Senior Plant Protection Officer
Executive Secretary of the APPPC
FAO Regional Office for Asia and Pacific (RAP)
39 Phra Atit Road
Bangkok 10200, Thailand
Phone: (+66) 2 6974628
Fax: (+66) 26974445
Email: yongfan.piao@fao.org

COMITÉ REGIONAL DE SANIDAD VEGETAL DEL CONO SUR

Sr. Nelson FARIÑA CESPEDES
Director de Protección Vegetal / Presidente de Cosave
Servicio Nacional de Calidad y Sanidad Vegetal y de Semillas (SENAVE)
Humaita 145 entre Indepencia Nacional y Nuestra Señora de la Asunción
Edificio Planeta, Piso 14
Asunción, Paraguay
Phone: (+595) 21441549
Email: nelson.farina@senave.gov.py

Sr. Ernesto GALLIANI GRANADA
Secretario Técnico del COSAVE
Edificio Planeta I
Humaitá Nº 145 entre Indepencia Nacional y Nuestra Señora de la Asunción
Asunción, Paraguay
Phone: (+595) 21445769/441549
Email: secretaria_tecnica@cosave.org

ANDEAN COMMUNITY
COMMUNAUTÉ ANDINE
COMUNIDAD ANDINA

Mr Camilo Beltrán MONTOYA
RPPO Comunidad Andina
Av. Paseo de la República 3895
San Isidro
Lima 27, Peru
Phone: (+51) 955023533
Email: cbeltran@comunidadandina.org

EUROPEAN AND MEDITERRANEAN PLANT PROTECTION ORGANIZATION
ORGANISATION EUROPÉENNE POUR LA PROTECTION DES PLANTES
ORGANIZACIÓN EUROPEA Y MEDITERRÁNEA DE PROTECCIÓN DE LAS PLANTAS

Mr Martin WARD
Director General
European and Mediterranean Plant Protection Organization (EPPO/OEPP)
21 Boulevard Richard Lenoir
75011 Paris, France
Phone: (+33) 145207794
Email: martin.ward@eppo.int Mr

Mr Baldissera GIOVANI
Coordinator of Euphresco
European and Mediterranean Plant Protection Organization (EPPO/OEPP)
21 Bouvelard Richar Lenoir
75011 Paris, France
Phone: (+33) 145207794
Email: bgiovani@euphresco.net

Mr Valerio LUCCHESI
Scientific Officer
European and Mediterranean Plant Protection Organization (EPPO/OEPP)
21 Bouvelard Richard Lenoir
75011 Paris, France
Phone: (+33) 145207794
Email: valerio.lucchesi@eppo.int

Ms Françoise PETTER
Assistant Director
European and Mediterranean Plant Protection Organization (EPPO/OEPP)
21 Boulevard Richard Lenoir
75011 Paris, France
Phone: (+33) 145207794
Email: francoise.petter@eppo.int

Ms Diana RYZHKOVA
Administrative Assistant
European and Mediterranean Plant Protection Organization (EPPO/OEPP)
21 Boulevard Richard Lenoir
75011 Paris, France
Phone: (+33) 145207794
Email: diana.ryzhkova@eppo.int

INTER AFRICAN PHYTOSANITARY COUNCIL
CONSEIL PHYTOSANITAIRE INTERAFRICAIN
CONSEJO FITOSANITARIO INTERAFRICANO

Dr. Jean Gerard MEZUI M'ELLA
Executive Director
Inter-African Phytosanitary Council of the African Union
P. O. Box, 4170 Nlongkak
Youndé, Cameroon
Phone: (+237) 694899340
Fax: (+237) 222 211967
Email: au-cpi@au-appo.org

Prof. Abdel Fattah AMER MABROUK
Senior Scientific Officer
Entomology
Inter-African Phytosanitary Council of the African Union
P. O. Box 4170 Nlongkak
Youngé, Cameroon
Phone: (+237) 677653138
Email: abdelfattahsalem@ymail.com/amera@africa-union.org

NEAR EAST PLANT PROTECTION ORGANIZATION
ORGANISATION POUR LA PROTECTION DES VÉGÉTAUX AU PROCHE-ORIENT
ORGANIZACIÓN DE PROTECCIÓNADE LAS PLANTAS DEL CERCANO ORIENTE

Mr Mekki CHOUIBANI
Executive Director
Batiment C INRA Angle des
Avenues Ibn
Ouazzani et Hassan II
Rabat, Morocco
Phone: (+212) 537704810
Email: hq.neppo@gmail.com

NORTH AMERICAN PLANT PROTECTION ORGANIZATION
ORGANISATION NORD AMÉRICAINE POUR LA PROTECTION DES PLANTES
ORGANIZACIÓN NORTEAMERICANA DE PROTECCIÓN A LAS PLANTAS

Ms Stephanie BLOEM
Executive Director
North American Plant Protection Organization (NAPPO)
1730 Varsity Drive, Suite 145
Raleigh, North Carolina 27606
United States of America
Phone: (+919) 6174040
Email: stephanie.bloem@nappo.org

REGIONAL INTERNATIONAL ORGANIZATION FOR PLANT PROTECTION AND ANIMAL HEALTH
ORGANISME INTERNATIONAL RÉGIONAL CONTRE LES AMALADIES DES PLANTES ET DES ANIMAUX
ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA

Mr Efrain MEDINA GUERRA
Executive Director
Organismo Internacional Regional de Sanidad Agropecuaria
Calle Ramón Belloso, final pasaje Isolde
Colonia Escalón
San Salvador, El Salvador
Phone: (+503) 77379999
Email: emedina@oirsa.org

Mr Carlos Ramon URIAS MORALES
Plant Health Regional Director
Organismo Internacional Regional de Sanidad Agropecuaria
Calle Ramón Belloso, final pasaje Isolde
Colonia Escalón
San Salvador, El Salvador
Phone: (+503) 22099222/(+503) 22099200
Email: curias@oirsa.org/ svegetal@oirsa.org

PACIFIC PLANT PROTECTION ORGANISATION
ORGANISATION DE PROTECTION DES VÉGÉTAUX POUR LE PACIFIQUE
ORGANIZACIÓN DE PROTECCIÓN FITOSANITARIA DEL PACIFICO

Mr Josua WAINIQOLO
Biosecurity and Trade Support Advisor
Pacific Community Land Resources Division
Private Mail Bag
Suva, Fiji
Phone: (+679) 3379348 (+679) 7590276
Email: josuaw@spc.int

REGIONAL INTERNATIONAL ORGANIZATION FOR PLANT PROTECTION AND ANIMAL HEALTH
ORGANISME INTERNATIONAL RÉGIONAL CONTRE LES MALADIES DES PLANTES ET DES ANIMAUX
ORGANISMO INTERNACIONAL REGIONAL DE SANIDAD AGROPECUARIA

Ms Juliet GOLDSMITH
Plant Health Specialist
Caribbean Agricultural Health and Food Safety Agency (CAHFSA)
Letitia Vriesdelaan 10
Paramaribo, Suriname
Phone: (+597) 0422547/ (+597) 7252922
Email: juliet.goldsmith@cahfsa.org

CONVENTION ON BIOLOGICAL DIVERSITY
CONVENTION SUR LA DIVERSITÉ BIOLOGIQUE
CONVENIO SOBRE LA DIVERSIDAD BIOLÓGICA

Ms Cristiana PASCA PALMER
Executive Secretary
Secretariat of the Convention on Biological Diversity
413, Saint Jacques Street, Suite 800
Montreal QC H2Y 1N9
Canada
Email: secretariat@cbd.int

Ms Junko SHIMURA
Programme Management Officer
Invasive Alien Species/Taxonomy
Secretariat of the Convention on Biological Diversity
413, Saint Jacques Street, Suite 800
Montreal QC H2Y 1N9
Canada
Phone: (+1 514) 287 8706

FAO REGIONAL OFFICES
BUREAUX RÉGIONAUX DE LA FAO
OFICINA REGIONALES DE LA FAO

Ms Joyce MULILA MITTI
Plant Production And Protection Officer
FAO Regional Office for Central Africa (SFS)
206. V. Impasse Pascal Nze Bie
Pont de Gué-Gué
PO Box 2643
Libreville, Gabon
Phone: (+241) 01443309/01444284
Email: FAO-SFC@fao.org

Mr Noureddine NASR
Plant Production and Protection Officer
FAO Sub-regional Office for North-Africa (SNE)
43 Av. Kheireddine Pacha
1002 Tunis Belvédère
BP. 300 Cité Mahrajène
1082 Tunis, Tunisia
Phone: (+216) 71 906553 (ext: 235)
Email: noureddine.nasr@fao.org

Mr Piotr WLODARCZYK
Agricultural Officer
FAO Regional Office for Europe and Central Asia (REU)
34 Benczur utca

H-1068 Budapest, Hungary
Phone: (+36) 1 4612000
Email: piotr.wlodarczyk@fao.org

Mr Thaer YASEEN
Regional Plant Protection Officer
FAO Regional Office for the Near East (RNE)
11 Al-Eslah Al-Zerai Street
Dokki, P. O. Box 2223
Cairo, Egypt
Phone: (+202) 33316000
Email: thaer.yaseen@fao.org

INTERNATIONAL ATOMIC ENERGY AGENCY
AGENCE INTERNATIONALE DE L'ÉNERGIE ATOMIQUE
ORGANISMO INTERNACIONAL DE ENERGÍA ATÓMICA

Mr Rui CARDOSO PEREIRA
Entomologist (PhD)
Head Insect Pest Control Section
Joint FAO/IAEA Division of Nuclear Techniques
International Atomic Energy Agency
Vienna International Centre
P. O. Box 100
1400 Vienna, Austria
Phone: (+43) 12600/26077
Email: r.cardoso-pereira@iaea.org

Ms Diana AKULLO
Policy Officer
Department of Rural Economy and Agriculture
African Union Commission
P. O. Box 3243
Addis Ababa, Ethiopia
Addis AbEba
Email: akullod@africa-union.org

CENTRE INTERNATIONAL DE HAUTES ETUDES AGRONOMIQUES MEDITERRANNES

Ms Anna Maria D'ONGHIA
Principal Administrator
Head of the Division Integrated Pest Management
Centre International de Hautes Etudes Agronomiques Méditerranéennes
Mediterranean Agronomic Institute
Bari, Italy
Phone: (+39) 0804606246
Email: donghia@iamb.it

EURASIAN ECONOMIC COMMISSION

Ms Viktoria CHEPELOVA
Adviser
International Cooperation Division
Department for Technical Regulation and Accreditation
Eurasian Economic Commission
2 Letnikovskaya St., Bld. 1/2
Moscow, Russian
Email: chepelova@eecommission.org

OBSEVERS FROM INTERGOVERNMENTAL ORGANIZATIONS
OBSERVATEURS D'ORGANISATIONS INTERGOUVERNEMENTALES
OBSERVADORES DE ORGANIZACIONES INTERGUBERNAMENTALES

AFRICAN UNION
UNION AFRICAINE
UNIÓN AFRICANA

Mr Mikhail CHUIKO
Head of the Secretariat of the
Member of the Board (Minister)
Technical Regulation
Eurasian Economic Commission
2 Letnikovskaya St., Bld 1/2
Moscow, Russia

Mr Valery KORESHKOV
Member of the Board (Minister)
Technical Regulation
Eurasian Economic Commission
2 Letnikovskaya St., Bld. 1/2
Moscow, Russia

Mr Evgenyi STRELKOV
Consultant
Department of Sanitary,
Phytosanitary and Veterinary
Measures
Eurasian Economic Commission
2 Letnikovskaya St., Bld. 1/2
Moscow, Russia

INTER-AMERICAN INSTITUTE FOR COOPERATION IN AGRICULTURE
INSTITUT INTERAMÉRICAIN DE COOPÉRATION POUR L'AGRICULTURE
INSTITUTO INTERAMERICANO DE COOPERACIÓN PARA LA AGRICULTURA

Mr Robert AHERN
Principal Officer
Inter-American Institute for
Cooperation on Agriculture (IICA)
Agricultural Health and Food Safety
P. O. Box 55-2200
Vazquez de Coronado, San Isidro
11101, San Jose, Costa Rica
Phone: (+506) 22160184
Email: robert.ahern@iica.int

ISPRA

Mr Alessandro BRATTI
ISPRA Institute for Environmental
Protection and Research
Via V. Brancati 48

00144 Rome, Italy

Mr Piero GENOVESI
Head of Wildlife Service
ISPRA Institute for Environmental Protection and Research
Via V. Brancati 48
00144 Rome, Italy
Phone: (+39) 0650072645
Email: piero.genovesi@isprambiente.it

WORLD TRADE ORGANIZATION
ORGANISATION MONDIALE DU COMMERCE
ORGANIZACIÓN MUNDIAL DEL COMERCIO

Ms Anneke HAMILTON
Economic Affairs Officer
Agriculture and Commodities Division
World Trade Organization
Rue de Lausanne, 154
CH 1211 Genève, 21
Switzerland
Email: anneke.hamilton@wto.org

Mr Melvin SPREIJ
Economic Affairs Officer
STDF Secretariat
World Trade Organization
Rue de Lausanne, 154
CH 121 Genève 21, Switzerland
Email: melvin.spreij@wto.org

UNITED NATIONS ENVIRONMENT PROGRAMME
PROGRAMME DES NATIONS UNIES POUR L'ENVIRONNEMENT
PROGRAMA DE LAS NACIONES UNIDAS PARA EL MEDIO AMBIENTE

Mr Andreas OBRECHT
Programme Management Officer, Biodiversity
UN Environment Programme
MEAs Support and Cooperation Unit
Law Division
P. O. Box 30552, NOF 1
UNEP Gigiri
Nairobi, Kenya
Phone: (+254) 205123465
Email: andreas.obrecht@unep.org

OBSERVERs
NON-GOVERNMENTAL ORGANIZATIONS
ORGANISATIONS NON GOUVERNMENTALES
ORGANIZACIONES NO GUBERNAMENTALES

ASIA AND PACIFIC SEED ASSOCIATION

Ms Heidi GALLANT
Executive Director
The Asia and Pacific Seed Association (APSA)
Institute of Food Research and Product Development Building
Kasetsart University, Ladyao
Chatuchak, 10900
Bangkok, Thailand
Email: heidi@apsaseed.org

Imperial College London

Ms Megan QUINLAN
Senior Research Fellow
Centre for Environmental Policy
Imperial College London
Silwood Park Campus
Ascot, Berkshire, SL5 7PY
United Kingdom
Phone: (+44) 2075942496
Email: m.quinlan@imperial.ac.uk

International Grain Trade Coalition

Ms Katy LEE
Secretariat
International Grain Trade Coalition (IGTC)
Rue de Lausanne 37
CH - 1201 Genève
Switzerland
Phone: (+41) 789329618
Email: secretariat@igtcglobal.org

INTERNATIONAL SEED FEDERATION

FÉDÉRATION INTERNATIONALE DES SEMENCES

Mr Richard DUNKLE
Senior Director
Seed Health and Trade
American Seed Trade Association
1701 Duke Street, Suite 275
Alexandria, VA 22314 USA
Phone: (+1) 703 8378140
Email: rdunkle@betterseed.org

Mr Claudio FEULNER
Regulatory Affairs and Policy Coordinator
Canadian Seed Trade Association
130 Albert Street, Suite 500
K1P 5G4 Ottawa
Ontario, Canada
Phone: (+1) 6138299527
Email: cfeulner@cdnseed.org

Mr Dennis JOHNSON
Seed Health Manager
International Seed Federation
Chemin du Reposoir 7
1260 Nyon, Switzerland
Phone: (+41) 223654420
Email: d.johnson@worldseed.org

SEED ASSOCIATION OF THE AMERICAS

Ms María Inés ARES
Senior Advisor on Seed Phytosanitary
Seed Association of the Americas (SAA)
Rondeau 1908 CP: 11.800
Montevideo, Uruguay
Phone: (+598) 29242832
Email: iares@saaseed.org

SPEAKERS

Mr Geoffrey DONOVAN
Research Forester, Forest Service, PNW Research Station,
USA

Mr Sebastien MASSART
University of Liège
Belgium

UNIVERSITIES

Mr Manuel PLANTEGENEST
UMR IGEPP
Plant Health Coordinator
Agrocampus Ouest
France
Email:
manuel.plantegenest@agrocampus.ouest.fr

Mr Alberto POZZEBON
Dafnae Department
University of Padova
Italy
Email: alberto.pozzebon@unipd.it

Ms Susanne WEIGAND
Coordinator MSc Crop Protection
Plant Health
University of Goettingen
Germany
Email: susanne.weigand@agr.uni-goettingen.de

OBSERVERS

Centre for Agriculture and Bioscience International

Mr Washington OTIENO
Regional Coordinator Plantwise Programme
673 Limuru Road
PO Box 633-00621
Nairobi, Kenya
Phone: (+254) 207224450
Email: w.otieno@cabi.org

Appendix 04 – Strategic Planning Group: Revised Rules of Procedure

Rule 1. Purpose

[1] The purpose of the Strategic Planning Group (SPG) is to provide strategic perspective to the work of the IPPC and to support improvement through the provision of recommendations and advice to the CPM on any issues which have been referred and other issues related to the functions of the SPG.

Rule 2. Functions

[2] The SPG will meet its objectives through carrying out the following functions:

- provide periodic review of the IPPC strategic framework; and
- provide strategic advice to the following specific issues:
    - implementation of the International Plant Protection Convention;
    - capacity development;
    - information exchange;
    - standards development;
    - review of plant protection;
    - resource mobilization and finance;
    - communication issues;
    - procedural issues;
    - operational issues; and
    - any other activity referred by the CPM.

Rule 3. Membership

[3] The SPG will consist of:

- the members of the CPM Bureau;
- the Chairpersons of the Implementation and Capacity Development Committee (IC) and the Standards Committee (SC);
- representatives of the Regional Plant Protection Organizations (RPPOs);
- other interested persons representing Contracting Parties.

Rule 4. Meetings

[4] The SPG will meet at least once a year and no less than four months prior to the CPM meeting, to allow for report preparation and the undertaking of specified activities before the CPM meeting.

[5] The Vice-Chairperson of the CPM Bureau or in his/her absence another member of the CPM Bureau will chair the meetings of the SPG.

[6] Other interested persons representing Contracting Parties with a specific interest in contributing to the strategic work of the SPG should indicate their intent to participate in a meeting of the SPG no less than 45 days prior to the beginning of the meeting. Wherever possible, members of the SPG will fund their own travel and daily subsistence to attend the meetings. Members of the CPM Bureau and the Chairpersons of the subsidiary bodies may request financial assistance from FAO for meetings, with the understanding that priority for financial assistance, if available, is given to participants from developing countries.

Rule 5. Recommendations

[7] The SPG strives for consensus on all issues in providing recommendations and advice to the CPM. Where no consensus can be reached, the CPM will be informed of the situation.

Rule 6. Documentation, records and reports

[8] The Secretariat, in consultation with the Chairperson and the Vice-Chairperson of the CPM will prepare a provisional agenda and make it available to the members of the SPG no less than 45 days prior to the relevant SPG meeting.

[9] Other meeting documents will be made available as soon as possible after the preparation of the provisional agenda and preferably no less than 14 days prior to the meeting.

[10] The SPG will elect a rapporteur for each meeting from among the participants. The IPPC Secretariat will keep the records of the SPG meetings and prepare a report for the CPM no later than 30 days after the conclusion of the meeting.

Rule 7. IPPC Secretariat

[11] The IPPC Secretariat will provide administrative, technical and editorial support as it may be required by the SPG.

Rule 8. Language

[12] The business of the SPG should be conducted in English.

Rule 9. Amendment

[13] Amendments to these rules of procedure for the SPG will be made by the CPM as required.

Appendix 05 – Sustainable Funding for the IPPC Secretariat: Supplementary Contribution Arrangement

[1] As agreed during the 13th Session of the Commission on Phytosanitary Measures (CPM), Contracting Parties to the International Plant Protection Convention (IPPC) may make available, on a grant basis, to the IPPC Secretariat represented by the Food and Agriculture Organization of the United Nations (FAO), contributions to provide support to the project "Special International Plant Protection Convention Trust Fund", ("the project"), as set out in the overall IPPC Secretariat work plan and budget approved by the CPM on an annual basis.

[2] FAO has established a Multiple Donor Trust Fund ("Trust Fund"), MTF/GLO/122/MUL, to administer the contributions and expenditures of the project. The contributions of the Contracting Parties to the IPPC ("the donor") will be paid to the Trust Fund and will be subject to the following conditions:

1) FAO will administer and account for the contribution in accordance with FAO's financial regulations and other applicable rules and procedures and practices and keep separate records and accounts for the project, which conform with professionally accepted bookkeeping rules and practices.

2) Contributions in currencies other than United States Dollars will be received and recorded based on the United States Dollar value at the UN rate of exchange prevailing on the day of receipt of the contribution.

3) The contribution will be used solely for the support to the project as specified in this Arrangement. All financial accounts and statements shall be expressed in United States Dollars or in dollars depending on the currency of the contribution and shall be subject exclusively to the internal and external auditing procedures laid down in the Financial Regulations, Rules and directives of FAO, in conformity with the single audit principle observed by the United Nations system as a whole.

4) The contribution will be paid to FAO into the following account:

Bank Name	Citibank
	399 Park Avenue, New York, NY, USA, 10022
Account Number	Food Agr Org – TF USD
Swift/BIC	CITIUS33
ABA/Bank Code	021000089
Account No.:	36352577

Clearly Stating Project MTF/GLO/122/MUL

5) The obligations of FAO are contingent upon receipt of the necessary funds from the donor in accordance with this Arrangement.

6) The contribution will include a provision not exceeding 6 percent of the total net inputs to cover the cost of administrative and operational services incurred by FAO directly relating to the project.

7) FAO will make every effort to ensure that the contribution is not used to meet the cost of import duties or customs duties (or any similar levies) imposed by the countries involved on the goods imported

or services provided. In the event that exemption from such duties is not granted, the costs of duties can be met from the contribution.

8) All procurement shall be made in accordance with FAO regulations, which conform to generally accepted principles of good procurement practice, including safeguards against corrupt and illegal practice, and that no offer, gift, payment or benefit of any kind, which would or could be construed as an illegal or corrupt practice can be accepted, either directly or indirectly, as an inducement or reward for the award or execution of procurement contracts. To this end, FAO shall ensure that it applies and enforces its relevant rules regarding corrupt and illegal practices.

9) The IPPC Secretariat will report the achieved results of the trust fund contributions every year on the occasion of the regular session of the Commission on Phytosanitary Measures, including a financial statement that will be issued in US dollars and will be for the project as a whole. Any unspent funds and any interest accrued from the contribution will be returned to the donor, following closure of the project, on a pro rata basis in proportion to the contribution of each donor.

10) The donor shall not accept any responsibility or liability for any claims, debt demands, damage or loss as a result of the implementations of this Arrangement.

11) The donor and FAO shall promptly inform each other of any event or situation which might affect the implementation of project activities and which may necessitate a modification or alteration of the scope, implementation, the agreed budget or other aspects of this Arrangement. In case any change occurs in the schedule or implementation of the activities, FAO shall promptly inform the donor.

12) If any changes occur which, in the opinion of the donor, impair significantly on the value of the project, the donor and FAO will consult on measures to resolve the problem and possible courses of action. In the event of such changes, the donor reserves the right to modify or terminate its financial contribution to the project. In the event of termination, the obligations already assumed by either party shall remain in force to the extent necessary to permit orderly withdrawal of personnel, funds and assets, the settlement of accounts between the parties and the settlement of any liability incurred by FAO for the activities covered by this Arrangement.

13) For the avoidance of doubt, nothing in this Arrangement or in any document relating thereto will be construed as constituting a waiver of privileges and immunities of FAO. Any dispute between the donor and FAO arising out of the interpretation or execution of this Arrangement shall be settled by a mutually agreed arrangement.

Appendix 06 – Revised Terms of Reference for the IPPC Financial Committee

(*Attachment II To IPPC Resource Mobilization Strategy (CPM2012/20), Adopted At CPM-7***)**

1. Objective

[1] The objective of the Financial Committee is to increase the financial security of the IPPC Secretariat through:

- enhancing donor confidence in the financial mechanisms of the IPPC
- assisting the IPPC Secretariat and CPM in its resource solicitation efforts
- improving the efficiency of financial planning.

2. Scope of the Financial Committee

[2] The Financial Committee is to assist the IPPC Secretariat and the CPM Bureau with:

- financial planning
- financial reporting
- the solicitation of resources
- the development of procedures with regard to financial transparency and resource mobilization.

3. Structure of the Financial Committee

[3] The Financial Committee will consist of four volunteer members to be selected by the CPM Bureau.

[4] The members of the Financial Committee should fund their own travel and subsistence to attend meetings. In the case that Financial Committee members solicit resources on behalf of the IPPC Secretariat, financial assistance may be requested.

4. Functions of the Financial Committee

[5] The Financial Committee will meet its objectives through carrying out the following functions:

- developing procedures for budget transparency
- assisting the IPPC Secretariat in the annual development of budget reports
- developing standardized budget forms
- assisting the IPPC Secretariat in the annual development of budget proposals
- review of resource issues
- assisting the IPPC Secretariat in the development of budgeted operational plans
- assisting the IPPC Secretariat and the CPM in resource mobilization activities
- providing regular reports to the CPM Bureau and the SPTA
- any other financially related activity referred by the CPM Bureau.

5. IPPC Secretariat

[6] The Secretariat provides administrative and technical support as necessary.

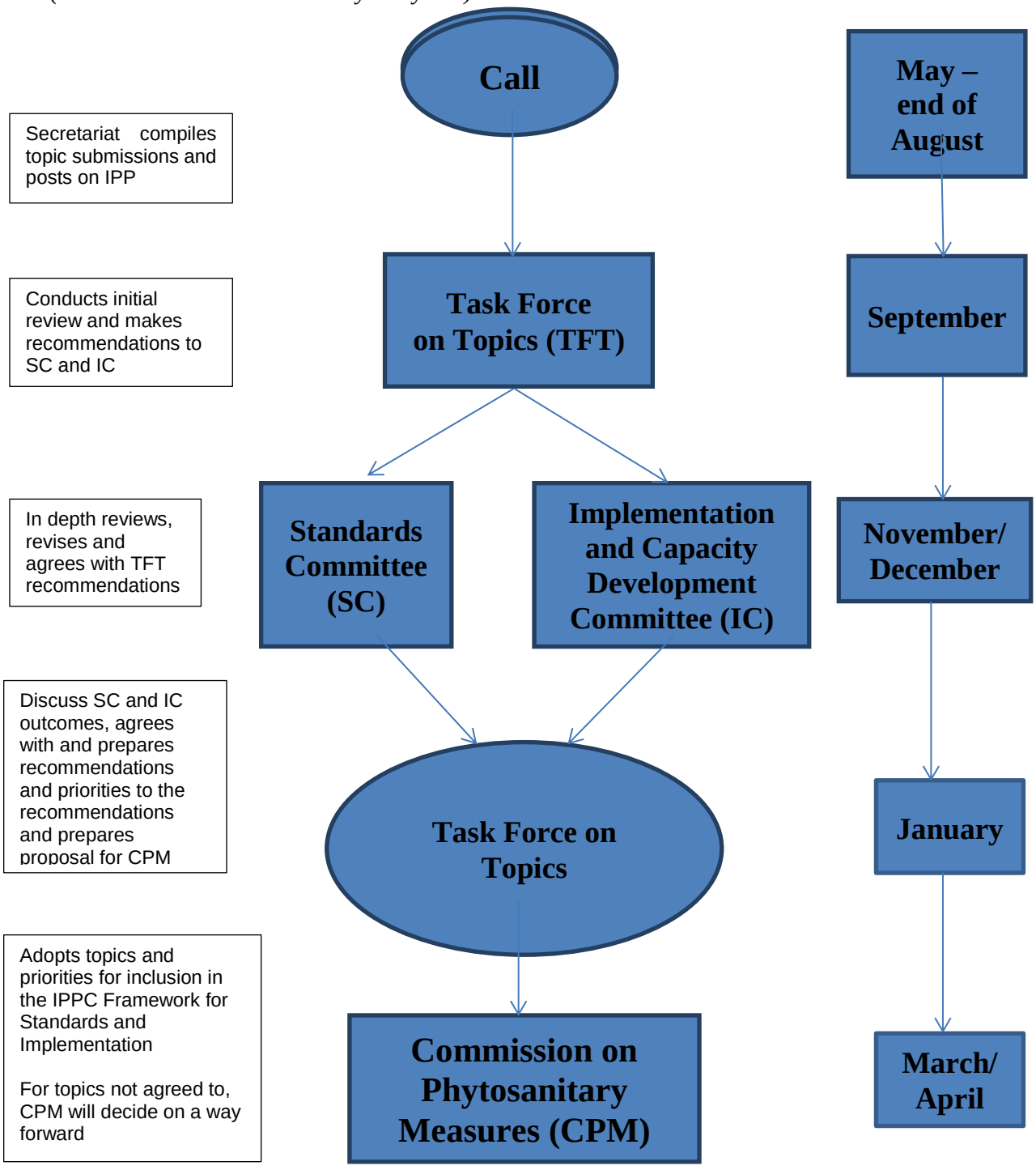
6. Observers

[7] The Financial Committee may be joined by one to three observers (maximum) to provide advice as appropriate on specific financial issues discussed by the Committee. The participation of observers should be approved by the Bureau prior to the Financial Committee meeting. The Bureau may decide on the attendance of observers (and their rotation) based on their relevance to each Financial Committee meeting agenda. The selection of observers (with financial background) should be done in accordance with the CPM procedures.

[8] Such observers may participate in the Financial Committee discussions, subject to the approval of the Chairperson; receive the documents other than those of a restricted nature, and; submit written statements on particular items of the agenda.

Appendix 07 – Standards and Implementation: Process for Call for Topics

– The proposed process of the Call for Topics: Standards and Implementation
(The Call to be issued once every two years)



Appendix 08 – Criteria for the Justification and Prioritization of Proposed Topics

[1] Priority will be given to topics with the largest global impact.

Core criteria (must provide information. It is expected that all submissions meet the following core criteria):

- Contribution to the purpose of the IPPC as described in article I.1.
- Linkage to IPPC Strategic Objectives (SOs) and Organizational results demonstrated.
- Feasibility of implementation at the global level (consider ease of implementation, technical complexity, capacity of NPPO(s) to implement, relevance for more than one region).
- Clear identification of the problems that need to be resolved through the development of the standard or implementation resource.
- Availability of, or possibility to collect, information in support of the proposed standard or implementation resource (e.g. scientific, historical, technical information, experience).

Supporting criteria (provide information as appropriate)

Practical

1) Is there a regional standard and/or implementation resource on the same topic already available and used by NPPOs, RPPOs or international organizations.
2) Availability of expertise needed to develop the proposed standard and/or implementation resource.

Economic

1) Estimated value of the plants protected.
2) Estimated value of trade including new trade opportunities affected by the proposed standard and/or implementation resource (e.g. volume of trade, value of trade, the percentage of Gross Domestic Product of this trade) if appropriate.

Environmental

1) Utility to reduce the potential negative environmental consequences of certain phytosanitary measures, for example reduction in global emissions for the protection of the ozone layer.
3) Utility in the management of non-indigenous species which are pests of plants (such as some invasive alien species).
4) Contribution to the protection of the environment, through the protection of wild flora, and their habitats and ecosystems, and of agricultural biodiversity.

Strategic

1) Extent of support for the proposed standard and/or implementation resource (e.g. one or more NPPOs or RPPOs have requested it, or one or more RPPOs have adopted a standard on the same topic).
2) Frequency with which the issue to be addressed, as identified in the submission emerges as a source of trade disruption (e.g. disputes or need for repeated bilateral discussions, number of times per year trade is disrupted).
3) Relevance and utility to developing countries.
4) Coverage (application to a wide range of countries/pests/commodities).
5) Complements other standards and/or implementation resources (e.g. potential for the standard to be used as part of a systems approach for one pest, complement treatments for other pests).
6) Conceptual standard and/or implementation resource to address fundamental concepts (e.g. treatment efficacy, inspection methodology).
7) Urgent need for the standard and/or implementation resource.

Appendix 09 – Terms of Reference and Rules of Procedure of the Task Force on Topics

1. Scope of the Task Force on Topics

[1] The Task Force on Topics (TFT) assists the Implementation and Capacity Development Committee (IC) and the Standards Committee (SC) in the process of the Call for Topics: Standards and Implementation.

[2] The functions of the TFT are:

- to screen the submitted topics against established criteria for justification and prioritization of proposed topics using a clear prioritarization score scheme agreed on by the TFT and develop recommendations to the IC and SC on the better way to address the topics: by a standard or by an implementation resource.
- to review if the submitted topics could be addressed jointly between the IC and the SC
- to discuss the topics recommended by the SC and IC and prepare the final paper on recommended topics for adoption by CPM.

2. Structure of TFT

[3] TFT consists of seven members, three of whom are members of the IC (including the Chair of the IC), three are members of the SC (including the Chair of the SC), and one is a CPM Bureau member.

3. Establishment of TFT

[4] Members of the TFT are selected by the IC, the SC and by the CPM Bureau. IC, SC and CPM Bureau should each select one replacement member, to participate in the work of the TFT when members are not available.

Rules of procedure for the Task Force on Topics

Rule 1. Membership

Members of the Task Force on Topics (TFT) should be members of the Implementation and Capacity Development Committee (IC) or the Standards Committee (SC) or the Commission on Phytosanitary Measures (CPM) Bureau, and should be able to participate in the work of TFT.

The IC, the SC and the CPM Bureau should review the membership of TFT as necessary, taking into account, in particular, changes in the membership of the IC, the SC or the CPM Bureau.

Rule 2. Procedure for nomination and selection of TFT members

Members of TFT are selected by the IC (three members and one replacement) and by the SC (three members and one replacement) and by the CPM Bureau (one member and one replacement).

The Secretariat maintains the membership list of TFT on the IPP.

Rule 3. Period of membership

Members of TFT may serve for the period of their membership in the IC, the SC or the CPM Bureau. The IC, the SC or the CPM Bureau may, in accordance with Rule 2 of these Rules of Procedure, change or amend the respective membership of TFT at any time. Members may at any time withdraw from the TFT.

Rule 4. Chairperson and Vice-Chairperson

Meetings of the TFT are chaired by the CPM Bureau member.

The Vice-Chairperson of TFT is elected from the TFT membership by the TFT members for a two years' term.

The Chairperson, or in the absence of the Chairperson or the CPM Bureau replacement member, the Vice-Chairperson, shall preside at meetings of the TFT and shall exercise such other functions as may be required to facilitate the work of the TFT. A Vice-Chairperson acting as a Chairperson shall have the same powers and duties as the Chairperson.

Rule 5. Observers

TFT should not allow observers.

Rule 6. The IPPC Secretariat

The IPPC Secretariat provides administrative, technical and editorial support for the TFT meetings.

Rule 7. Meetings

TFT should work as necessary, generally after each call for topics. E-mail, teleconferencing, e-decisions and other virtual communication methods should be used where possible to prepare and conduct the meetings of TFT. Face-to-face meetings will be held as needed.

A meeting of the TFT shall not be declared open unless there is a quorum. The presence of a majority of the members of the TFT (four members) is necessary to constitute a quorum.

Rule 8. Approval

Decisions of TFT are taken by its members only. Approvals relating to draft documents and agreement on recommendations provided to the IC and the SC should be by consensus and communicated to the IC and the SC. If consensus is not reached, contentious issues should be mentioned and positions explained in the meeting report and brought to the attention of the IC and the SC.

Rule 9. Reports

The report of each TFT meeting should be published on the IPP. The reports should be presented to the IC and the SC and the CPM Bureau

Rule 10. Working language

English should be the working language of TFT meetings.

Rule 11. Amendments

Amendments to the Terms of Reference and Rules of Procedures, if required, should be adopted by the CPM.

Appendix 10 – Recognition related to Standard Setting activities

[1] We would like to express gratitude to the experts of the drafting groups for their active contribution in the development of the following ISPMs, or Annexes to ISPMs, adopted in 2017/2018:

Table 1: ISPM on Revision of ISPM 6 (*Surveillance*) (2009-004)

Country	Expert Name	Role
Argentina	Mr Ezequiel FERRO	Steward (2016-05)
Kenya	Ms. Esther KIMANI	Assistant Steward (2015-11)
Poland	Mr Piotr WLODARCZYK	Steward (2015-05)
Australia	Mr Bart ROSSEL	Assistant Steward (2013-05)
Argentina	Mr Pablo Luis CORTESE	EWG Member
Australia	Mr Chris DALE	EWG Member
Canada	Mr Robert FAVRIN	EWG Member
The Netherlands	Mr Jan SCHANS	EWG Member
USA	Mr Brian Joseph KOPPER	EWG Member
New Zealand	Mr Paul STEVENS	EWG Organizer
New Zealand	Mr John HEDLEY	EWG Host (Steward (2009-11))

Table 2: ISPM on 2015 and 2016 amendments to ISPM 5 (*Glossary of phytosanitary terms*) (1994-001)

Country	Expert Name	Role
France	Ms Laurence BOUHOT-DELDUC	TPG Steward
USA	Ms Stephanie BLOEM	TPG English
New Zealand	Mr John HEDLEY	TPG English
Uruguay	Ms Beatriz MELCHO	TPG Spanish
China	Ms Hong NING	TPG Chinese
Denmark	Mr Ebbe NORDBO	TPG English
Egypt	Ms Shaza Roushdy OMAR	TPG Arabic
France	Mr Andrei ORLINSKI	TPG Russian

Table 3: Revision of Annex 1 and Annex 2 to ISPM 15, for inclusion of the phytosanitary treatment sulphuryl fluoride fumigation and revision of the dielectric heating section (2006-010A&B)

Country	Expert Name	Role
USA	Ms Marina ZLOTINA	Steward (2016-05)
Poland	Mr Piotr WLODARCZYK	Steward (2015-05)
Canada	Ms Marie-Claude FOREST	Assistant Steward (2015-05)
Norway	Mr Sven Christer MAGNUSSON	TPFQ member
Japan	Mr Mamoru MATSUI	TPFQ member
Canada	Mr Shane SELA	TPFQ member
Canada	Mr Eric ALLEN	IFQRG Chair
Ghana	Mr Victor AGYEMAN	TPFQ member
Chile	Mr Marcos Beéche CISTERNAS	TPFQ member
Germany	Mr Thomas SCHRÖDER	TPFQ member

Table 4: ISPM 42 on Requirements for the use of temperature treatments as a phytosanitary measure (2014-005)

Country	Expert Name	Role
Argentina	Mr Ezequiel FERRO	Steward (2016-11 SC)
Argentina	Mr Eduardo WILLINK	Assistant Steward (2016-11 SC)
Australia	Mr Glen BOWMAN	Assistant Steward (2015-05 SC)
Israel	Mr David OPATOWSKI	TPPT Steward
FAO/IAEA Joint Division	Mr Rui CARDOSO PEREIRA	Host Representative
FAO/IAEA Joint Division	Mr Carl BLACKBURN	Host Representative
Japan	Mr Yukio YOKOI	Host Representative
Japan	Ms Akiko NAGANO	Host Representative
Japan	Ms Masumi YAMAMOTO	Host Representative
Australia	Mr Jan Bart ROSSEL	TPPT Steward

USA	Mr Patrick GOMES	TPPT Member
USA / IAEA	Mr Guy HALLMAN	TPPT Member
New Zealand	Mr Michael ORMSBY	TPPT Member
China	Mr Yuejin WANG	TPPT Member
USA	Mr Scott MYERS	TPPT Member
Australia	Mr Matthew SMYTH	TPPT Member
China	Mr Daojian YU	TPPT Member
Japan	Mr Toshiyuki DOHINO	TPPT Member
FAO/IAEA Joint Division	Mr Andrew PARKER	Invited Expert
Japan	Mr Ichiro NAKAGAWA	Host Representative
Japan	Mr Manabu SUZUKI	Organizer
Japan	Mr Kunihiko YAMADA	Organizer

Table 5: ISPMs developed by the Technical Panel on Diagnostic Protocols as annexes to ISPM 27 (*Diagnostic protocols for regulated pests*)

Table 5-A: TPDP Steward:

Country	**Steward Name**
UK	Ms Jane Chard

Table 5-B: DP 23 Phytophthora ramorum (2004-013)

Country	Expert Name	Role
The Netherlands	Mr Johannes DE GRUYTER	Discipline lead
New Zealand	Mr Robert TAYLOR	Referee
UK	Ms Tricia GILTRAP	Lead author
Canada	Mr Stephan BRIÈRE	Co-Author
USA	Ms Zoila Gloria ABAD	Co-Author

Table 5-C: DP 24 Tomato spotted wilt virus, Impatiens necrotic spot virus and Watermelon silver mottle virus (2004-019)

Country	Expert Name	Role
Canada	Mr Delano JAMES	Discipline lead
Australia	Mr Brendan RODONI	Referee
USA	Mr Thomas GERMAN	Lead author
UK	Ms Jane MORRIS	Co-Author
South Africa	Mr Gerhard PIETERSEN	Co-Author

Table 6: ISPMs developed by the Technical Panel on Phytosanitary Treatments as annexes to ISPM 28 (*Phytosanitary treatments for regulated pests*) PT 32 on Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109)

Country	Expert Name	Role
Israel	Mr David OPATOWSKI	TPPT Steward
Argentina	Mr Ezequiel FERRO	TPPT Steward
Australia	Mr Jan Bart ROSSEL	TPPT Steward
USA / IAEA	Mr Guy HALLMAN	Treatment lead

Appendix 11 – Revised Standards Committee Terms of Reference and Rules of Procedure

Terms of Reference for the Standards Committee[67]

Scope

[1] The SC manages the standard-setting process and assists in the development of International Standards for Phytosanitary Measures (ISPMs) which have been identified by the Commission as priority standards.

Objective

[2] The main objective of the SC is to prepare draft ISPMs according to the standard-setting procedures in the most expeditious manner for adoption by the Commission.

Structure of the Standards Committee

[3] The SC consists of 25 members drawn from each of the FAO regions. The distribution for each region will be:

- Africa (4 members)
- Asia (4)
- Europe (4)
- Latin America and the Caribbean (4)
- Near East (4)
- North America (2)
- Southwest Pacific (3)

A representative of the Implementation and Capacity Development Committee may also participate.

[4] Temporary or permanent working groups, and drafting groups consisting of SC members, may be established by the SC as required. SC working groups are selected by the SC from its membership.

[5] Seven SC members are selected by the SC to form the SC-7 and are guided by the terms of reference and rules of procedure for this group which are approved by the SC.

[6] The functions and working procedures of the SC-7 and other SC working groups are determined by the SC.

Functions of the Standards Committee

[7] The SC serves as a forum for:

- examination and approval or amendment of specifications
- review of specifications
- designation of members of SC working groups and identification of tasks of the groups
- establishment and disestablishment of expert working groups and SC working groups as appropriate
- approval of the work programmes of technical panels, and review, guidance and supervision of their activities and outcomes of their meetings

67 Adopted by the CPM-1 (2006) and aligned by the SC November 2008, Appendix 4, as requested by the CPM-3 (2008).

- selection of membership of expert drafting groups as required and in accordance with the appropriate terms of reference and/or rules of procedure for these groups
- review of draft ISPMs
- approval of draft standards to be submitted to contracting parties, NPPOs, RPPOs and relevant international organizations under the member consultation procedure
- establishment of open-ended discussion groups where appropriate
- revision of draft ISPMs in cooperation with the IPPC Secretariat taking into account comments of contracting parties, NPPOs, RPPOs and relevant international organizations
- approval of final drafts of ISPMs for submission to the Commission
- review of existing ISPMs and identification and review of those requiring reconsideration
- identification of priorities for ISPMs under development
- ensuring that language used in draft ISPMs is clear, simple and focused
- assigning stewardship for each ISPM
- Work in close collaboration with the CPM Subsidiary Body "Implementation and Capacity Development Committee" (IC) to help make standard setting and implementation complementary and effective.
- Other functions related to standard setting as directed by the Commission

[8] These functions may be executed during face to face meetings and between meetings, via electronic means, as determined by the SC.68

IPPC Secretariat

[9] The Secretariat provides administrative, technical and editorial support as required by the SC. The Secretariat is responsible for reporting and record keeping regarding the standard-setting programme.

68 The SC (2008) discussed issues related to electronic communication for SC business. The issues include selection of experts, approval of explanatory documents, finalizing specifications, adjustment of stewards and deciding on other tasks as appropriate. The SC discussed what type of work could be handled electronically outside of the meeting. The SC considered that development of specifications via electronic means could be done partially through electronic means, but that discussion in the SC is also valuable. The length of time for responses was changed from two weeks as previously agreed to three weeks. The SC agreed to these new procedures (SC November 2008, Appendix 4).

Rules of Procedure for the Standards Committee[69]

Rule 1. Membership

[1] Members should be senior officials of national plant protection organizations (NPPO), designated by contracting parties, and have qualifications in a scientific biological discipline (or equivalent) in plant protection, and experience and skills particularly in the:

- practical operation of a national or international phytosanitary system
- administration of a national or international phytosanitary system, and
- application of phytosanitary measures related to international trade.

[2] Contracting parties agree that SC members dedicate the necessary time to participate in a regular and systematic way in the meetings.

[3] Each FAO region may devise its own procedures for selecting its members of the SC. The IPPC Secretariat is notified of the selections that are submitted to the CPM for confirmation.

[4] The SC is responsible for selecting the SC-7 members from within its membership. Members selected for the SC-7 will meet the above-mentioned qualifications and experience.

Rule 2. Replacement of members

[5] Each FAO region shall, following its own procedures, nominate potential replacements for members of the SC and submit them to the CPM for confirmation. Once confirmed, potential replacements are valid for the same periods of time as specified in Rule 3. These potential replacements should meet the qualifications for membership set forth in these Rules. Each FAO region shall identify a maximum of two potential replacements. Where a region nominates two, it should indicate the order in which they would serve as replacements under this Rule.

[6] A member of the SC will be replaced by a confirmed potential replacement from within the same region if the member resigns, no longer meets the qualifications for membership set forth in these Rules, or fails to attend two consecutive meetings of the SC.

[7] The national IPPC contact point should communicate to the Secretariat any circumstances where a member from its country needs to be replaced. The Secretariat should inform the relevant FAO regional chair.

[8] A replacement will serve through the completion of the term of the original member, and may be nominated to serve additional terms.

Rule 3. Period of membership

[9] Members of the SC shall serve for terms of three years. Members may serve no more than two terms, unless a region submits a request to the CPM for an exemption to allow a member from within its region to serve an additional term. In that case, the member may serve an additional term. Regions may submit requests for additional exemptions for the same member on a term-by-term basis. Partial terms served by replacements shall not be counted as a term under these Rules.

Rule 4. Chairperson

[10] The Chairperson and Vice-Chairperson of the SC are elected by the SC from its membership and serve for three years, with a possibility of re-election for one additional term of three years. The Chairperson and

69 Adopted by the CPM-1 (2006) and aligned by the SC November 2008 (Appendix 4), as requested by the CPM-3 (2008), revised by SC November 2012 and adopted by CPM-8 (2013), Appendix 3

Vice-Chairperson may serve in these capacities only when a member of the SC. The Chairperson, or in the absence of the Chairperson, the Vice-Chairperson, shall preside at meetings of the SC and shall exercise such other functions as may be required to facilitate the work of the SC. A Vice-Chairperson acting as a Chairperson shall have the same powers and duties as the Chairperson.

[11] The Chairperson shall direct the discussions in SC meetings, and at such meetings ensure observance of these Rules, accord the right to speak, put questions and announce decisions. He/she shall rule on points of order and, subject to these Rules, shall have complete control over the proceedings at any meetings. He/she may, in the course of the discussion of an item, propose to the SC the limitation of the time to be allowed to speakers, the number of times each member may speak on any question, the closure of the list of speakers, the suspension or adjournment of the meeting, or the adjournment or closure of the debate on the item under discussion. The Chairperson, in the exercise of his/her functions, remains under the authority of the SC.

Rule 5. Sessions

[12] Meetings of the SC are normally held at FAO Headquarters in Rome. The SC meets at least once per year.

[13] Depending on the workload and resources available, the SC or the Secretariat, in consultation with the Bureau of the CPM, may request additional meetings of the SC. In particular, the SC may need to meet after the CPM meeting in order to prepare draft standards for member consultation.

[14] Depending on the workload and resources available, the SC, in consultation with the Secretariat and the Bureau of the CPM, may authorize the SC-7 or extraordinary working groups of the SC to meet.

[15] A session of the SC shall not be declared open unless there is a quorum. The presence of a majority of the members of the SC is necessary to constitute a quorum.

[16] Some tasks, as agreed by the SC, may be undertaken between meetings via electronic means, and should be reported on in the report of the next session of the SC.

Rule 6. Approval

[17] Approvals relating to specifications or draft standards are sought by consensus. Final drafts of ISPMs which have been approved by the SC are submitted to the CPM without undue delay.

Rule 7. Observers

[18] A contracting party to the IPPC or any regional plant protection organization may request to send one observer to attend an SC meeting. This request should be communicated by the official IPPC contact point to the Standards Officer thirty days prior to the starting date of the meeting. In response to this request, the observer will be invited to attend, depending whether logistical arrangements can be made.

[19] A representative of the IC may attend as an observer.

[20] Such observers may i) participate in the discussions, subject to the approval of the Chairperson and without the right to vote; ii) receive the documents other than those of a restricted nature, and, iii) submit written statements on particular items of the agenda.

Rule 8. Reports

[21] SC meeting records shall be kept by the Secretariat. The report of the meetings shall include:

- approval of draft specifications for ISPMs
- finalization of specifications with a detailed explanation including reasons for changes
- reasons why a draft standard has not been approved

- a generic summary of SC reactions to classes of comments made in member consultation
- draft standards that are sent for member consultation and draft standards recommended for adoption by the CPM.

[22] The Secretariat shall endeavour to provide to CPM Members upon request the rationale of the SC for accepting or not accepting proposals for modifications to specifications or draft standards.

[23] A report on the activities of the SC shall be made by the Chairperson of the SC to the annual session of the CPM.

[24] Reports of SC meetings shall be adopted by the SC before they are made available to Members of the CPM and RPPOs.

Rule 9. Language

[25] The business of the SC shall be conducted in the languages of the organization.

Rule 10. Amendments

[26] Amendments to the Rules of Procedures and the Terms of Reference may be promulgated by the CPM as required.

Appendix 12 – Subsidiary Body of the Commission on Phytosanitary Measures, the Implementation and Capacity Development Committee (IC) Membership

IC Members

Role/ Region	Name, Organization, Address, Telephone	E-mail address	Term expires
Member/ Africa	**Ms. Faith NDUNGE** Head Biosafety And Phyosanitary Services. Kenya/Kenya Plant Health Inspectorate Service. P. O. Box 49592, Nairobi **Kenya** Tel: +254 / 0709891000	fndunge@kephis.org	2020
Member/ Africa	**Mr. Kenneth MSISKA** Principal Agriculture Research Officer/Ippc Contact. Mount Makulu Research, P/B 7, Chilanga, Lusaka **Zambia** Tel: +260977771503	msiska12@yahoo.co.uk	2020
Member/ Asia	**Mr. Yuji KITAHARA** Senior section chief, Bilateral Consultation on Plant Quarantine. Japan / Ministry of Agriculture, Forestry and Fisheries. 1-2-1 Kasumigaseki, Chiyoda-ku Tokyo, 100-8950. **Japan** Tel: +81-3-3502-8111 ex.4565	yuji_kitahara090@maff.go.jp	2020
Member/ Asia	**Mr. Dilli Ram SHARMA** Program Director (Joint Secretary) Plant Protection Directorate, NPPONepal Hariharbhawan, Lalitpur **Nepal** Tel: 0977-9841369615	sharmadilli.2018@gmail.com	2020
Member/ Caribbean and Latinamerica	**Mr. Francisco GUTIERREZ** Technical Director Plant Health Belize Agricultural Health Authority Corner Hummingbird hw /Fd, Belmopan, **Belize** Tel: +501 604 0319	francisco.gutierrez@baha.org.bz	2020

Member/ Caribbean and Latinamerica	**Ms. Magda GONZALEZ ARROYO** Head of Standards and regulations DPT. Ministerio de Agricultura y Ganaderia. Sabana sur, San José, contiguo al ed. De ministerio de Agricultura y Ganadería, CP 10108 **Costa Rica** Tel: +506 25493600	mgonzalez@sfe.go.cr	2020
IC Chair - Member/ Europe	**Ms. Olga LAVRENTJEVA** Adviser in phytosanitary questions, Plant Health Department. Estonia/ Ministry of Rural Affairs. Lai tn 39 // Lai tn 41, 15056 Tallinn **Estonia** Tel : +372 625 6535	olga.lavrentjeva@agri.ee	2020
Member/ Near East	**Mr. Mamoun ALBAKRI** Head of Phytosanitary Labs. Jordan / Ministry of Agriculture. P. O. Box 8374, Amman **Jordan** Tel: +962799063228	mambakri@email.com	2020
IC Vice Chair - Member/ North America	**Mr. Dominique PELLETIER** International Plant Health Standards Officer Canadian Food Inspection Agency 1400, Merivale rd, Tower 1, room 301, Ottawa, ON, K1A 0Y9 **Canada** Tel: +613 773 6492	dominique.pelletier@inspection.gc.ca	2020
Member/ Southwest Pacific	**Mr. Christopher John DALE** Program manager, International Plant health Surveillance Program Department of Agriculture (DAWR). 7 London Circuit, Canberra ACT 2601 **Australia** Tel: +61 262725194	chris.dale@agriculture.gov.au	2020
Member/ Southwest Pacific	**Mr. Ngatoko NGATOKO** Director of Biosecurity Service Ministry of Agriculture **Cook Islands** Tel: +682 28711	nngatoko@agriculture.gov.ck	2020
Member/ Southwest Pacific	**Ms. Sally JENNINGS** Senior Policy Analyst New Zealand, Ministry for Primary Industries 25 The Terrace, CBD, Wellington **New Zealand** Tel: +64 4 8940431	Sally.Jennings@mpi.govt.nz	2020

TC- RPPO Representative[70] NAPPO	**Ms. Stephanie BLOEM** Executive Director North American Plant Protection Organization - NAPPO 1730 Varsity Drive, Suite 145 Raleigh, NC 27606 USA Tel: (+919) 617-4040 Tel: (+ 919) 480-4761	Stephanie.Bloem@NAPPO.org SBloem.NAPPO@gmail.com	
SC Representative[71]	**Mr. Samuel BISHOP** Office of the Chief Plant Health Officer Department for Environment, Food and Rural Affairs National Agri-Food Innovation Campus Sand Hutton North Yorkshire **UK** Tel: + 44 (0) 1904 405153	sam.bishop@defra.gsi.gov.uk	

[70] Named Representative may change from time to time as determined by the TC-RPPO

[71] Named Representative may change from time to time as determined by the SC

IC Alternate Members

Role/ Region	Name, Organization, Address, Telephone	E-mail address	Term expires
Alternate member/ Africa	**Mr. Philip Karonjo NJOROGE** Head of Trade and Standards Kenya Plant Health Inspectorate Service (KEPHIS) P. O. Box 49592, Nairobi **Kenya** Tel: **+254-**20 661 8000	pknjoro@gmail.com	2020
Alternate member/ Asia	**Ms. Hongsook PARK** Assistant Director Animal and Plant Quarantine Agency RoK 177, Hyeoksin 8-ro, Gimcheon-si, Gyeongsangbuk-so - 39660 **Republic of Korea** Tel: +82 54 912 0635	hspark101@korea.kr	2020
Alternate member/ Caribbean and Latinamerica	**Mr. Nelson LAVILLE** Head of Plant Protection and Quarantine services. Commonwealth of Dominica / Ministry of Agriculture. Botanic Gardens, Roseau **Dominica** Tel: +1 767 266 3802	nelson.laville@gmail.com	2020
Alternate member/ Europe	**Vacant**		
Alternate member/ Near East	**Mr. Ahmed M. ABDELLAH** Plant Health Officer Near east region (Qatar) 7th floor, Mansoury tour, Almenaa St., Doha **Qatar** Tel: +97433262779	bidoeng@yahoo.com; bidoeng@gmail.com	2020
Alternate member/ North America	**Ms. Wendy BELTZ** National Field Operations Director United States/USDA-APHIS-PPQ 2150 Centre Ave., Bldg. B, Fort Collins, Colorado **USA** Tel: +1 970-494-7564	wendolyn.beltz@aphis.usda.gov	2020

Co-alternate member/ North America	**Ms. Parul R. PATEL** Senior Agriculturist, Lacey Act Program United States/USDA-APHIS-PPQ 2150 Centre Ave., Bldg. B, Fort Collins, Colorado **USA** Tel: +1 3018512351	Parul.R.Patel@aphis.usda.gov	2020
Alternate member/ Southwest Pacific	**Mr. Nathan Andrew REID** A/g Director, Compliance partnerships. Department of Agriculture (DAWR) 7 London Circuit, Canberra ACT 2601 **Australia** Tel: +61 2 62725023	nathan.reid@agriculture.gov.au	2020

Appendix 13 – Terms of Reference and Rules of Procedure of the Sea Containers Task Force

Purpose

[1] The Sea Container Task Force (SCTF) is a sub-group of the Implementation and Capacity Development Committee (IC) whose purpose is to supervise and direct the implementation of the Sea Container Complementary Action Plan[72] under the oversight of the IC.

Scope

[2] The SCTF will supervise actions in the Sea Container Complementary Action Plan and complement them with any other actions through:

- Providing information on pest risks of sea containers and their management
- Coordinating with contracting parties, regional plant protection organizations (RPPOs), industry and other international organizations
- Establishing a mechanism for contracting parties to report to Commission on Phytosanitary Measures (CPM) on their progress and achievements
- Providing advice on how the Cargo Transport Unit (CTU) shipping code or any other instrument could be updated and
- Providing, through the Implementation and Capacity Development Committee (IC), updates on its activities to be presented annually to the CPM, as well as a final report for presentation to CPM-16 (2021).

[3] As agreed by the CPM12, the SCTF will operate for a temporary period to supervise the actions of the Sea Container Complementary Action Plan at the latest until CPM16 in 2021.

Composition

[4] The SCTF should be composed of representatives of contracting parties, RPPOs, international organizations and phytosanitary experts who already have an experience relevant to the pest risks on sea containers and their management.

[5] This may be drawn from:

Core members:

- Up to three representatives of contracting parties;
- One representative from the CPM Bureau
- One steward from the IC
- One representative of the SC
- One representative from World Customs Organization (WCO)
- One representative from International Maritime Organization (IMO)
- One representative from the RPPOs.

Invited experts:

- One expert from Container Owners Association (COA)
- One from industry, importer/export trading community
- One from World Bank
- One from World Shipping Council

[72] Sea Containers Complementary Action Plan endorsed by CPM 12 - https://www.ippc.int/static/media/files/publication/en/2017/05/CPM-12_Report-2017-05-30_withISPMs.pdf

- One from the Global Shippers Forum
- One former Sea Container Expert Working Group (EWG) member.

[6] A fixed core membership of six to eight experts may be supplemented by additional experts from national plant protection organizations (NPPOs), the Convention on Biological Diversity (CBD) and the World Organization for Animal Health (OIE) where expertise such as on risk management, implementation experience, economic and financial analysis, is needed to implement the Complementary Action Plan.

[7] A member of the IC is appointed as a Steward of the SCTF to ensure appropriate linkage with the IC. The Steward is required to attend SCTF meetings and act as a liaison with the IC.

[8] An officer from the IPPC Secretariat would be assigned as a focal point to the topic and would ensure liaison and consistency across the different IPPC governing bodies.

[9] An SCTF Coordinator will be appointed by the Bureau.

[10] The SCTF Coordinator is required to support and drive the activities of the SCTF to achieve the outcomes defined by the work plan, and will liaise closely with the IC Steward.

[11] The Coordinator will:

- Maintain the membership list and contact details of the SCTF members
- Coordinate arrangements for any SCTF meetings, either face to face or virtual
- Facilitate actions to progress the SCTF work plan
- Facilitate communication and engagement with and between SCTF members, CPs, RPPOs, industry, technical experts and other international organizations to progress activities and outcomes of the SCTF
- Prepare and deliver reports to the IC on the activities and achievements of the SCTF with reference to the agreed SCTF work plan
- Liaise with the IPPC Secretariat to monitor SCTF expenditure against the agreed SCTF budget and available resource
- Coordinate the publication of resource materials with the IPPC Secretariat

Functions

[12] The SCTF Coordinator will support and drive the functions and activities of the SCTF to achieve the outcomes defined by the work plan, to act as liaison with the IC and the CPM.

[13] Key functions of the SCTF are:

- Measuring the impact of the CTU shipping code through:
  - The development of a joint IPPC/International Maritime Organization (IMO)/industry protocol for the collection of data related to contamination of sea containers to be completed by CPM-16 (2021);
  - Monitoring the uptake and implementation of the IMO/ILO/United Nations Economic Commission for Europe (UNECE) Code of Practice for Packing of Cargo Transport Units through:
    - Industry reporting
    - NPPO monitoring
- Verifying the efficacy of the CTU shipping code in ensuring the arrival of clean sea container through:
  - Monitoring for pest contamination and freedom of soil by NPPOs;
  - Assisting NPPOs manage pest risks associated with sea containers,

- Increasing awareness of pest risks of sea container through:
    - Publication of the data of the Sea Container EWG by the IPPC Secretariat;
    - A request by the IPPC Secretariat for countries having data on contamination of sea containers to make it publically available;
    - Calling for and publication of pest risk management guidance material for sea containers;
    - Encouraging NPPOs to inform industry on the risks and possible international actions to manage pest risks associated with sea containers; and
- Ensuring that any regulations on sea containers that are developed and implemented by NPPOs are based on pest risk analysis and consistent with Recommendation CPM 10/2015_01 on Sea Containers[73.]

Relationship with the IPPC Secretariat

[14] The IPPC Secretariat is responsible for providing administrative, editorial, operational and technical support to the SCTF. The Secretariat advises the IC on the availability and use of financial and staff resources for the SCTF.

Relationship with the IC

[15] The SCTF can request decisions biannually or out of session from the IC.

[16] The SCTF should provide biannual updates to the IC and out of session updates as deemed necessary.

73 Recommendation CPM 10/2015_01 on Sea Containers - https://www.ippc.int/static/media/files/publication/en/2017/04/R_06_En_2017-04-26_Combined_DwiZlUp.pdf

Appendix 14 – Rules of Procedure: Membership of the Sea Containers Task Force

Membership

[1] The SCTF should be composed of representatives of contracting parties, regional plant protection organizations (RPPOs), international organizations and phytosanitary experts who already have an experience relevant to the pest risks on sea containers and their management.

[2] Members of the SCTF should be nominated by contracting parties or RPPOs and have expertise in IPPC matters and sea container logistics. At least one member of the SCTF should be a Sea Container EWG member. In addition, industry experts and representatives of relevant international organizations could also be part of the task force as invited experts, as required.

Procedure for selection of members

[3] Membership of the SCTF will be sought through a call, coordinated by the IPPC Secretariat on behalf of the IC. This may be for specific expertise or for a SCTF core member. Alternates may be sought for core membership.

[4] Members are selected by the Commission on Phytosanitary Measures (CPM) Bureau on the basis of expertise and relevance.

Chairperson and vice chairperson

[5] The Chairperson and Vice-Chairperson of the SCTF are elected by its members and serve for the period of implementation of the Complementary Action Plan, on acceptance of the CPM Bureau.

Meetings

[6] The SCTF will meet at least once a year and should convene virtual meetings as frequently as needed.

[7] The SCTF will meet prior to the second annual meeting of the IC each year, during its activity.

Observers and invited experts

[8] Meetings of the SCTF will be open to observers, in accordance with the applicable Food and Agriculture Organization (FAO) and CPM rules and procedures.

[9] In addition, industry experts and representatives of relevant international organizations could also be part of the task force as invited experts, including former Sea Container EWG members.

Decision making

[10] The SCTF in its regular or out of session reports to the IC can request decisions for:

- Approval and/or revision of the work plan;
- Actions requiring extra budgetary resources; and
- Recommendations for further actions.

Reporting

[11] The SCTF will report to the IC biannually, at least two weeks prior to schedule meetings of the IC.

IPPC SCTF membership

The below list of individuals consists of members, invited experts and observers.

Role	Name, Organization, Address, Telephone	Email address
SCTF coordinator		
SCTF Coordinator	Mr. Mike Downes Independent Consultant 14 Carlisle Street, Waimate 7924, NEW ZEALAND Tel: +64 21 255 9704	michael.downes732@gmail.com
Core members		
CPM Bureau member SCTF Chairperson	Ms. Marie-Claude FOREST National Manager and International Standards Adviser, Plant Protection Division, Canadian Food Inspection Agency 59 Camelot Drive Ottawa, Ontario K1A 0Y9, CANADA Tel: +1 613 773 7235	Marie-Claude.Forest@inspection.gc.ca
Representative of the IC	Mr. Mamoun ALBAKARI Head of Phytosanitary Laboratories, Jordan Ministry of Agriculture. P. O. Box 8374, Amman, JORDAN Tel: +96 27990 63228	mambakri@email.com
Representative of the SC	Mr. Jesulindo Nery DE SOUZA JUNIOR Assistente Técnico, Esplanada dos Ministérios, Bloco D, Anexo B, Sala 303 70043-900 - Brasília, DF BRAZIL Tel: +55 61 3218 2843	jesulindo.junior@agricultura.gov.br
Contracting party member: China	Ms. Guanghao GU Deputy Director, Shenzhen Airport Entry-Exit Inspection & Quarantine Bureau. 1011 Hangzhangyi Road, Bao'an District, Shenzhen City, Guangdong Province, PEOPLES' REPUBLIC OF CHINA Tel: + 86 755 2750 0984	gugh@szciq.gov.cn
Contracting party member: Australia	Mr. Rama KARRI Assistant Director, Cargo Pathways Team, Compliance Division, Department of Agriculture and Water Resources. 7 London Circuit, Canberra, ACT 2601, AUSTRALIA Tel: +61 6272 5737	rama.karri@agriculture.gov.au
Contracting party member: United States of America	Ms. Wendolyn (Wendy) BELTZ National Field Operations Director, United States Department of Agriculture-Animal and Plant Health Inspection Service, Plant Protection and Quarantine. 2150 Centre Avenue, Building B, Fort Collins, CO 80526, UNITED STATES OF AMERICA Tel: +1 970 494 7564	wendolyn.beltz@aphis.usda.gov
Contracting party member: Kenya	Mr. Frederick MAKATHIMA Senior Inspector, Kenya Plant Health Inspectorate Service (KEPHIS) P.O. Box 80126-80100 Mombasa, KENYA Tel: + 25 4722 560 936	makathima@kephis.org
Representative of the RPPOs	Ms. Sina WAGHORN Senior Advisor, Biosecurity and Environment Group, New Zealand Ministry for Primary Industries (MPI).	sina.waghorn@mpi.govt.nz

	14 Sir William Pickering Drive, Christchurch, NEW ZEALAND Tel: +64 3943 3234	
Representative of the WCO	Mr. Theo HESSELINK Technical Officer, Compliance and Facilitation Directorate, World Customs Organization. Rue du Marché, 30, B-1210 Brussels, BELGIUM Tel: +32 0 2209 9356	theo.hesselink@wcoomd.org
Representative of the IMO	TBC	TBC
Invited experts		
Expert from ex-SC EWG for sea containers	Mr. Nicolaas (Nico) Maria HORN Senior Officer Plant Health, Netherlands Food and Consumer Product Safety Authority (NVWA), Division Plant and Nature National Plant Protection Organization (NPPO) P.O. Box 9102 6700 HC, Wageningen, THE NETHERLANDS Tel: +31 65199 8151	n.m.horn@nvwa.nl
Expert	Mr. John HEDLEY Principle Advisor, International Policy, New Zealand Ministry for Primary Industries (MPI) 25 Terrace, Wellington 6011, NEW ZEALAND Tel: +64 4 894 0428	jhedley1910@gmail.com
Expert from COA	Mr. Brian RYSZ Senior Global Equipment Manager, Maersk Line, The Maersk Group, Esplanaden 50, 1098 Copenhagen K, DENMARK Tel: +45 3363 3003	brian.rysz@maersk.com
Expert from WSC	Mr. Lars KJAER Senior Vice President World Shipping Council 1156 15th Street, NW, Suite 300 Washington, DC 20005, UNITED STATES OF AMERICA Telephone: +1 202 589 1234	lkjaer@worldshipping.org
Expert from WB	Ms. Theresa MORRISSEY Senior Trade Facilitation Expert World Bank Auckland, New Zealand Tel: +64 212770086	Theresa.morrissey.nz@gmail.co m
Expert from the Chinese industry	Mr. Jiang MINDE Manager of Integrated Container Services Dept, Equipment Control Center COSCO Shipping Lines Co. , Ltd No.378 Dong Daming Road, Shanghai, China Telephone number: +86 21 35124888 x 1968 Fax: +86 21 65953113	jiangmd@coscon.com
Expert from the Global Shippers Forum	TBD	TBD

Appendix 15 – Sea Containers Task Force: Five-Year Action Plan

Year 1

Establishment of SCTF

- Inaugural meeting
- Initial action plan assigned
- IC meeting – agreement for and subsequent calls for information

1st report
Update membership
o/c Bureau meeting for approval

Year 2

- Establishment of publicly accessible Sea Container and SCTF pages on the IPP
- Data collection – industry/NPPOs
- Alignment of industry container cleaning guidelines
- Develop joint how-to guidelines
- Receive existing NPPO data. Consolidate for review/analysis
- Work with IC/Secretariat to have actions for NPPO reports or CTU implementation / achievement advocate work at SCTF at CPM-13 and subsequently
- Create a calendar of industry events for NPPO attendance
- Industry awareness/profile raising – SCTF member attendance
- Setting up mechanism for best practice sharing and fostering communication between NPPOs and RPPOs
- Presentation at TC-RPPOs annual meeting
- Production and distribution of outreach material
- Separate calendar of industry events for SCTF members attendance including IMO meetings
- Translation of material
- Pilot AEO and WB/WCO management
- Receive and analyse results of call to establish regulatory basis for NPPO inspections and actions, subsequent recommendation to IC and CPM
- Report to IC and CPM
- Create success criteria

Year 3

- Data collection
- Communication / awareness activities including RPPOs at the regional level
- Prepare material for 2020 International Year of Plant Health (IYPH).
- Review material available to NPPOs
- International Plant Protection Convention Page 23 of 25
- Assess update / success requirements – provisional go/no go
- Plan for alternate action based on result standard or?
- Plan for future requirements e.g. data exchange
- Early warning to IC and CPM as appropriate
- Recommendation to design changes to sea containers to minimize contamination.

Year 4

- Continue awareness with continued involvement from NPPOs and RPPOs
- Continue monitoring and data collection/analysis
- Go/no go recommendation to IC and CPM – future action
- Final data collection /analysis. Report to SCTF annual meeting
- Elicit information from RPPOs.

Appendix 16 – Sea Containers Task Force: Work Plan with Action Items

The SCTF 2018 Work Plan with Action Items

With respect to monitoring uptake and efficacy of the CTU Code:

- Industry will investigate and implement reporting of numbers of contaminated (Pest contaminated in IPPC terms) containers returned or positioned to container depots. It was agreed that a representative sample consisting of 2 or 3 major shipping lines would serve for this purpose initially with the intention to expand reporting further should it be deemed necessary based on sample findings.

Such reporting will be on a gross basis, that is to say, simply numbers of contaminated containers dealt with. The purpose of this is to provide simple trend monitoring over time, which will enable an assessment of the uptake and effectiveness of the CTU code provisions.

Action: COA, Mr Rysz
Timeline: 12 months

- It is recognised that there are a multitude of Container cleaning guidelines in use within the shipping industry and that some form of alignment with respect to the cleaning of pest contamination is required. Industry will be engaged at various industry forums to encourage acceptance and adoption of the joint Industry Guidelines for Cleaning of Containers and subsequent amendment of existing guidelines where appropriate.

Action: COA, WSC (to be discussed and confirmed)
Timeline: 12 months

- China noted that the IICL Guidelines for Container Cleaning is in common use in Chinese container depots. Inclusion of the Industry Guidelines for Container Cleaning in this document is recognised as highly desirable as, in addition to the cleaning documents above it has widespread industry usage. The IICL should thus be reached out to and requested to include the Industry Guidelines for Container Cleaning in their own documentation.

Action: Mr Downes
Timeline: 12 months

- The Task Force concluded that monitoring by NPPOs to gauge the uptake and effect of the CTU code adoption over time is necessary in addition to Industry cleaning data. It was agreed to request the Implementation Committee (IC) and IPPC Secretariat to make a call to ascertain which NPPOs can provide such data and/or who are currently undertaking such monitoring.

Once the results of the call are received the SCTF will collect data, review the findings and decide which of the above is applicable for baseline and on-going monitoring.
Action: Mr Albakri

Timeline: Discuss call request at forthcoming IC meeting in December.

- The Task Force recognised that, subsequent to the call above, other NPPOs may wish to undertake monitoring and reporting and that they should be encouraged to do so. To assist in this it was agreed that guidance on what should be reported and a suitable format to do so would be useful. This is to be developed and made available on the SCTF website.

Action: Mr Karri
Timeline: 2 months for consultation and reporting template agreement
With respect to Communication/Increasing Awareness

- NPPOs should attend SC industry events to foster awareness and cooperation. It is recognised that this may be limited by budgetary constraints
- Develop guidance and best-practice sharing. Liaise with IPPC Integration and Support Unit to determine how this can be achieved
    - Enhance website for Sea Container Pest Management guidance on the IPP
    - Communication kit for NPPOs and RPPOs
    - Social Media
        - Facebook
        - Twitter
    - IPPC branded outreach material
    - Risk guidance material able to be "local" branded and freely shared

Action: Mrs Marie-Claude Forest and Mr Mike Downes

- IPPC guidance/fact sheets – translated into FAO languages. Proposed that the excellent flyer distributed in the US and Canada (see attachment) is used as the basis for other region/country specific fact sheets subject to agreement from the US and Canada.

Action: Mrs Beltz
Timeline: Two months

- Determine what is already available both as existing NPPO guidance and in use nationally by NPPOs. Select and make available the most suitable material in an easy to access forum for both Industry and NPPOs.

Action: Ms Waghorn
Timeline: 6 months

- WCO AEO – proposal to add IPPC requirements to point number 7 of the AEO requirements. Liaise with WCO to assess feasibility.

Action: Mr Hesselink
Timeline: ?

- Pilot to assess what donor agency support e.g. WB is required to set up a basis for managing risk of sea containers in developing countries.

Action: Ms Morrissey
Timeline: End January 2018

- Regulations – encourage compliance in national regulations "consistent with" IPPC/CTU Code guidelines
- In order to assist NPPOs to establish monitoring regimes there is a need to establish how many have no regulatory basis for doing so. In addition, if a regulatory basis does exist, what authority is then delegated to NPPOs? An IC call is requested to establish this information.

Action: Mr Albakri
Timeline: Discuss call request at forthcoming IC meeting in December.

Appendix 17 – Confirmation of Membership and Potential Replacement Members for CPM Subsidiary Bodies

Table 1. Current membership of the Bureau of the CPM (following CPM-13 decisions) (rows in grey indicate action is needed)

Region	Country	Name	Nominated/ Re-nominated	Current term/duration	Term expires
Africa (Vice Chairperson)	Cote D'Ivoire	Mr Lucien KOUAME KONAN	CPM-7 (2012) CPM-9 (2014) CPM-11 (2016) CPM-13 (2018)	4th Term/2 years	2020
Asia	China	Mr Wang FUXIANG	CPM -13 (2018)	1st term/ 2 years	2020
Europe	Malta	Ms Marica GATT	CPM-13 (2018)	1st term/2 years	2020
Latin America and Caribbean (Chairperson)	Mexico	Mr Francisco Javier TRUJILLO ARRIAGA	CPM-11 (2016) CPM-13 (2018)	2nd term/ 2 years	2020
Near East	Yemen	Mr Gamil Anwar Mohammed RAMADHAN	CPM-13 (2018)	1st term/2 years	2020
North America	Canada	Mr Greg WOLFF	CPM-13 (2018)	1st term/ 2 years	2020
Southwest Pacific	Australia	Ms Lois RANSOM	CPM-11 (2016) CPM-13 (2018)	2nd term/2 years	2020

Table 2. Current replacements of the Bureau of the CPM (following CPM-13 decisions)

Region	Country	Name	Nominated/ Renominated	Current term/duration	Term expires
Africa	1 Cameroon	Mr Edouard NYA	CPM-12 (2017)	1st term/ 2 years	2019
	2 South Africa	Mr Kgabo MATLALA	CPM-13 (2018)	1st term/ 2 years	2020
Asia	1 Indonesia	Mr Antarjo DIKIN	CPM-11 (2016) CPM-13 (2018)	2nd term/ 2 years	2020
	2	VACANT			
Europe	1 United Kingdom	Mr Samuel BISHOP	CPM-12 (2017)	1st term/ 2 years	2019
	2	VACANT			
Latin America and Caribbean	1 Argentina	Mr Diego Quiroga	CPM-11 (2016) CPM-13 (2018)	2nd term/ 2 years	2020
	2 Belize	Mr Francisco GUTIÉRREZ	CPM-13 (2018)	1st term/ 2 years	2020
Near East	1 Libya	Mr Salem Abdulkader HAROUN	CPM-13 (2018)	1st term/ 2 years	2020
	2 Egypt	Mr Ahmed EL-ATTAR	CPM-13 (2018)	1st term/ 2 years	2020
North America	1 United States	Mr John GREIFER	CPM-11 (2016) CPM-13 (2018)	2nd term/ 2 years	2020
	2	VACANT			
Southwest Pacific	1 New Zealand	Mr Peter THOMSON	CPM-13 (2018)	1st term/ 2 years	2020
	2	VACANT			

Table 3. Standards Committee Membership and Potential Replacements
Standards Committee Membership

Region	Country	Name	Nominated/ Re-nominated	Current term/duration	Term expires
Africa	Kenya	Ms Esther KIMANI	CPM-9 (2014) CPM-12 (2017)	2nd term / 3 years	2020
	Republic of Congo	Ms Alphonsine LOUHOUARI TOKOZABA	CPM-13 (2018)	1st term / 3 years	2021
	Malawi	Mr David KAMANGIRA	CPM-11 (2016)	1st term / 3 years	2019
	Nigeria	Mr Moses Adegboyega ADEWUMI	CPM-13 (2018)	1st term / 3 years	2021
Asia	Indonesia	Mr HERMAWAN	CPM-11 (2016)	1st term / 3 years	2019
	Japan	Mr Masahiro SAI	CPM-13 (2018)	1st term / 3 years	2021
	Sri Lanka	Ms Jayani Nimanthika WATHUKARAGE	CPM-13 (2018)	1st term / 3 years	2021
	China	Mr Xiaodong FENG	CPM-13 (2018)	1st term / 3 years	2021
Europe	France	Ms Laurence BOUHOT-DELDUC	CPM-10 (2015) CPM-13 (2018)	2nd term / 3 years	2021
	Israel	Mr David OPATOWSKI	CPM-1 (2006) CPM-4 (2009) CPM-12 (2017)	3rd term / 3 years	2020
	Netherlands	Mr Nicolaas Maria HORN	CPM-9 (2014) CPM-12 (2017)	2nd term / 3 years	2020
	United Kingdom	Mr Samuel BISHOP	CPM-13 (2018)	1st term /3 years	2021
	Argentina	Mr Ezequiel FERRO	CPM-8 (2013) CPM-11 (2016)	2nd term / 3 years	2019

Region	Country	Name	Nominated/ Re-nominated	Current term/duration	Term expires
Latin America and Caribbean	Brazil	Mr Jesulindo Nery DE SOUZA JUNIOR	CPM-11 (2016)	1st term / 3 years	2019
	Costa Rica	Mr Hernando Morera GONZÁLEZ	CPM-13 (2018)	1st term / 3 years	2021
	Chile	Mr Álvaro SEPÚLVEDA LUQUE	CPM-10 (2015) CPM-13 (2018)	2nd term / 3 years	2021
Near East	Egypt	Ms Shaza OMAR	CPM-11 (2016)	1st term / 3 years	2019
	Syria	Mr Ouroba Alzitani ABOALBORGHOL	CPM-13 (2018)	1st term / 3 years	2021
	Sudan	Mr Abdelmoneim Ismail ADRA ABDETAM	CPM-13 (2018)	1st term / 3 years	2021
	Iraq	Mr Abdulqader Khudhair ABBAS	CPM -13 (2018)	1st term / 3 years	2021
North America	Canada	Mr Rajesh RAMARATHNAM	CPM-11 (2016)	1st term / 3 years	2019
	USA	Ms Marina ZLOTINA	CPM-10 (2015) CPM-13 (2018)	2nd term / 3 years	2021
Southwest Pacific	Australia	Mr Bruce HANCOCKS	CPM-12 (2017)	1st term / 3 years	2020
	New Zealand	Mr Stephen BUTCHER	Replacement member for Mr John HEDLEY CPM-11 (2016)	Replacement	2019
	Samoa	Mr Lupeomanu Pelenato FONOTI	CPM-12 (2017)	1st term / 3 years	2020

TABLE. 4 Standards Committee Potential Replacements

Region	Country	Name	Nominated / Re-nominated	Current term/duration	Term expires
Africa	1 Guinea Bissau	Mr Lois Antonio TAVARES	CPM-12 (2017)	1st term / 3 years	2020
	2 Burundi	Mr Eliakim SAKAYOYA	CPM-11 (2016)	1st term / 3 years	2019
Asia	1 Thailand	Ms Chonticha RAKKRAI	CPM-13 (2018)	1st term / 3 years	2021
	2	VACANT			
Europe	1 Estonia	Ms Olga LAVRENTJEVA	CPM-12 (2017)	1st term / 3 years	2020
	2	VACANT			
Latin America and Caribbean	1 Panama	Ms Judith Ivette VARGAS AZCÁRRAGA	CPM-9 (2014) CPM-12 (2017)	1 st term / 3 years	2020
	2 Dominica	Mr Nelson LAVILLE	CPM-11 (2016)	1st term / 3 years	2019
Near East	1Lebanon	Mr Nicholas EID	CPM-13 (2018)	1st term / 3 years	2021
	2 United Arab Emirates	Ms Fatima SAD AL KALABANI	CPM-13 (2018)	1st term / 3 years	2021
North America	1 Canada	Mr Steve CÔTÉ	CPM-13 (2018)	1st term / 3 years	2021
	2 USA	Ms Stephanie DUBON	CPM-11 (2016)	1st term / 3 years	2019
Southwest Pacific	1 To replace New Zealand or Australia	Ms Sophie Alexia PETERSON	CPM-12 (2017)	1st term / 3 years	2020
	2 Fiji	Mr Nitesh DATT	CPM-13 (2018)	1st term / 3 years	2021

Appendix 18 – Proposed ink amendment to ISPM 5 ("detention")

(Prepared by the TPG December 2016; approved by the SC May 2017)

Proposed ink amendment to ISPM 5 (*Glossary of phytosanitary terms*) for consistency

detention	Keeping a **consignment** in **official** custody or confinement, as a **phytosanitary measure** ~~(see **quarantine**)~~ [FAO, 1990; revised FAO, 1995; CEPM, 1999; ICPM, 2005]

Ink amendments incorporated into Appendix 1 of ISPM 12

[1] Legend for the changes: Deletions are marked with ~~strikethrough~~ and insertions are marked with underline.

APPENDIX 1: Electronic phytosanitary certificates, information on standard XML schemas and exchange mechanisms (2014)

Introduction

[2] Electronic phytosanitary certificates are the electronic equivalents of phytosanitary certificates in paper form and may be used if they are accepted by the national plant protection organization (NPPO) of the importing country. When electronic phytosanitary certificates are issued by the NPPO of the exporting or re-exporting country, they should be made directly available to the NPPO of the importing country.

[3] All the requirements and procedures in this standard apply to electronic phytosanitary certificates.

[4] When using electronic phytosanitary certificates, NPPOs should develop a system for the issuance, transmission and receipt of electronic phytosanitary certificates that uses Extensible Markup Language (XML), standardized message structure and contents, and standardized exchange protocols.

[5] This appendix provides guidance on these elements and refers to a page on the IPPC website[74] (~~http://ePhyto.ippc.int~~) that provides links to further details – both IPPC and external websites and documents – on the information contained in this appendix. These links are referred to in the text as "Link 1", "Link 2" and so forth.

[6] The system should include the following harmonized components to generate electronic phytosanitary certificates.

1. XML Message Structure

[7] NPPOs should use the World Wide Web Consortium's (WC3) XML (*Link 1*) for exchange of electronic phytosanitary certification data.

[8] The phytosanitary XML message structure is based on the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) Sanitary and Phytosanitary (SPS) XML schema (*Link 2*) and on XML data mapping, which indicates where the phytosanitary certification data should be placed in the XML schema.

[9] The phytosanitary XML data mapping enables the generation of an electronic phytosanitary certificate for export (*Link 3*) and an electronic phytosanitary certificate for re-export (*Link 4*).

2. XML Schema Contents

[10] To facilitate automatic electronic communication and processing of phytosanitary certification data, NPPOs are encouraged to use standardized (harmonized) terms, codes and text for the data elements associated with the XML message for electronic phytosanitary certificates.

[11] The use of free (i.e. non-standardized) text should be limited when appropriate codes are available.

[12] For dates and country names, harmonized text is available and no free text is anticipated to be required.

[13] For scientific names of plants and pests, consignment description, treatments, additional declarations and points of entry, extensive lists of harmonized terms, codes and text are being developed and will be available. Free text may be inserted if the appropriate term, text or value does not appear in the lists.

[74] See (https://www.ippc.int/en/ephyto/ephyto-technical-information/)

[14] The process for maintaining and updating the lists of harmonized terms is being developed and will be described on the IPPC website[74] ~~(http://ePhyto.ippc.int)~~. NPPOs will be requested to submit proposals for new harmonized terms using this process.

[15] For data elements other than those above, no harmonization of terms and text is needed and therefore free text may be entered.

[16] Further details on the information to be entered for the data elements in the XML message are provided in the following subsections.

2.1 Country names

[17] For the names of countries (i.e. the country of origin, export, re-export, transit and destination) it is encouraged that the two-letter country codes of the International Organization for Standardization (ISO) (*Link 6*) be used.

2.2 Scientific names of plants and pests

[18] For the scientific names of the plants in the consignment, the plants from which plant products were derived, and the regulated pests, the use of the database of scientific names ~~available on the IPPC website (http://ePhyto.ippc.int)~~ (*Link 7*) is encouraged.

2.3 Description of consignment

[19] The type of commodity and the type of packaging should be included in the description of the consignment. It is encouraged that the commodity be described using IPPC commodity terminology (*Link 8*). It is also encouraged that the type of packaging be described using the United Nations Economic Commission for Europe (UNECE) Recommendation 21 (*Link 9*).

[20] Other elements of the description of the consignment may include, where possible:

- weight, volume and height (which is encouraged to be described using UNECE Recommendation 20 (*Link 10*)
- declared means of conveyance (which is encouraged to be described using UNECE Recommendation 19 (~~Link 16~~ *Link 15*)
- declared point of entry and country name (which is encouraged to be described using the United Nations Code for Trade and Transportation Locations (UN/LOCODE) (~~Link 15~~ *Link 14*) ~~or country name~~.

2.4 Treatments

[21] It is encouraged that treatment types be specified using the IPPC's harmonized terms for treatment types (*Link 11*). Active ingredients are encouraged to be specified using the pesticide index of the Codex Alimentarius (*Link 12*). Other parameters (e.g. concentration, dosage, temperature, and duration of exposure) are encouraged to be described using UNECE Recommendation 20 (~~Link 13~~ *Link 10*).

2.5 Additional declarations

[22] Recommended standardized wording for additional declarations is provided in Appendix 2 and it is encouraged to be described using IPPC codes for additional declarations (~~Link 14~~ *Link 13*). Free text may be used to supplement the additional declarations indicated on the IPPC website or to describe additional declarations that have not been standardized.

2.6 Name of authorized officer

[23] The name of the authorized officer issuing the electronic phytosanitary certificates should be included in each types of electronic phytosanitary certificate.

3. Secure Data Exchange Mechanisms

[24] NPPOs are responsible for the security of their national information technology (IT) system used for generating electronic phytosanitary certificates.

[25] During transmission, the data should be encrypted to ensure that the electronic exchange of the electronic phytosanitary certification data between NPPOs is secure and authenticated. NPPOs should use a secure protocol with a minimum 128-bit encryption. Before transmission, the electronic phytosanitary certification data may be subjected to additional encryption ~~(*Link 17*)~~ that remains intact after transmission.

[26] Transmission of data over the Internet from the NPPO of the exporting country to the NPPO of the importing country should be performed using secure IT mechanisms (e.g. Simple Object Access Protocol (SOAP), Secure/Multipurpose Internet Mail Extensions (S/MIME), File Transfer Protocol (FTP), Representative State Transfer (REST)) using systems that are mutually compatible.

[27] The NPPO of the exporting country should make available to the exporter the actual electronic phytosanitary certificate number for the consignment.

[28] Communication on the status of the message exchange between NPPOs should follow UN/CEFACT recommended standard messages ~~(*Link 18*)~~.

[29] NPPOs are responsible for developing and maintaining their systems for exchanging electronic phytosanitary certification data. In cases where an exchange mechanism is suspended due to maintenance or unexpected system failure, the NPPO should notify other NPPOs as soon as possible.

4. Electronic Phytosanitary Certificate for Re-export

[30] In paper-only systems, the original phytosanitary certificate for export or its certified copy should be available as an attachment to the phytosanitary certificate for re-export. In the situation where paper and electronic phytosanitary certificates are both in use, the following requirements should be met.

4.1 Electronic phytosanitary certificate for re-export with original phytosanitary certificate for export in electronic form

[31] When both the phytosanitary certificate for export and the phytosanitary certificate for re-export are in electronic form, the electronic phytosanitary certificate for export should be attached electronically to the electronic phytosanitary certificate for re-export.

4.2 Electronic phytosanitary certificate for re-export with original phytosanitary certificate in paper form

[32] When the original phytosanitary certificate for export is in paper form and the phytosanitary certificate for re-export is in electronic form, a scan of the original phytosanitary certificate for export (in PDF or other non-editable format) should be attached to the electronic phytosanitary certificate for re-export.

4.3 Paper phytosanitary certificate for re-export with original phytosanitary certificate in electronic form

[33] When the original phytosanitary certificate for export is in electronic form and the phytosanitary certificate for re-export is in paper form, the electronic phytosanitary certificate for export should be printed and validated by the NPPO of the country of re-export by stamping, dating and countersigning.

[34] The printed version of the electronic phytosanitary certificate for export becomes a certified copy and should then, in paper form, be attached to the phytosanitary certificate for re-export.

5. Management of Electronic Phytosanitary Certificates Issued by NPPOs

5.1 Retrieval issues

[35] If the NPPO of the importing country is unable to retrieve the electronic phytosanitary certificates, the NPPO of the exporting country should resubmit the original electronic phytosanitary certificates at the request of the NPPO of the importing country.

5.2 Alteration and replacement

[36] If any of the information in electronic phytosanitary certificates needs to be altered after their issuance, the original electronic phytosanitary certificates should be revoked and replacement electronic phytosanitary certificates (*Link 5*) with alterations should be issued as described in this standard.

5.3 Cancelled dispatch

[37] If the NPPO of the exporting country becomes aware of a consignment that is not dispatched after the issuance of electronic phytosanitary certificates, the NPPO of the exporting country should revoke the associated electronic phytosanitary certificates.

5.4 Certified copy

[38] Certified copies of electronic phytosanitary certificates are printouts of the electronic phytosanitary certification data that are validated (stamped, dated and countersigned) by an NPPO attesting the authenticity of the data.

[39] The printouts should be in the format that follows the standardized wording provided by the IPPC model phytosanitary certificates and recognized as phytosanitary certificates. However, the printouts may be XML data in XML format if accepted by the NPPO of the importing country.

6. Declared Name and Address of Consignee

[40] In the case of paper phytosanitary certificates, for "Declared name and address of consignee" the term "To order" may be used in instances where the consignee is not known and the NPPO of the importing country permits use of the term.

[41] With electronic phytosanitary certificates, the consignment information may arrive in the importing country well before the consignment arrives, which will allow pre-entry verification of the electronic phytosanitary certification data.

[42] Instead of using the "To order" option, NPPOs are encouraged to require the electronic phytosanitary certificates to include the name and address of a contact person in the importing country responsible for the consignment.

Appendix 19 – Adoption of International Standards for Phytosanitary Measures

[1] The CPM adopted the following ISPMs and phytosanitary treatments (PTs) (attached to this report):

- Revision of ISPM 6 (*Surveillance*) (2009-004).
- 2015 and 2016 amendments to ISPM 5 (*Glossary of phytosanitary terms*) (1994-001).
- Revision of Annex 1 and Annex 2 to ISPM 15, (*Regulation of wood packaging material in international trade*), for inclusion of the phytosanitary treatment *sulphuryl fluoride fumigation* and *revision of the dielectric heating section* (2006-010A&B)
- ISPM 42 (*Requirements for the use of temperature treatments as a phytosanitary measure*) (2014-005)
- As annexes to ISPM 28 (*Phytosanitary treatments for regulated pests*): PT 32 Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109).

[2] The CPM noted that the SC adopted on behalf of CPM the following two diagnostic protocols (DPs) as Annexes to ISPM 27 (*Diagnostic protocols for regulated pests*) (attached to this report, and in English only):

- DP 23: *Phytophthora ramorum* (2004-013)
- DP 24: *Tomato spotted wilt virus, Impatiens necrotic spot virus and Watermelon silver mottle virus* (2004-019)

DRAFT REVISION OF ISPM 6: SURVEILLANCE (2009-004)

Status box

This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.	
Date of this document	2017-11-27
Document category	Draft revision of ISPM 6 (*Guidelines for surveillance* (2009-004))
Current document stage	*From* SC November 2017 *to* CPM-13 (2018)
Major stages	2009-11 Standards Committee (SC) recommended topic *Revision of ISPM 6 (Guidelines for surveillance)* be added to the work programme 2010-03 CPM-5 added topic to the *List of topics for IPPC standards* 2014-05 SC revised and approved specification 61 2015-09 Expert working group (EWG) started the revision of ISPM (meeting) 2015-11 EWG finalized draft ISPM (virtual meeting) 2016-05 SC revised and approved draft for first consultation 2016-07 First consultation 2017-05 SC-7 revised and approved draft for second consultation 2017-07 Second consultation 2017-10 Steward revised the draft based on consultation comments 2017-11 SC revised in meeting and approved the draft for adoption by CPM
Steward history	2009-11 SC Mr John HEDLEY (NZ, Lead Steward) 2013-05 SC Mr Bart ROSSEL (AU, Assistant Steward) 2015-05 SC Mr Piotr WLODARCZYK (PL, Lead Steward) 2015-11 SC Ms Esther KIMANI (KE, Assistant Steward) 2016-05 SC Mr Ezequiel FERRO (AR, Lead Steward)
Notes	2015-11 EWG recommended the title change from “Guidelines for surveillance” to “National surveillance systems” 2016-01 Edited 2017-05 Edited 2017-11 SC agreed change of title to “Surveillance” 2017-11 Edited

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Adoption

[To be inserted following adoption]

INTRODUCTION

Scope

[1] This standard describes the requirements for surveillance, including the components of a national surveillance system.

References

[2] The present standard refers to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

Definitions

[3] Definitions of phytosanitary terms used in this standard can be found in ISPM 5 (*Glossary of phytosanitary terms*).

Outline of Requirements

[4] Surveillance is one of the core activities of national plant protection organizations (NPPOs). It provides NPPOs with a technical basis for many phytosanitary measures; for example, phytosanitary import requirements, pest free areas, pest reporting and eradication, and pest status in an area.

[5] National surveillance systems relate to both general surveillance and specific surveillance. A national surveillance system comprises surveillance programmes and the infrastructure required to implement them. Surveillance protocols describe the methodology of surveillance, whether general or specific. Supporting elements to consider for a national surveillance system include phytosanitary legislation and policies, prioritization, planning, resources, documentation, training, auditing, communication and stakeholder engagement, pest diagnostics, information management systems and pest reporting.

BACKGROUND

[6] Surveillance is essential in plant protection. Article IV of the IPPC prescribes general provisions for the organizational arrangements for national plant protection and specifically states that the responsibilities of an official national plant protection organization shall include "the surveillance of growing plants, including both areas under cultivation (*inter alia* fields, plantations, nurseries, gardens, greenhouses and laboratories) and wild flora, and of plants and plant products in storage or in transportation, particularly with the object of reporting the occurrence, outbreak and spread of pests, and of controlling those pests, including the reporting referred to under Article VIII paragraph 1(a)". According to the same article the "designation, maintenance and surveillance of pest free areas and areas of low pest prevalence" are a responsibility of NPPOs. In addition, Article VII.2(j) specifies that "contracting parties shall, to the best of their ability, conduct surveillance for pests and develop and maintain adequate information on pest status".

[7] Surveillance underpins several activities, including:

- the early detection of pests new to an area
- the compilation of host pest lists, commodity pest lists and pest distribution records (e.g. to support pest risk analysis and phytosanitary certification)
- the establishment and maintenance of pest free areas, pest free places of production, pest free production sites or areas of low pest prevalence
- the determination of pest status in an area
- pest reporting to other countries

- measuring changes in the characteristics of a pest population or pest incidence (e.g. for areas of low pest prevalence or for research)
- delimiting a pest population in an area
- eradication and pest management.

IMPACTS ON BIODIVERSITY AND THE ENVIRONMENT

[8] This standard may contribute to the protection of biodiversity and the environment by helping countries develop systems to provide reliable and well-structured information on the presence, absence or distribution of pests in an area and information about hosts or commodities as pathways. These pests could include organisms relevant to biodiversity (e.g. invasive alien species).

REQUIREMENTS

1. Components of a National Surveillance System

[9] A national surveillance system should be an integral part of a country's plant health system.

[10] A national surveillance system may be structured into programmes (e.g. for specific pest species or groups of pests) and should include the supporting infrastructure required to implement them (Figure 1 and section 3).

[11] Surveillance programmes may include the following types of surveillance:

- General surveillance: a process whereby information on pests of concern in an area is gathered from various sources. Sources may include national or local government bodies, research institutions, universities, museums, scientific societies (including those of independent specialists), producers, consultants, the general public, scientific and trade journals, unpublished data, and the websites of other NPPOs or international organizations (e.g. the IPPC, regional plant protection organizations, the Convention on Biological Diversity).
- Specific surveillance: a process whereby information on pests of concern in an area is obtained by the NPPO over a defined period. NPPOs actively gather specific pest-related data. Specific surveillance includes surveys that are conducted to determine the characteristics of a pest population or to determine which species are present or absent in an area.

[12] NPPOs should develop surveillance protocols describing how to conduct general and specific surveillance.

[13] Elements to be considered when an NPPO develops a national surveillance system are illustrated in Figure 1.

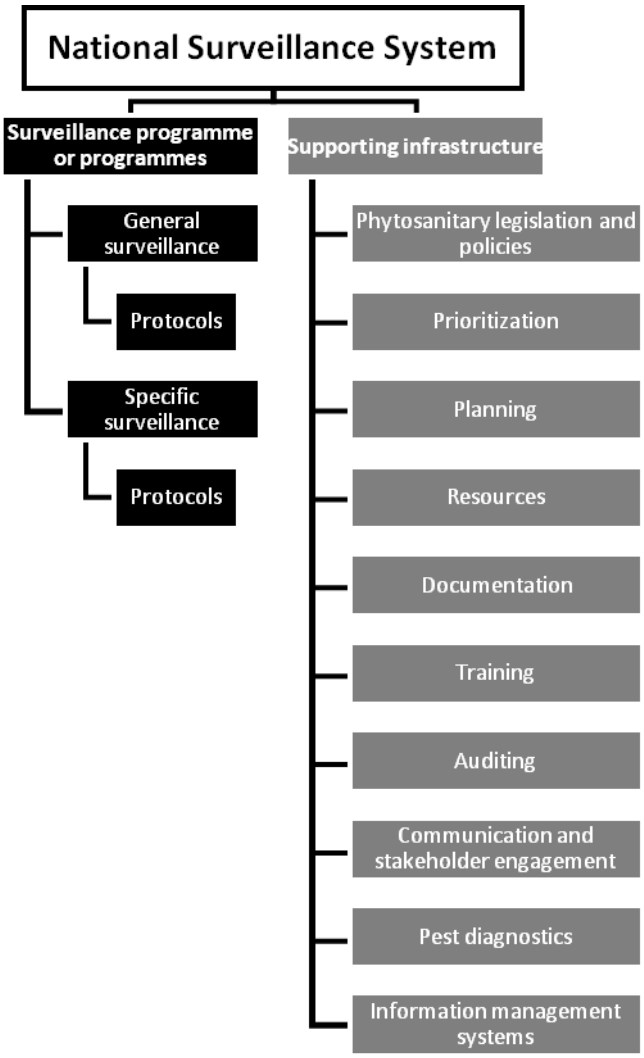

Figure 1.A model national surveillance system, comprising surveillance programmes (general and specific) and supporting infrastructure.

2. Designing Surveillance Programmes

[14] Surveillance programmes should, as appropriate, be long term and regular with well-developed methodology, so that results may be compared and analysed. Surveillance programmes may include elements of general and specific surveillance (Figure 1). The methodology of surveillance should be described in surveillance protocols. The protocols developed by NPPOs should aim to achieve the purpose of the surveillance programme.

[15] Surveillance protocols should provide clear instructions for carrying out a surveillance activity in a consistent manner that can be used by various operational personnel at different locations. Methods used in the surveillance protocols may be distinguished by, for example, the means by which data are collected, where the surveillance is carried out, the aim of the surveillance or whether the methods are focused on the pest, host or pathway.

[16] Surveillance methods should be based on international or regional guidelines where they exist or be developed by the NPPO. Surveillance managers and officers should be aware of current methodologies associated with specific groups of pests and should ensure that the methods are used appropriately to deliver reliable surveillance outcomes.

[17] NPPOs may need to develop or adopt new methods for new or emerging pests. In all cases, surveillance methods should be based on relevant scientific, geographical and statistical information, and be operationally feasible.

2.1 General surveillance

2.1.1 Approaches to general surveillance

[18] NPPOs may use a range of approaches to general surveillance with varying degrees of involvement by the NPPO – from reports received by the NPPO to increasingly structured and targeted programmes run entirely by the NPPO. Examples of general surveillance approaches are listed below:

- receipt of reports from the general public (i.e. initiated by the public)
- scanning of sources of pest information
- general encouragement of public reporting through official channels (e.g. via a free call phone number in response to publicity about plant health or educating on the advantages of reporting pests)
- encouragement of public reporting on specific pests – this is useful where the target species is known and public awareness is already high (e.g. through the use of public awareness materials) and during known periods of high pest incidence (e.g. breeding seasons)
- encouragement of reporting by groups involved with specific crops(e.g. producers, community groups)
- involvement of specific groups in plant health activities organized by the NPPO to obtain surveillance data (e.g. scientific societies, plant health clinics and agricultural extension services)
- cooperation with other governmental services (e.g. forestry or environmental services)
- cooperation with institutions that carry out research
- general surveillance carried out by NPPO staff.

[19] NPPOs should take into account the following factors when developing approaches to general surveillance:

- costs and resource requirements are usually lower with less involvement of the NPPO
- good results are more readily achieved for easily noticed and recognizable pests (e.g. beetles and caterpillars) or symptoms
- detection of hidden pests (e.g. wood-boring beetles, or pathogens that are symptomless in some hosts) is usually less effective
- surveillance may not need to be restricted to a defined period
- the proportion of useful reports received is usually lower for less-structured or less-targeted programmes
- the usefulness of the information (e.g. pest diagnosis, monitoring methodologies) may depend on how current it is
- systems may be needed to manage large numbers of reports from general surveillance, in order to identify those which are relevant
- the validity of the data may need to be verified
- increasing the sensitivity and specificity of a general surveillance programme may result in higher costs.

[20] When conducting general surveillance, NPPOs should evaluate the reliability of the information, which depends on the source of the information (e.g. reports from the general public versus entomologists). Guidance on evaluating the reliability of a pest record is provided in ISPM 8 (*Determination of pest status in an area*).

2.1.2 Elements of general surveillance

[21] NPPOs should recognize that general surveillance can be an effective supplement to specific surveillance. For example, general surveillance can provide the context for undertaking specific surveillance to accurately determine the pest status in an area or site. The NPPO may also decide that the result of general surveillance is sufficient to determine the pest status.

[22] The elements of general surveillance may include:

- mechanisms to facilitate reporting:
  - legislative obligations (for the general public, growers or specific agencies)
  - cooperative agreements (between NPPOs and, for example, stakeholders or scientific societies)
  - the use of contact personnel to enhance communication channels to and from NPPOs
  - public education and awareness raising initiatives
- tools for collecting reports from the public:
  - publicly accessible free call phone numbers
  - systems for free delivery of samples
  - smartphone and mobile device applications (apps)
  - social media channels and e-mail
- systems or processes to enhance the quality of reporting:
  - a filtering process at the point of initial contact
  - the ability to send and receive images for initial identification
  - publicity material to allow submitters to self-filter (e.g. leaflets and websites with pest information and photos)
  - training for submitters
- means to consolidate, analyse and communicate the information gathered:
  - integrated national, regional or global databases and alert systems for emerging pests
  - spatial modelling tools embedded in web-based systems (e.g. geographical information systems)
  - mathematical and simulation models of data collected (e.g. Bayesian networks).

[23] NPPOs may encourage reporting by ensuring timely feedback (e.g. identification of specimens submitted) to those providing reports.

2.2 Specific surveillance

[24] Three types of surveys may be utilized by NPPOs depending on the objectives of the specific surveillance programme:

- detection survey: conducted in an area to determine if pests are present (or absent)
- delimiting survey: conducted to establish the boundaries of an area considered to be infested by or free from a pest
- monitoring survey: ongoing survey to verify the characteristics of a pest population.

[25] These surveys may be developed for pests in relation to one or more areas, sites, hosts, pathways or commodities and should include the collection of pest presence and absence records.

[26] The result of every observation or sample taken should be recorded, including when the pest was not found. Data on pest absence collected during surveys can be used by NPPOs to support a country's pest status and pest free areas, as well as its trade and market access.

[27] The most important factor for the validity of pest absence data is the design of the specific surveillance programme. Elements that should be considered in the design of specific surveillance programmes are presented in sections 2.2.1 to 2.2.9.

2.2.1 Purpose

[28] The purpose of the surveillance should include background on the phytosanitary objectives and the reasons why the information is required (e.g. early detection, assurance for a pest free area, pest free production site or area of low pest prevalence, commodity pest list).

2.2.2 Scope

[29] The scope describes the extent of the area to be covered by the surveillance, both geographically and in terms of the production system (whole or parts) or uncultivated area.

2.2.3 Target

[30] The target of the surveillance should be described. The target may be a single or multiple pests, hosts, pathways or commodities, or a combination of any of these.

2.2.4 Timing

[31] Timing may include the start and end of the survey and the frequency of visits by field personnel. These may be determined by, for example, the life cycle of the pest, the phenology of the pest's hosts or the scheduling of pest management programmes.

2.2.5 Area or site selection

[32] Area or site selection may be determined by:

- any previously reported presence, distribution and resulting pest status of the pest
- the previously reported absence of a pest
- the undetermined pest status of an area
- the biology of the pest
- the suitability of the climate and other ecological conditions in the area for the pest
- the geographical distribution of host plants and production areas
- the degree of isolation of an area
- pest management programmes (at commercial and non-commercial sites)
- the points of consolidation, handling or storage of the harvested commodity
- proximity to:
  - points of entry (for pathways, including people)
  - sites where imported commodities are marketed, stored, processed or used as planting material
  - tourist activities.

[33] To achieve effective use of resources, surveillance for absent or recently intercepted pests (e.g. in a consignment) may best be concentrated on those places that are at higher risk of the primary spread of the pest.

[34] If the objective of surveillance is to delimit an outbreak, the area selection should be focused on the immediate surroundings of the known infested area and to sites of the same habitat type that, according to exercises of trace-forward and trace-back, may also have become infested. Surveillance that is focused on specific areas or sites within a larger area may be complemented by random sampling of sites in the whole area. For surveillance of pests that are widely distributed, a more systematic selection of sites over the whole area to be surveyed is more appropriate.

2.2.6 Statistical design

[35] NPPOs should define the population units (in the statistical sense) to be surveyed; that is, the population as a collection of similar units of concern. Defining the statistical population may be based on pest biology, a pathway or an entity upon which phytosanitary measures may be applied. The population unit may be of various types, for example:

- a geographical unit, comprising the area covered with a trapping grid
- a field planted with a host crop
- an individual host plant in an unmanaged or uncultivated area
- a storage facility.

[36] It is often not feasible to survey all units of an entire population. Therefore, NPPOs may decide to perform the surveillance on a sample taken from the population. The five most common sampling methods, which may be applied alone or in combination, are:

- simple random sampling
- systematic sampling
- stratified sampling
- cluster sampling
- targeted sampling.

[37] Statistical sampling methods described in ISPM 31 (*Methodologies for sampling of consignments*) or other appropriate methods should be used as appropriate. They are often used when the data captured are of a binary nature (presence/absence). The statistical analysis of the data should be based on an appropriate method and may require expert advice.

[38] NPPOs are encouraged to state the level of confidence and the minimum level of detection of the pest survey.

2.2.7 Data collection

[39] NPPOs should determine the data elements to be captured during surveillance and how these data will be transferred to the information management system (e.g. by the use of forms and electronic devices).

2.2.8 Biosecurity and sanitation

[40] When developing surveillance protocols, NPPOs should consider procedures to ensure that spread of pests is not facilitated during a survey.

[41] NPPO officers, or other personnel authorized to undertake surveillance, should follow any biosecurity procedures that are in place at facilities, places of production or sites being surveyed.

2.2.9 Samples

[42] The surveillance protocol should include a description of when and how samples are to be taken, collected, handled and prepared in order to ensure specimen integrity and preservation and timely delivery to the laboratory for diagnostic processing. Each sample should be given a unique identifier code (e.g. label, number or bar code) to enable tracking and follow-up from the point of collection in the field, through the stages of processing and identification, to storage in a formal reference collection, if applicable.

3. Supporting Infrastructure

3.1 Phytosanitary legislation and policies

[43] A national surveillance system should be supported by phytosanitary legislation and policies that ensure that authority, responsibilities and financial resources are assigned to the appropriate administrative levels.

[44] Contracting parties should include the following provisions in their phytosanitary legislation or in official procedures:

- the legal power, process and protection for NPPO officers or other authorized personnel to undertake surveillance activities, including entering premises or land to inspect plants, plant products or other articles that may be capable of harbouring pests, or to collect samples for testing
- the establishment and maintenance of facilities for diagnostics or appropriate access to up-to-date diagnostic services to ensure that pests are properly identified
- mandatory domestic reporting (e.g. by research institutions, diagnostic laboratories, non-governmental organizations, industry, growers, local government or scientific groups) to the NPPO on detection or suspected presence of:
  - targeted pests
  - pests new to an area, host or pathway.

[45] Surveillance policies should cover responsibilities related to administration, finance and governance within the NPPO, including funding for surveillance activities, procedures for surveillance deliverables and training and qualification of personnel.

3.2 Prioritization

[46] Priorities for surveillance may vary from country to country depending on the needs for surveillance information.

[47] Factors to consider when prioritizing surveillance programmes may include:

- impact of pests on crops and biodiversity
- existing national, bilateral, regional or international phytosanitary obligations and arrangements
- implementation of pest management programmes
- emerging pests at the local, national, regional or international level and potential benefits of their early detection
- whether surveillance is cost-effective
- the availability of the resources and methods required to implement a surveillance programme
- the quality and reliability of the expected surveillance results, given the required resource expenditure
- national lists of priority pests prepared using pest risk ranking methods or similar analytical techniques
- trade and market access
- foodsecurity
- findings of a pest in a consignment originating from an area where the pest was not known to be present (e.g. notification from trading partner or detection during export certification).

3.3 Planning

[48] Once priorities for surveillance have been established, NPPOs should develop plans for the implementation of surveillance programmes, taking into account phytosanitary legislation and policies.

3.4 Resources

[49] Surveillance should be adequately resourced with appropriate human, financial and physical resources. Diagnostic services resources are an essential part of a national surveillance system.

[50] Human resources may include personnel in administration, operations, technical functions, management and logistics. NPPOs should ensure that personnel are appropriately trained and qualified.

[51] Financial resources may be required for surveillance logistics and staff travel (e.g. transport costs, accommodation and meals), equipment purchase and maintenance, staff training, specimen processing

and diagnosis, maintenance of an information management system, facility maintenance and emergency response expenses for unplanned surveillance activities.

[52] Physical resources may include field equipment (including personal protective equipment), vehicles, appropriate storage facilities and consumables used for carrying out surveys and monitoring, reference materials and other documentation, computers, georeferencing devices and other equipment for data input and storage, software for information management systems, staff uniforms (or valid identification) and materials for raising public awareness.

3.5 Documentation

[53] NPPOs should develop administrative procedures for maintaining official documentation, undertaking surveillance (including technical instructions in the form of surveillance protocols), and managing or having access to specimen collections. Documentation is essential for promoting consistency, improving interpretation and reliability of results, and facilitating audit and verification of activities under a national surveillance system.

3.6 Training

[54] Training, assessment and regular review of personnel involved in surveillance activities are integral components of a national surveillance system. NPPOs should develop and implement procedures to ensure that the competencies of staff are maintained.

[55] Personnel involved in surveillance activities should be adequately trained in plant health and related fields (including relevant pests, their biology, hosts and symptoms of infestation) and data management. Personnel should also be trained in biosecurity, sampling methods, handling of samples, preservation and transportation of samples for identification, and record keeping associated with samples.

[56] Training materials should be developed and updated regularly to ensure that the competencies of personnel are developed and maintained. Training and reference materials should be readily available to all personnel involved in surveillance activities.

3.7 Auditing

[57] NPPOs should conduct regular audits of their general and specific surveillance, including activities conducted by authorized entities, to ensure that activities are carried out in accordance with relevant surveillance protocols.

3.8 Communication and stakeholder engagement

[58] NPPOs are encouraged to engage through effective and timely communication with stakeholders and relevant experts on the design, planning, implementation and review of national surveillance systems, as well as on priorities for surveillance and on expected outcomes. Arrangements may include:

- internal communication within the NPPO (e.g. meetings, briefings, newsletters)
- external communication by the NPPO (e.g. official reporting, industry notices)
- formal stakeholder engagement (e.g. forums, newsletters, awareness raising and training initiatives)
- formal and informal national surveillance networks that develop and implement surveillance programmes, and their channels to communicate information to and from the NPPO.

3.9 Pest diagnostics

[59] Diagnostic services are fundamental to the success of a national surveillance system. NPPOs should ensure that appropriate diagnostic services are accessible. Some diagnostic protocols are available as annexes to ISPM 27 (*Diagnostic protocols for regulated pests*).

[60] Characteristics of the diagnostic services include:

- have expertise in disciplines relevant to pest (and host) identification

- have adequate facilities and equipment
- have access to specialists for verification where necessary
- have facilities for recordkeeping
- have facilities for processing and storing of reference specimens
- use standard operating procedures, where appropriate and available.

3.10 Information management systems

[61] Information management systems should be used as a repository or centralized database for all results obtained.

[62] Information management systems should be designed for the collection, consolidation, management, validation and reporting of surveillance data and information for analysis, including records of presence and absence of pests.

[63] It is critical that surveillance data and information are collected in a uniform manner to ensure their integrity from collection to reporting. NPPOs should develop and implement minimum data sets, for use across all surveillance programmes in accordance with section 4 of this standard. These data sets should form the basis of a surveillance information management system. Information management systems should ensure traceability of samples taken during surveillance activities. Data verification procedures should also be an integral element of information management systems.

[64] Information management systems should allow easy retrieval of data and information to meet national and international surveillance-related reporting requirements.

4. Pest Records

[65] NPPOs should determine how long pest records are required to be retained, taking into account that they may be needed to support declarations of pest status. For example, fruit fly absence pest records may be needed to support pest free areas for fruit flies in accordance with ISPM 26 (*Establishment of pest free areas for fruit flies (Tephritidae)*). Reference to the survey methodology used should be included in the pest records.

[66] Pest records from specific surveillance should include, as a minimum, the following information:

- scientific name and taxonomic position of the pest
- scientific name and taxonomic position of the host
- locality (e.g. location code, address, geographical coordinates)
- date of survey and name of surveyor
- identification date, method of identification and name of identifier.

When relevant and available, the above information should be included in pest records from general surveillance.

[67] Pest records should also include, to the extent possible, the following information, especially if the presence of a quarantine pest is suspected:

- codes for pest and host scientific names (e.g. EPPO codes)
- verification date, method of verification and name of verifier
- references (e.g. diagnostic protocol used)
- phytosanitary measures taken.

[68] Additional information may be useful; for example, the nature of the pest and host relationship, pest incidence, the growth stage and the origin of the host plant affected, whether the host plant is grown only in greenhouses in the area, the plant part affected or the means of sample collection (e.g. attractant trap, soil sample, sweep net).

[69] The NPPO should act as the national repository for pest records.

5. Analysis and Reporting

[70] Tools such as spatial mapping (geographical information system), modelling and statistical analysis software can be used to manage surveillance data and to facilitate their presentation and reporting.

[71] The information to be reported will depend on the type of surveillance conducted. In all cases, reports should provide data on the target (pest, host, pathway or commodity of concern), the area covered, the number of observations or samples taken, the results obtained and, if appropriate, the statistical reliability.

[72] The means by which data are consolidated, analysed and reported may also be used to predict the probable behaviour of pests or vectors, including the probability of establishment and spread, in order to support decision-making on pest management and further surveillance.

6. Transparency

[73] NPPOs should, on request, provide information on methods used to conduct surveillance and on pest status and distribution.

DRAFT 2015 AND 2016 AMENDMENTS TO ISPM 5: *GLOSSARY OF PHYTOSANITARY TERMS* (1994-001)

Publication history

Date of this document	2018-01-16
Document category	Draft 2015 and 2016 Amendments to ISPM 5 *(Glossary of phytosanitary terms)* (1994-001)
Current document stage	*From* Standards Committee (SC) November 2017 *to* the Commission on Phytosanitary Measures (CPM) for adoption
Major stages	CEPM (1994) added topic: 1994-001, Amendments to ISPM 5: Glossary of phytosanitary terms. 2006-05 Standards Committee (SC) approved specification TP5 2012-10 Technical Panel for the Glossary (TPG) revised specification 2012-11 SC revised and approved revised specification, revoking Specification 1. 2014-12 TPG drafted text (for draft Amendments approved by SC in 2015-05). 2015-05 SC reviewed and approved for consultation. 2015-12 TPG drafted text (for draft Amendments approved by SC in 2016-05). 2016-05 SC approved for first consultation. 2016-07 First consultation. 2016-12 TPG reviewed consultation comments and adjusted the draft 2016 Amendments. The TPG recommended withdrawing the revision of “endangered area” from the draft 2016 Amendments because “endangered area” is defined in Article II of IPPC and the original definition is not incorrect. The misunderstandings that the revision could address are not sufficiently important to merit an “agreed interpretation” of the term. Instead, the Explanatory document on ISPM 5 (the “Annotated Glossary”), note 1, will be adjusted to clarify that the term “endangered area” should not be misinterpreted to mean an environmentally protected area in the ecological conservation sense. 2017-05 SC-7 approved for second consultation. 2017-10 Steward revised draft amendments based on comments. 2017-11 SC reviewed and recommended the draft 2015 and 2016 Amendments to ISPM 5 to the CPM for adoption.
Notes	Note to Secretariat formatting this paper: formatting in definitions and explanations (strikethrough, bold, italics) needs to remain. “Kiln-drying” did not receive comments during first consultation and was therefore not open for comments in second consultation. 2017-03-20 IPPC Secretariat corrected minor errors in the draft Amendments in consistency with TPG decisions. **NOTE: The explanations for each proposal are presented only in the version of the draft Amendments presented to consultation and to the SC. For CPM, only the proposals will be presented. For full details on the discussions related to the specific terms, please refer to the meeting reports on the IPP.**

1. ADDITION

1.1 "exclusion (of a pest)" (2010-008)

Proposed addition

exclusion (of a **pest**)	Application of **phytosanitary measures** to prevent the **entry** or **establishment** of a **pest** into an **area** [CPM, 2018]

2. REVISIONS

2.1 "contaminating pest", "contamination" (2012-001)

Original definitions

contaminating pest	A **pest** that is carried by a **commodity** and, in the case of **plants** and **plant products**, does not infest those **plants** or **plant products** [CEPM, 1996; revised CEPM, 1999]
contamination	Presence in a **commodity**, storage place, conveyance or container, of **pests** or other **regulated articles**, not constituting an **infestation** (see **infestation**) [CEPM, 1997; revised CEPM, 1999]

Proposed revisions

contaminating pest	A **pest** that is carried by a **commodity**, **packaging**, conveyance or container, or present in a storage place and that, in the case of **plants** and **plant products**, does not **infest** themose **plants or plant products** [CEPM, 1996; revised CEPM, 1999]
contamination	Presence of a **contaminating pests** or other unintended presence of a **regulated articles** in or on a **commodity**, **packaging**, storage place, conveyance, or container or storage place, not constituting an **infestation** (see **infestation**) [CEPM, 1997; revised CEPM, 1999]

2.3 "quarantine" (2015-002)

Current definition

quarantine	**Official** confinement of **regulated articles** for observation and research or for further **inspection**, **testing** or **treatment** [FAO, 1990; revised ISPM 3, 1995; CEPM, 1999]

Proposed revision

quarantine	**Official** confinement of **regulated articles**, **pests** or beneficial organisms for observation and research or for further **inspection**, **testing**, or **treatment**, observation or research [FAO, 1990; revised ISPM 3, 1995; CEPM, 1999]

2.4 "test" (2015-003), "visual examination" (2013-010)

Current definitions

test	**Official** examination, other than visual, to determine if **pests** are present or to identify **pests** [FAO, 1990]
visual examination	The physical examination of **plants**, **plant products**, or other **regulated articles** using the unaided eye, lens, stereoscope or microscope to detect **pests** or **contaminants** without **testing** or processing [ISPM 23, 2005]

Proposed revisions

test	**Official** examination of **plants**, **plant products** or other **regulated articles**, other than visual, to determine if **pests** are present, or to identify **pests** or determine compliance with specific phytosanitary requirements [FAO, 1990]
visual examination	The physical eExamination of **plants, plant products,** or other **regulated articles** using the unaided eye, lens, stereoscope or other optical microscope

	~~to detect~~ **~~pests~~** ~~or~~ **~~contaminants~~** ~~without~~ **~~testing~~** ~~or processing~~ [ISPM 23, 2005]

3. DELETIONS

3.1 "kiln-drying" (2013-006)

Proposed deletion

kiln-drying	A process in which **wood** is dried in a closed chamber using heat and/or humidity control to achieve a required moisture content [ISPM 15, 2002]

3.2. "pre-clearance" (2013-016)

Proposed deletion

pre-clearance	**Phytosanitary certification** and/or **clearance** in the **country of origin**, performed by or under the regular supervision of the **national plant protection organization** of the country of destination [FAO, 1990; revised FAO, 1995]

[1]Draft revision of Annex 1 (*Approved treatments associated with wood packaging material*) and Annex 2 (*The mark and its application*) to ISPM 15 (*Regulation of wood packaging material in international trade*): inclusion of the phytosanitary treatment *Sulphuryl fluoride fumigation* and *Revision of the dielectric heating section* (2006-010A&B)

[2]**Status box**	
[3]*This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.*	
[4]**Date of this document**	[5]2017-11-24
[6]**Document category**	[7]Draft revision of Annexes 1 and 2 to ISPM 15 (*Regulation of wood packaging material in international trade*)
[8]**Current document stage**	[9]*From* Standards Committee (SC) November 2017 *to* CPM-13 (2018)
[10]**Major stages for the phytosanitary treatment *Sulphuryl fluoride fumigation***	[11]2006-09 *Sulfuryl fluoride fumigation of wood packaging material treatment* (2007-101) submitted [12]2006-12 Technical Panel on Phytosanitary Treatments (TPPT) reviewed treatment [13]2007-07 Revised text considered by Technical Panel on Forest Quarantine (TPFQ) [14]2007-12 Further revised text submitted to TPPT [15]2008-12 TPFQ discussion [16]2009-01 TPPT reviewed treatment [17]2009-07 Amended text considered by TPFQ [18]2010-07 Text updated and recommended to SC [19]2010-09 TPFQ discussion [20]2011-04 SC e-decision [21]2011-05 SC via e-discussion returned to TPPT [22]2011-07 TPPT revised text based on SC comments [23]2011-10 TPPT reviewed treatment [24]2012-02 TPFQ discussion [25]2012-12 TPPT reviewed treatment [26]2014-06 TPPT recommended treatment to SC for approval for consultation [27]2014-09 SC approved for consultation via e-decision [28]2014-11 SC agreed to split *Sulfuryl fluoride fumigation of wood packaging material* (2007-101) into two separate topics: *Sulfuryl fluoride fumigation of insects in debarked wood* (2007-101A) and *Sulfuryl fluoride fumigation of nematodes and insects in debarked wood* (2007-101B) and recommended to CPM to include a new topic: Revision of dielectric heating section (Annex 1 (*Approved treatments associated with wood packaging material*) to ISPM 15 (*Regulation of wood packaging material in international trade*)) [29]2014-12 TPFQ reviewed the draft treatment *Sulfuryl fluoride fumigation of nematodes and insects in debarked wood* (2007-101B) for inclusion to ISPM 15 (2006-010A) [30]2015-05 SC reviewed and approved draft revision to ISPM 15 in relation to topics 2006-010A and 2007-101B for consultation. [31]2015-07 Consultation for draft ISPMs [32]2016-01 TPFQ inputs to the draft and steward [33]2016-05 SC-7 asked the TPPT to better assess the treatments [34]2017-05 SC-7 2017-07 Second consultation 2017-10 Steward revised the draft based on consultation comments 2017-11 SC revised in meeting and approved the draft for adoption by CPM
[35]**Steward's history**	[36]2006-05 SC: Mr Greg WOLFF (CA, Lead Steward) [37]2010-04 SC: Mr Thomas SCHRODER (DE, Lead Steward) [38]2011-11 SC: Mr Piotr WLODARCZYK (PL, Lead Steward) [39]2016-05 SC: Ms Marina ZLOTINA (US, Lead Steward) [40]2016-05 SC: Mr Ezequiel FERRO (AR, Assistant steward)

[41]**Major stages for the revision of the dielectric heating section**	[42]2014-10 TPFQ reviewed draft treatment for *Heat treatment of wood using dielectric heating* (2007-114) and suggested changes to the dielectric heating section of Annex 1 to ISPM 15
[43]**Secretariat notes**	[44]2015-02 This document combines two topics: [45]Inclusion of the phytosanitary treatment Sulphuryl fluoride fumigation of wood packaging material in Annexes 1 and 2 to ISPM 15 [46]Revision of dielectric heating section (Annex 1 (*Approved treatments associated with wood packaging material*) to ISPM 15 (*Regulation of wood packaging material in international trade*)) (2006-010B) [47]Grey text was not open for comments and was only changed for consistency with the revised text, indicated in black. Edited 2017-11 *The text will be formatted after adoption.*

[48]This revised Annex 1 was adopted by the XXth Session of the Commission on Phytosanitary Measures in [month] [year].

[49]The annex is a prescriptive part of the standard.

[50]ANNEX 1: Approved treatments associated with wood packaging material (2013)

[51]The approved treatments may be applied to units of wood packaging material or to pieces of wood that are to be made into wood packaging material.

[52]Use of debarked wood

[53]Irrespective of the type of treatment applied, wood packaging material must be made of debarked wood. For this standard, any number of visually separate and clearly distinct small pieces of bark may remain if they are:

[54]- less than 3 cm in width (regardless of the length) or

[55]- greater than 3 cm in width, with the total surface area of an individual piece of bark less than 50 square cm.

[56]For methyl bromide and sulphuryl fluoride treatments, the removal of bark must be carried out before treatment as the presence of bark on the wood may affect treatment efficacy. For heat treatment, the removal of bark may be carried out before or after treatment. When a dimension limitation is specified for a certain type of heat treatment (e.g. dielectric heating), any bark must be included in the dimension measurement.

[57]Heat treatment

[58]Various energy sources or processes may be suitable to achieve the required treatment parameters. For example, conventional steam heating, kiln-drying, heat-enabled chemical pressure impregnation and dielectric heating (microwave, radio frequency) may all be considered heat treatments provided they meet the heat treatment parameters specified in this standard.

[59]NPPOs should ensure that treatment providers monitor the treatment temperature at a location likely to be the coldest, which will be the location taking the longest time to reach the target temperature in the wood, to ensure that the target temperature is maintained for the duration of treatment throughout the batch of wood being treated. The point at which a piece of wood is the coldest may vary depending on the energy source or process applied, the moisture content and the initial temperature distribution in the wood.

[60]When using dielectric heating as a heat source, the coldest part of the wood during treatment is usually the surface. In some situations (e.g. dielectric heating of wood of large dimensions that has been frozen and until the wood has thawed) the core may be the coldest part of the wood.

[61]Heat treatment using a conventional steam or dry kiln heat chamber (treatment code for the mark: HT)

[62]When using conventional heat chamber technology, the fundamental requirement is to achieve a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including its core).

[63]This temperature can be measured by inserting temperature sensors in the core of the wood. Alternatively, when using kiln-drying heat chambers or other heat treatment chambers, treatment schedules may be developed based on a series of test treatments during which the core temperature of the wood at various locations inside the heat chamber has been measured and correlated with chamber air temperature, taking into account the moisture content of the wood and other substantial parameters (such as species and thickness of the wood, air flow rate and humidity). The test series must demonstrate that a minimum temperature of 56 °C is maintained for a minimum duration of 30 continuous minutes throughout the entire profile of the wood.

[64]Treatment schedules should be specified or approved by the NPPO.

[65]Treatment providers should be approved by the NPPO. NPPOs should consider the following factors that may be required for a heat chamber to meet the treatment requirements:

[66]- The heat chamber is sealed and well insulated, including insulation in the floor.

[67]- The heat chamber is designed in a manner that permits uniform flow of air around and through the wood stack. Wood to be treated is loaded into the chamber in a manner that ensures adequate air flow around and through the wood stack.

[68]- Air deflectors in the chamber area and spacers in the stack of the wood are used as required to ensure adequate air flow.

[69]- Fans are used to circulate air during treatment, and air flow from these fans is sufficient to ensure the core temperature of the wood is maintained at the specified level for the required duration.

[70]- The coldest location within the chamber is identified for each load and temperature sensors are placed there, either in the wood or in the chamber.

[71]- Where the treatment is monitored using temperature sensors inserted into the wood, at least two temperature sensors are recommended. These temperature sensors should be suitable for measuring wood core temperature. The use of multiple temperature sensors ensures that any failure of a temperature sensor is detected during the treatment process. The temperature sensors are inserted at least 30 cm from the end of a piece of wood and penetrate to the centre of the wood. For shorter boards or pallet blocks, temperature sensors are also inserted in the piece of wood with the largest dimensions in a manner that ensures the temperature at the core is measured. Any holes drilled in the wood to place the temperature sensors are sealed with appropriate material to prevent interference in temperature measurement by convection or conduction. Special attention should be paid to external influences on the wood such as nails or metal insertions that may lead to incorrect measurements.

[72]- Where the treatment schedule is based on monitoring chamber air temperature and is used for treatment of different wood types (e.g. specific species and sizes), the schedule takes into account the species, moisture content and thickness of the wood being treated. At least two temperature sensors are recommended for monitoring the air temperature in the chamber treating wood packaging according to treatment schedules.

[73]- If the air flow in the chamber is routinely reversed during treatment, a greater number of temperature sensors may be needed to account for a possible change in the location of the coldest point.

[74]- Temperature sensors and data recording equipment are calibrated in accordance with the manufacturer's instructions at a frequency specified by the NPPO.

[75]- Temperatures are monitored and recorded during each treatment to ensure that the prescribed minimum temperature is maintained for the required period of time. If the minimum temperature is not maintained, corrective action needs to be taken to ensure that all wood is treated according to heat treatment requirements (30 continuous minutes at 56 °C); for example, the treatment is restarted or the treatment time extended and, if necessary, the temperature raised. During the treatment period, the frequency of temperature readings is sufficient to ensure that treatment failures can be detected.

[76]- For the purpose of auditing, the treatment provider keeps records of heat treatments and calibrations for a period of time specified by the NPPO.

[77]**Heat treatment using dielectric heating (treatment code for the mark: DH)**

[78]Where dielectric heating ~~is used~~ (~~e.g.~~ microwaves or radio waves) is used, wood packaging material ~~composed of wood not exceeding 20 cm[1] when measured across the smallest dimension of the piece or the stack~~ must be heated to achieve a minimum temperature of 60 °C for 1 continuous minute throughout the entire profile of the wood (including its surface). ~~The prescribed temperature must be reached within 30 minutes from the start of the treatment[2].~~ Treatment providers using dielectric heating must verify that their schedules achieve specified treatment parameters (taking into account the moisture content of the wood, its size and density, and the frequency of microwaves or radio waves).

[79]Treatment schedules should be specified or approved by the NPPO.

[80]Treatment providers should be approved by the NPPO. NPPOs should consider the following factors that may be required for a dielectric heating chamber to meet the treatment requirements: ~~:~~

[81]- Irrespective of whether dielectric heating is conducted as a batch process or as a continuous (conveyor) process, the treatment is monitored in the wood where the temperature is likely to be the coldest (normally on the surface) to ensure the target temperature is maintained. For measuring the temperature, at least two temperature sensors are recommended to ensure that any failure of a temperature sensor is detected.

[82]- The treatment provider has initially validated that the wood temperatures reach or exceed 60 °C for 1 continuous minute throughout the entire profile of the wood (including its surface).

[83]- For wood exceeding 5 cm in thickness, dielectric heating at 2.45 GHz requires bidirectional application or multiple waveguides for the delivery of microwave energy to ensure uniformity of heating.

[84]- Temperature sensors and data recording equipment are calibrated in accordance with the manufacturer's instructions at a frequency specified by the NPPO.

[85]- For the purpose of auditing, the treatment provider keeps records of heat treatments and calibrations for a period of time specified by the NPPO.

[86]**Methyl bromide treatment (treatment code for the mark: MB)**

[87]NPPOs are encouraged to promote the use of alternative treatments approved in this standard[~~13~~]. Use of methyl bromide should take into account the CPM recommendation on the replacement or reduction of the use of methyl bromide as a phytosanitary measure (CPM, 2008).

[88]Wood packaging material containing a piece of wood exceeding 20 cm in cross-section at its smallest dimension must not be treated with methyl bromide.

[89]The fumigation of wood packaging material with methyl bromide must be in accordance with a schedule specified or approved by the NPPO that achieves the minimum concentration-time product[~~24~~] (CT) over 24 hours at the temperature and final residual concentration specified in Table 1. This CT must be achieved throughout the profile of the wood, including its core, although the concentration~~s would be~~ is measured in the ambient atmosphere. The minimum temperature of the wood and its surrounding atmosphere must not be less than 10 °C and the minimum exposure time must not be less than 24 hours. Monitoring of gas concentrations must be carried out at a minimum at 2, 4 and 24 hours from the beginning of the treatment. In the case of longer exposure times and weaker concentrations, additional measurement of the gas concentrations should be recorded at the end of fumigation.

[90]If the CT is not achieved over 24 hours, corrective action needs to be taken to ensure the CT is reached; for example, the treatment is restarted or the treatment time extended for a maximum of ~~2~~two hours without adding more methyl bromide to achieve the required CT (see the footnote to Table 1).

[1] Contracting parties to the IPPC may also have obligations under the Montreal Protocol on Substances that D~~d~~eplete the Ozone Layer (UNEP, 2000).

[2] The CT utilized for methyl bromide and sulphuryl fluoride treatments in this standard is the sum of the products of the concentration (g/m^3) and time (h) over the duration of the treatment.

[91]**Table 1.:** Minimum required CT over 24 hours for wood packaging material fumigated with methyl bromide

[92]Temperature (°C)	[93]**Minimum required** CT (g·h/m^3) over 24 h	[94]Minimum final concentration (g/m^3) after 24 h#
[95]21.0 or above	[96]650	[97]24
[98]16.0 – 20.9	[99]800	[100]28
[101]10.0 – 15.9	[102]900	[103]32

[104]# In circumstances when the minimum final concentration is not achieved after 24 hours, a deviation in the concentration of ~5% is permitted provided additional treatment time is added to the end of the treatment to achieve the prescribed CT.

[105]One example of a schedule that may be used for achieving the specified requirements is shown in Table 2.

[106]**Table 2.:** Example of a treatment schedule that achieves the minimum required CT for wood packaging material treated with methyl bromide (initial doses may need to be higher in conditions of high sorption or leakage)

[107]Temperature (°C)	[108]Dosage (g/m^3)	[109]Minimum concentration (g/m^3) at:		
[110]	[111]	[112]2 h	[113]4 h	[114]24 h
[115]21.0 or above	[116]48	[117]36	[118]31	[119]24
[120]16.0 – 20.9	[121]56	[122]42	[123]36	[124]28
[125]10.0 – 15.9	[126]64	[127]48	[128]42	[129]32

[130]Treatment providers should be approved by the NPPO. NPPOs should consider the following factors that may be required for methyl bromide fumigation to meet the treatment requirements:

[131]- Fans are used as appropriate during the gas distribution phase of fumigation to ensure equilibrium is reached, and they are positioned to make certain the fumigant is rapidly and effectively distributed throughout the fumigation enclosure (preferably within the first hour of application).

[132]- The fumigation enclosure is not loaded beyond 80% of its volume.

[133]- The fumigation enclosure is well sealed and as gas tight as possible. If fumigation is to be carried out under sheets, these are made of gas-proof material and sealed appropriately at the seams and at floor level.

[134]- The fumigation site floor is impermeable to the fumigant; if it is not, gas-proof sheets are laid on the floor.

[135]- The use of a vaporizer to apply methyl bromide (“hot gassing”) in order to fully volatilize the fumigant prior to its entry into the fumigation enclosure is recommended.

[136]- Methyl bromide treatment is not carried out on stacked wood packaging material exceeding 20 cm in cross-section at its smallest dimension. Therefore, stacked wood packaging material may need separators to ensure adequate methyl bromide circulation and penetration.

[137]- The concentration of methyl bromide in the air space is always measured at a location furthest from the insertion point of the gas as well as at other locations throughout the enclosure (e.g. at front bottom, centre middle and back top) to confirm that uniform distribution of the gas is reached. Treatment time is not calculated until uniform distribution has been reached.

[138]- When calculating methyl bromide dosage, compensation is made for any gas mixtures (e.g. 2% chloropicrin) to ensure that the total amount of methyl bromide applied meets required dose rates.

[139]- Initial dose rates and post-treatment product handling procedures take account of likely methyl bromide sorption by the treated wood packaging material or associated product (e.g. polystyrene boxes).

[140]- The measured or expected temperature of the product or the ambient air immediately before or during treatment (whichever is the lowest) is used to calculate the methyl bromide dose.

[141]- Wood packaging material to be fumigated is not wrapped or coated in materials impervious to the fumigant.

[142]- Temperature and gas concentration sensors and data recording equipment are calibrated in accordance with the manufacturer's instructions at a frequency specified by the NPPO.

[143]- For the purposes of auditing, the treatment provider keeps records of methyl bromide treatments and calibrations for a period of time specified by the NPPO.

[144]**Sulphuryl fluoride treatment (treatment code for the mark: SF)**

[145]Wood packaging material containing a piece of wood exceeding 20 cm in cross-section at its smallest dimension must not be treated with sulphuryl fluoride. Wood packaging material with a moisture content higher than 75% (dry basis) must not be treated with sulphuryl fluoride.

[146]The fumigation of wood packaging material with sulphuryl fluoride must be in accordance with a schedule specified or approved by the NPPO that achieves the minimum CT^2 over 24 or 48 hours at the target temperature and final residual concentration specified in Table 3. This CT must be achieved throughout the profile of the wood, including its core, although the concentration is measured in the ambient atmosphere. Small increases in the treatment time (not more than two hours) may be permitted to achieve the required CT if the minimum final concentration is not reached. The minimum temperature of the wood must not be lower than 20 °C and the minimum exposure time must not be less than the time stated for each temperature in Table 3. Monitoring of gas concentration must be carried out at a minimum of 2, 4, 24 and, when appropriate, 48 hours from the beginning of the treatment. In the case of longer exposure times and weaker concentrations, additional measurements of the gas concentrations should be recorded at the end of fumigation.

[147]If the CT is not achieved within a single 24 or 48 hour period (even if the minimum final concentration is achieved), corrective action should be taken. The treatment time may be extended for a maximum of two hours without adding more sulphuryl fluoride, or it may be restarted.

[148]**Table 3.** Minimum required CT over 24 or 48 hours for wood packaging material fumigated with sulphuryl fluoride

[149]**Temperature (°C)**	[150]**Minimum required CT ($g \cdot h/m^3$)**	[151]**Minimum final concentration (g/m^3)†**
[152]30 or above for 24 h	[153]1 400	[154]41
[155]20 or above for 48 h	[156]3 000	[157]29

[158]

[159]† If the minimum final concentration is not achieved after 24 or 48 hours by the end of the treatment, a deviation in the concentration of ~5% is permitted, provided additional treatment time is added at the end of the treatment to achieve the prescribed CT.

[160]One example of a schedule that may be used for achieving the specified requirements is shown in Table 4.

[161]**Table 4.** Example of a treatment schedule that achieves the minimum required CT for wood packaging material treated with sulphuryl fluoride (initial dosage may need to be higher in conditions of high sorption or leakage)

			[165]**Minimum concentration (g/m^3) at:**

[162]**Temperature (°C)**	[163]**Minimum required CT (g·h/m³)**	[164]**Dosage (g/m³)**	[169]**0.5 h**	[170]**2 h**	[171]**4 h**	[172]**12 h**	[173]**24 h**	[174]**36 h**	[175]**48 h**
[176]30 or above	[177]1 400	[178]82	[179]87	[180]78	[181]73	[182]58	[183]41	[184]n/a†	[185]n/a†
[186]20 or above	[187]3 000	[188]120	[189]124	[190]112	[191]104	[192]82	[193]58	[194]41	[195]29

[196]† n/a, Not applicable.

[197]Treatment providers should be approved by the NPPO. NPPOs should consider the following factors that may be required for sulphuryl fluoride fumigation to meet the treatment requirements.

- [198]Fans are used as appropriate during the gas distribution phase of fumigation to ensure equilibrium is reached, and they are positioned to make certain that the fumigant is rapidly and effectively distributed throughout the fumigation enclosure (preferably within the first hour of application).
- [199]The fumigation enclosure is not loaded beyond 80% of its volume.
- [200]The fumigation enclosure is well sealed and as gas tight as possible. If fumigation is to be carried out under sheets, these must be made of gas-proof material and sealed appropriately at the seams and at floor level.
- [201]The fumigation site floor is either impermeable to the fumigant or gas-proof sheets are laid on the floor.
- [202]Wood stacks need separators at least every 20 cm to ensure adequate sulphuryl fluoride circulation and penetration.
- [203]When calculating sulphuryl fluoride dosage, compensation is made for any gas mixtures (e.g. carbon dioxide) to ensure that the total amount of pure fumigant applied meets the requirements prescribed in the standard.
- [204]The concentration of sulphuryl fluoride in the air space is always measured at a location furthest from the insertion point of the gas as well as at other locations throughout the enclosure (e.g. at front bottom, centre middle and back top) to confirm that uniform distribution of the gas is reached. Treatment time is not calculated until uniform distribution has been reached.
- [205]Initial dosage and post-treatment product handling procedures take into account likely sulphuryl fluoride sorption by the treated wood packaging material or associated product.
- [206]The measured temperature of the product or the ambient air (whichever is lower) is used to calculate the sulphuryl fluoride dosage, and the temperature of the product must be at least 20 °C (including at the wood core) throughout the duration of the treatment.
- [207]Wood packaging material to be fumigated is not wrapped or coated in materials impervious to the fumigant.
- [208]Temperature and gas concentration sensors and data recording equipment are calibrated in accordance with the manufacturer's instructions at a frequency specified by the NPPO. Instruments used for measuring the concentration of sulphuryl fluoride may be affected by altitude, water vapour, carbon dioxide or temperature. These instruments need to be calibrated specifically for sulphuryl fluoride.

- [209]For the purpose of auditing, the treatment provider keeps records of sulphuryl fluoride treatments and calibrations for a period of time specified by the NPPO.

- [210]Personnel applying fumigation treatment should follow the label requirements for use of sulphuryl fluoride.

[211]**Adoption of alternative treatments and revisions of approved treatment schedules**

[212]As new technical information becomes available, existing treatments may be reviewed and modified, and alternative treatments or a new treatment schedule for wood packaging material may be adopted by the CPM. If a new treatment or a revised treatment schedule is adopted for wood packaging material and incorporated into this ISPM, material treated under the previous treatment and/or schedule does not need to be re-treated or re-marked.

This revised Annex 2 was adopted by the XXth Session of the Commission on Phytosanitary Measures in [month] [year].

[213] ANNEX 2: The mark and its application

The annex is a prescriptive part of the standard.

[214]A mark indicating that wood packaging material has been subjected to approved phytosanitary treatment in accordance with this standard[3] comprises the following required components:

[215]- the symbol

[216]- a country code

[217]- a producer/treatment provider code

[218]- a treatment code using the appropriate abbreviation according to Annex 1 (HT, DH, MB or SF).

[219]**Symbol**

[220]The design of the symbol (which may have been registered under national, regional or international procedures, as either a trademark or a certification/collective/guarantee mark) must resemble closely that shown in the examples illustrated below and must be presented to the left of the other components.

[221]**Country code**

[222]The country code must be the International Organization for Standards (ISO) two-letter country code (shown in the examples as "XX"). It must be separated by a hyphen from the producer/treatment provider code.

[223]**Producer/treatment provider code**

[224]The producer/treatment provider code is a unique code assigned by the NPPO to the producer of the wood packaging material or treatment provider who applies the marks or the entity otherwise responsible to the NPPO for ensuring that appropriately treated wood is used and properly marked (shown in the examples as "000"). The number and order of digits and/or letters are assigned by the NPPO.

[225]**Treatment code**

[226]The treatment code is an IPPC abbreviation as provided in Annex 1 for the approved measure used and shown in the examples as "YY". The treatment code must appear after the combined country and producer/treatment provider codes. It must appear on a separate line from the country code and producer/treatment provider code, or be separated by a hyphen if presented on the same line as the other codes.

[227]**Treatment code**	[228]**Treatment type**
[229]HT	[230]Heat treatment
[231]DH	[232]Dielectric heating
[233]MB	[234]Methyl bromide
[235]SF	[236]Sulphuryl fluoride

[3] At import, countries should accept previously produced wood packaging material carrying a mark consistent with earlier versions of this standard.

[237]**Application of the mark**

[238]The size, font types used, and position of the mark may vary, but its size must be sufficient to be both visible and legible to inspectors without the use of a visual aid. The mark must be rectangular or square in shape and contained within a border line with a vertical line separating the symbol from the code components. To facilitate the use of stencilling, small gaps in the border, the vertical line, and elsewhere among the components of the mark, may be present.

[239]No other information shall be contained within the border of the mark. If additional marks (e.g. trademarks of the producer, logo of the authorizing body) are considered useful to protect the use of the mark on a national level, such information may be provided adjacent to but outside of the border of the mark.

[240]The mark must be:

[241]- legible

[242]- durable and not transferable

[243]- placed in a location that is visible when the wood packaging is in use, preferably on at least two opposite sides of the wood packaging unit.

[244]The mark must not be hand drawn.

[245]The use of red or orange should be avoided because these colours are used in the labelling of dangerous goods.

[246]Where various components are integrated into a unit of wood packaging material, the resultant composite unit should be considered as a single unit for marking purposes. On a composite unit of wood packaging material made of both treated wood and processed wood material (where the processed component does not require treatment), it may be appropriate for the mark to appear on the processed wood material components to ensure that the mark is in a visible location and is of a sufficient size. This approach to the application of the mark applies only to composite single units, not to temporary assemblies of wood packaging material.

[247]Special consideration of legible application of the mark to dunnage may be necessary because treated wood for use as dunnage may not be cut to final length until loading of a conveyance takes place. It is important that shippers ensure that all dunnage used to secure or support commodities is treated and displays the mark described in this annex, and that the marks are clear and legible. Small pieces of wood that do not include all the required elements of the mark should not be used for dunnage. Options for marking dunnage appropriately include:

[248]- application of the mark to pieces of wood intended for use as dunnage along their entire length at very short intervals (NB: where very small pieces are subsequently cut for use as dunnage, the cuts should be made so that an entire mark is present on the dunnage used.)

[249]- additional application of the mark to treated dunnage in a visible location after cutting, provided that the shipper is authorized in accordance with section 4.

[250]The examples below illustrate some acceptable variants of the required components of the mark that is used to certify that the wood packaging material that bears such a mark has been subjected to an approved treatment. No variations in the symbol should be accepted. Variations in the layout of the mark should be accepted provided that they meet the requirements set out in this annex.

DRAFT ISPM: REQUIREMENTS FOR THE USE OF TEMPERATURE TREATMENTS AS PHYTOSANITARY MEASURES (2014-005)

Status box

This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.	
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Adoption

[Text to this paragraph will be added following adoption.]

INTRODUCTION

Scope

[1] This standard provides technical guidance on the application of various temperature treatments as phytosanitary measures for regulated pests on regulated articles. This standard does not provide details on specific treatments.

References

[2] The present standard refers to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

Definitions

[3] Definitions of phytosanitary terms used in this standard can be found in ISPM 5 (*Glossary of phytosanitary terms*).

Outline of Requirements

[4] This standard provides guidance on how temperature treatments may be used for pest management to comply with phytosanitary import requirements.

[5] This standard provides guidance on the main operational requirements for the application of each type of temperature treatment to achieve pest mortality at a specified efficacy.

[6] This standard also provides guidance on monitoring and recording systems and temperature mapping of facilities to ensure that the specific facility–commodity configuration will enable the treatment to be effective.

[7] The national plant protection organization (NPPO) should be responsible for approving the treatment facilities, and procedures should be in place to ensure the accurate measuring, recording and documentation of treatments applied.

BACKGROUND

[8] Phytosanitary treatments based on temperature are considered to be effective when the specific temperature–time combination required for the stated efficacy to be achieved is attained.

[9] The purpose of this standard is to provide generic requirements for the application of phytosanitary temperature treatments, specifically those adopted under ISPM 28 (*Phytosanitary treatments for regulated pests*).

[10] ISPM 28 was adopted to harmonize effective phytosanitary treatments over a wide range of circumstances and to enhance the mutual recognition of treatment efficacy by NPPOs, which may facilitate trade. ISPM 28 provides requirements for submission and evaluation of efficacy data and other relevant information on phytosanitary treatments, and annexes with specific temperature treatments that have been evaluated and adopted by the Commission on Phytosanitary Measures.

IMPACTS ON BIODIVERSITY AND THE ENVIRONMENT

[11] The use of temperature treatments as phytosanitary measures has a beneficial impact on biodiversity and the environment by preventing the introduction and spread of regulated pests with the trade of plants and plant products.

REQUIREMENTS

1. Treatment Objective

[12] The objective of using a temperature treatment as a phytosanitary measure is to achieve pest mortality (including devitalization of seeds as pests) at a specified efficacy.

2. Treatment Application

[13] Temperature treatments may be applied at any point along the supply chain, for example:

- as an integral part of production or packaging operations
- after packaging (e.g. once the commodity is packaged for dispatch)
- during storage
- immediately before dispatch (e.g. at centralized locations at a port)
- during transport
- after unloading.

[14] The requirement of a temperature treatment is that the scheduled temperature is attained throughout the commodity for the specified treatment duration, allowing the required efficacy to be achieved.

[15] Parameters to consider when implementing a temperature treatment are the temperature and duration of the treatment and, where applicable, the humidity of the treatment environment or moisture content of the commodity. The specified level for each parameter should be met to achieve the required efficacy.

[16] Packaging size and controlled atmospheres or modified atmospheres created by packaging may alter treatment efficacy. Packaging should allow the treatment to be properly applied throughout the load.

[17] Where the treatment specifies a minimum humidity level, impervious packaging must be removed, opened or adequately punctured to allow the humidity to reach the level required by the treatment.

[18] The treatment protocol should describe the process of pre- and post-conditioning to reach the required temperature and humidity, where these processes are critical to the treatment achieving the required efficacy while preserving commodity quality. The protocol should also include contingency procedures and guidance on corrective actions for treatment failures.

3. Treatment Types

3.1 Cold treatment

[19] Cold treatment uses refrigerated air to lower the temperature of the commodity to or below a specific temperature for a specific period. Cold treatment is used primarily for perishable commodities that are hosts of pests that are internal feeders.

[20] Cold treatment may be applied during transport to the importing country (e.g. refrigerated cargo holds in vessels and refrigerated sea containers). The treatment may start before dispatch and be completed prior to or at the point of entry. Prior to beginning treatment, the commodity may be precooled to the temperature at which the commodity will be treated. Where applicable, mixed consignments (e.g. fresh lemon and orange fruits loaded in the same facility) may also be treated pre-dispatch or during transport. In all cases, the commodities should be protected from infestation throughout treatment, transport and storage. Cold treatment may be used in combination with chemical treatment (e.g. fumigation).

3.2 Heat treatment

[21] Heat treatment raises the temperature of the commodity to the minimum required temperature or higher throughout a specific period.

[22] Following the completion of a heat treatment, rapid cooling to preserve commodity quality (when applicable) should be carried out only if this has been shown not to reduce the treatment efficacy.

[23] Heat treatment may be used in combination with chemical treatment, usually done sequentially (e.g. fumigation and immersion treatment).

3.2.1 Hot water immersion treatment

[24] Hot water immersion treatment (also known as hydrothermal treatment) uses heated water at a required temperature to heat the surface of the commodity for a specific period or to raise the temperature of the entire commodity to the required temperature for a specific period. This treatment is used primarily for certain fruits and vegetables that are hosts of fruit flies, but it may also be used for plants for planting (e.g. ornamental bulbs, grapevine material) and some seeds (e.g. paddy and ornamental palm seeds).

3.2.2 Vapour heat treatment

[25] Vapour heat treatment (VHT), including high temperature forced air (HTFA)[1], uses water vapour to heat the commodity throughout a specific period. The high heat energy of hot moist air enables vapour heat to raise the commodity temperature faster than dry air.

[26] This treatment is suitable for those plant products that are tolerant of high moisture but are vulnerable to drying out, such as fruits, vegetables and flower bulbs. It is also used for the treatment of wood products.

[27] Variable humidity heat treatment is a type of VHT or HTFA. Hot and relatively dry fan-driven air is used initially, avoiding condensation, to heat the entire commodity from ambient temperature to the required temperature, which is then maintained in humid air, just below dew point, for a specific period.

3.2.3 Dry heat treatment

[28] Dry heat treatment uses heated air at the required temperature to heat the surface of the commodity or to raise the entire commodity to the required temperature for a specific period. This treatment is used primarily for commodities with low moisture content, such as seeds, grain and wood, that should not be exposed to moisture.

3.2.4 Dielectric heat treatment

[29] Dielectric heating raises the temperature of the commodity by subjecting it to high frequency electromagnetic waves that cause heating by molecular dipole rotation of polar molecules, especially water. Dielectric heating may be provided by the application of electromagnetic radiation over a range of frequencies, including microwaves and radio waves.

[30] Unlike traditional heating techniques, where heat moves via conduction from the surface to the inside of the commodity, and where therefore the surface is the hottest, dielectric heating generates heat throughout the material, including the internal part, and the heat propagates by convection and conduction outwards, reducing treatment time. The inside of the commodity tends to be hotter than the surface due to heat radiation.

[31] Dielectric heating has the potential advantage of selectively heating moist substances, such as pests, within relatively drier commodities, such as wood and grain, resulting in a shorter treatment time than if the entire commodity were heated with water or air until it reached a uniform temperature throughout.

[1] The main distinction between VHT and HTFA relates to the moisture content of the heated air and the consequential heating. VHT typically uses air near saturation, which results in condensation of water on the commodity surface until the commodity surface temperature increases to near the air temperature, while during HTFA the dew point is always kept below the surface temperature of the commodity being heated resulting in no condensation.

4. Temperature and Humidity Calibration, Monitoring and Recording

[32] Monitoring and recording equipment for temperature and humidity, when required, should be appropriate for the selected temperature treatment. The equipment should be evaluated for the accuracy and consistency of its measurement of temperature, humidity and duration of treatment.

[33] To ensure that the required temperature, humidity and duration of treatment are achieved for a particular commodity, the temperature monitoring equipment should be calibrated in accordance with the manufacturer's instructions and international standards or appropriate national standards, at the temperature and humidity specified in the treatment schedule for heat treatments or in an ice slurry for cold treatments.

[34] Temperature monitoring methods should consider the following factors in the commodity being treated: (1) density and composition (including insulative property of the commodity); (2) shape, size and volume; (3) orientation in the facility (e.g. stacking and spacing); and (4) packaging.

[35] The NPPO of the country in which the treatment is initiated or conducted should ensure that monitoring and recording of temperature and humidity are properly conducted, thus allowing for verification that the treatment parameters have been met. The monitoring and recording system, number and location of sensors, and the frequency of monitoring (i.e. temperature and humidity readings) or recording should be appropriate for the specific treatment equipment, commodities, relevant technical standards and phytosanitary import requirements.

4.1 Temperature mapping

[36] Temperature mapping should be conducted by the NPPO or an authorized entity (person or organization) of the country in which the treatment is initiated or conducted. The NPPO should ensure that the temperature mapping follows the approved procedures and is appropriate for:

- the packaging type
- the arrangement and density of the commodity within the packaging
- the load configuration to be used in the treatment facility
- the type of treatment facility.

[37] Temperature mapping studies should be conducted to characterize the temperature distribution within the temperature treatment facility and the commodity (in relation to the volume and arrangement of the commodity). Such information is used to identify where the temperature monitoring and recording devices should be placed during the application of a temperature treatment using the same facility and commodity configuration. Temperature mapping is not required for each consignment, as it is designed for each facility. Temperature mapping may rely on historical use of treatments for information on the configuration, arrangement and density of a facility or commodity. In other cases, based on recognized research, the positions of the sensors may be fixed. Temperature mapping may also be conducted regularly to check possible changes of temperature distribution over time. Independent temperature mapping for a partially filled treatment facility is required to determine whether the temperature distribution is significantly different from a filled facility and therefore whether the treatment needs to be adjusted accordingly.

[38] Temperature mapping should be carried out following modifications or adjustments in equipment or processes that affect attainment of the required temperature for the treatment. Mapping should also be carried out following changes in packaging or pack configuration.

4.2 Sensor placement for temperature monitoring

[39] When the core temperature of the commodity needs to be monitored during treatment, sensors should be placed into appropriate units of the commodity, with the exception of dielectric heat treatment where surface temperature is measured. In mixed commodities, sensors should be placed appropriately to allow monitoring of the different commodities to ensure that they have all reached the required temperature and met the temperature conditions throughout the treatment cycle.

[40] Sensors should be placed in areas of the commodity that will take the longest time to reach the required core temperature (e.g. the centre of a bag in the centre bag of a pallet).

[41] The sensor should be appropriately secured to the commodity so that it does not become dislodged and in a manner that does not interfere with heat transfer in and out of the commodity.

[42] The sensor should be completely encased by the commodity to avoid false readings. Core sensors that are not completely encased should be sealed into the insertion holes using heat resistant, insulating filler.

[43] Placing the sensor close to metal objects such as nails should be avoided, as heat transfer along the metal objects may interfere with the integrity of the temperature recorded by the core sensor.

[44] For small commodities such as cherries and grapes, the sensor should be inserted through enough of the fruits to ensure that it monitors pulp temperature and not ambient air temperature.

[45] For larger commodities, the sensors should be placed in the largest items, which may take the longest time to reach the required core temperature.

4.2.1 Cold treatment

[46] Cold treatment requires:

- monitoring of the core temperature of the commodity
- adequate air circulation to ensure that the required temperature is uniformly maintained.

[47] The number of sensors required depends on factors such as the treatment schedule, commodity size, commodity type and the type of treatment facility. The number of sensors required to monitor the temperature of the commodity also depends on the temperature mapping and the size of the treatment facility.

[48] Monitoring of the air temperature provides useful information for the verification of the commodity treatment, but not as a replacement for commodity temperature.

[49] In the temperature treatment facility, at least three sensors should be used. The number of additional sensors should be adjusted to take into account factors such as the density and composition of the commodity, and the load configuration. Monitoring of the outlet air temperature may also be required.

[50] Additional sensors may be installed in accordance with the mapping to compensate for possible sensor malfunction of one or more of the minimum required sensors.

4.2.2 Hot water immersion treatment

[51] Hot water immersion treatment requires:

- monitoring of the water temperature
- adequate water circulation to ensure that the required temperature is uniformly maintained
- a means to ensure that the commodity is fully submerged.

[52] Sensors should be fully submerged in the water to ensure that they can monitor the uniformity of the treatment temperature. Depending on the requirements of the treatment (e.g. whether it is the core temperature of the commodity or the water temperature that needs to be maintained at a specific temperature for a given time), commodity sensors may or may not be required. If they are required, the largest units of the commodity should be selected for sensor placement.

4.2.3 Vapour heat treatment

[53] Vapour heat treatment requires:

- monitoring of the air temperature and humidity within the facility
- monitoring of the core temperature of the commodity

- adequate circulation of vapour heated air to ensure uniformity of temperature and relative humidity in the facility.

[54] The number of sensors required depends on factors such as temperature mapping, commodity size and configuration and the type of treatment facility. The largest units of the commodity should be selected for sensor placement and the sensors should be placed in the coldest part of the commodity and the heat treatment facility, as identified by temperature mapping.

[55] The treatment schedule should include:

(1) heat-up time (also known as run-up or ramp-up time): the minimum time allowed for all the temperature sensors to reach the required minimum temperature in the commodity

(2) minimum air temperature and heating time: the maximum time to raise the room temperature to the minimum temperature required for the air in the facility

(3) minimum commodity temperature at the end of heat-up time: the minimum temperature required for all commodity core temperature sensors

(4) dwell time: the length of time all commodity temperature sensors must maintain the minimum core or pulp temperature and air temperature sensors must maintain the minimum air temperature

(5) total heat treatment time: total time from the start of heating of the commodity to the end of dwell time

(6) humidity control parameters during treatment

(7) the type of post-treatment cooling (if appropriate).

4.2.4 Dry heat treatment

[56] Dry heat treatment requires:

- monitoring of the air temperature and humidity in the facility
- monitoring of the core temperature of the commodity, when appropriate
- adequate circulation of air to ensure uniformity of temperature and relative humidity in the facility.

[57] In dry heat treatment schedules that specify air temperature and humidity requirements, air temperature should be monitored using temperature sensors (analogue or digital) and humidity should be monitored using wet and dry bulb thermometers or humidity sensors.

[58] Sensors should be located away from any heat source and as far from the wall of the treatment facility as possible or, alternatively, schedules may be developed based on a series of test treatments during which the temperature farthest from the wall of the facility has been measured and correlated with the temperature at the sensor location.

[59] Additional sensors may be installed to compensate for possible sensor malfunctioning.

[60] Dry heat treatment for nuts and seeds should have a minimum of three temperature sensors placed in the commodity at locations determined by temperature mapping studies.

[61] Where the treatment temperature is monitored using sensors inserted into the commodity, they should be suitable for measuring commodity core temperature. The overall number of sensors should be adjusted according to the treatment type, commodity type, commodity size and configuration, temperature mapping and the type of treatment facility. Monitoring the core temperature of the commodity, when appropriate, may provide additional information on the verification of dry heat treatment, compared to monitoring air temperature alone.

4.2.5 Dielectric heat treatment

[62] Dielectric heat treatment requires monitoring of the temperature at the coolest region of the commodity.

[63] The nature of dielectric heating means that systems for monitoring and recording temperature need to be compatible with this technology. Examples include infrared cameras, temperature sensors not affected by the electromagnetic fields generated, thermocouples and fibre-optic sensors.

[64] Depending on the specific treatment to be applied to a particular commodity (e.g. whether the core or the surface of the commodity is the coolest region identified by temperature mapping), internal temperature sensors may be required as appropriate.

[65] Sensors should be positioned, according to approved procedures, to monitor the uniformity of the treatment temperature in the largest part of the commodity.

5. Adequate Systems for Treatment Facilities

[66] Confidence in the adequacy of a temperature treatment as a phytosanitary measure is primarily based on assurance that the treatment is effective against the pest of concern under specific conditions and the treatment has been properly applied. Systems for treatment delivery should be designed, used and monitored to ensure that treatments are properly conducted and commodities are protected from infestation and contamination after treatment.

[67] The NPPO of the country in which the treatment facility is located or where treatments are initiated is responsible for ensuring that the system requirements are met.

5.1 Approval of facilities

[68] Treatment facilities should be subject to approval by the NPPO in the country in which the facility is located before phytosanitary treatments are applied there. In cases where the treatment is applied during transport, the NPPO may approve the procedures for this application. NPPOs should maintain a list of approved facilities.

5.2 Prevention of infestation after treatment

[69] The treatment facility should provide the necessary measures to prevent possible infestation or contamination of the commodity after treatment. The following measures may be required:

- keeping the commodity in a pest free enclosure
- packing the commodity immediately after treatment
- segregating and identifying treated commodities
- dispatching the commodity immediately after treatment.

5.3 Labelling

[70] Commodities may be labelled with treatment lot numbers or other features of identification allowing trace-back for non-compliant consignments. The labels should be easily identifiable and placed on visible locations.

5.4 Monitoring and auditing

[71] The NPPO of the country in which the temperature treatment is conducted is responsible for monitoring and auditing the application of phytosanitary treatments and the facilities within which the treatments are conducted. Continuous supervision of treatments should not be necessary provided that there is a system for continuous temperature monitoring and for ensuring the security of the facility, process and commodity in question. The monitoring and auditing should be sufficient to detect and correct deficiencies promptly.

5.5 Requirements for treatment facilities

[72] Treatment facilities should meet the requirements specified by the NPPO. These may include the following elements:

- approval of the facility by the NPPO of the country in which the facility is located

- authorization of entities by the NPPO
- access for the NPPO of the country in which the facility is located to documentation and records of the treatment facility
- corrective action to be taken in cases of non-compliance.

6. Documentation

[73] The NPPO of the country in which the treatment facility is located is responsible for ensuring that treatment providers keep appropriate records, such as raw data on temperature and humidity recorded during the treatment. Accurate record keeping is essential to allow for trace-back capability.

6.1 Documentation of procedures

[74] Procedures should be documented to ensure that commodities are consistently treated, as required. Process controls and operational parameters should be established to provide the details necessary for a specific approval of a treatment facility. Calibration and quality control procedures should be documented by the treatment facility operator. As a minimum, they should address the following:

- commodity handling procedures before, during and after treatment
- orientation and configuration of the commodity during treatment
- critical process parameters and the means for their monitoring
- temperature calibration and recording and, where appropriate, humidity calibration and recording
- contingency plans and corrective actions to be taken in the event of treatment failure or problems with critical treatment processes
- procedures for handling rejected lots
- labelling (if required), record keeping and documentation requirements
- training of personnel.

6.2 Record keeping

[75] Treatment facility operators should keep records for each treatment application. These records should be made available to the NPPO of the importing or exporting country when, for example, a trace-back is necessary.

[76] Appropriate records for temperature treatments as phytosanitary measures should be kept by the treatment facility for at least one year to enable the trace-back of treated lots. Information that may be required to be recorded includes:

- identification of facility
- commodity treated
- target regulated pest
- packer, grower and place of production of the commodity
- lot size and volume, including number of articles or packages
- identifying markings or characteristics
- date of treatment
- any observed deviation from the treatment schedule
- temperature, humidity (if required) and time recorded
- calibration data.

6.3 Documentation by the NPPO

[77] All NPPO procedures should be appropriately documented and records, including those of monitoring inspections made and phytosanitary certificates issued, should be maintained for at least one year. In cases of non-compliance or new or unexpected phytosanitary situations, documentation should be made

available upon request as described in ISPM 13 (*Guidelines for the notification of non-compliance and emergency action*).

7. Inspection

[78] Inspection is carried out to determine compliance with phytosanitary import requirements. Where live non-target pests are found after treatment, the NPPO should consider if their survival indicates a treatment failure and whether additional measures may be necessary.

[79] The NPPO of the importing country may inspect documentation and records for treatments conducted during transport to determine compliance with phytosanitary import requirements.

8. Responsibilities

[80] The NPPO of the country in which the temperature treatment is initiated or conducted is responsible for the evaluation, approval and monitoring of the application of temperature treatments as phytosanitary measures, including those performed by other authorized entities. However, when treatments are conducted or completed during transport, the NPPO of the exporting country is usually responsible for authorizing the entity applying the treatment during transport, and the NPPO of the importing country is responsible for verifying if the treatment requirements have been met.

DRAFT ANNEX TO ISPM 28: Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya* (2009-109)

Status box	
This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.	
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Document category	Draft annex to ISPM 28
Current document stage	*From* SC *to* CPM-13 (2018)
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Notes	2013-09 Formatted in accordance with new requirements 2013-09 Secretariat started using previously revised footnote relating to treatment adoption 2014-04 Editor edited the text 2015-05 Pending research results 2016-11 Title change: removal of the variety 'Solo' as the TPPT did not find any evidence to support any possible varietal or cultivar differences in *Carica papaya* (see section 5.2 of the TPPT 2016 meeting report) 2017-07 TPPT revised this draft PT and concluded from the research results that the response to vapour heat treatment does not differ between different populations of *B. dorsalis* 2017-09 Edited

Scope of the treatment

[1] This treatment describes the vapour heat treatment of fruit of *Carica papaya* to result in the mortality of eggs and larvae (all instars) of *Bactrocera dorsalis* at the stated efficacy[1].

Treatment description

[2] **Name of treatment:** Vapour heat treatment for *Bactrocera dorsalis* on *Carica papaya*

[3] **Active ingredient:** n/a

[4] **Treatment type:** Physical (vapour heat)

[5] **Target pest:** *Bactrocera dorsalis* (Hendel, 1912) (Diptera: Tephritidae)

[6] **Target regulated articles:** Fruit of *Carica papaya*

Treatment schedule

Exposure in a vapour heat chamber:

- with air temperature increasing over a minimum of three hours from room temperature to 47 °C or above at a maximum of 80% relative humidity
- with air temperature then held at 47 °C or above at a minimum of 90% relative humidity, during which time all fruit within the chamber maintains a core temperature of 46 °C or above for a minimum of 70 minutes.

[7] After treatment the fruit should not be exposed to accelerated cooling, for example, by water or forced air.

[8] There is 95% confidence that the treatment according to this schedule kills not less than 99.9841% of eggs and larvae of *Bactrocera dorsalis*.

Other relevant information

[9] In evaluating this treatment the Technical Panel on Phytosanitary Treatments considered issues associated with temperature regimes and thermal conditioning, taking into account the work of Hallman and Mangan (1997).

[10] This schedule was based on the work of Santos (1996) and, the BPI-PQS and JICA cooperative study (1988), the latter identifying the egg stage of *B. dorsalis* as the most thermotolerant. The fruit crop used to develop the schedule was the 'Solo' cultivar of *C. papaya*.

[11] The air humidity is lower at the beginning of the treatment to prevent condensation on the fruit and hence maintain fruit quality.

References

[12] The present annex may refer to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

BPI-PQS & JICA. 1988. *Vapour heat treatment of papaya for oriental fruit flies disinfestation and fruit quality*. A joint report by the Japan International Cooperation Agency (JICA) and the Plant

[1] The scope of phytosanitary treatments does not include issues related to pesticide registration or other domestic requirements for contracting parties' approval of treatments. Treatments adopted by the Commission on Phytosanitary Measures may not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to contracting parties approving a treatment. In addition, potential effects of treatments on product quality are considered for some host commodities before their international adoption. However, evaluation of any effects of a treatment on the quality of commodities may require additional consideration. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.

Quarantine Service Bureau of Plant Industry. Department of Agriculture Bureau of Plant Industry, Manila. 58 pp.

Hallman, G.J. & Mangan, R.L. 1997. Concerns with temperature quarantine treatment research. In: G.L. Obenauf, ed. *Proceedings of the 1997 Annual International Research Conference on Methyl Bromide Alternatives and Emissions Reduction*, San Diego, CA, 3–5 November 2017, pp. 79-1–79-4. Fresno, CA, Methyl Bromide Alternatives Outreach, Available at https://www.mbao.org/static/docs/confs/1997-sandiego/papers/079hallman.pdf (last accessed 1 September 2017).

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

This diagnostic protocol was adopted by the Standards Committee on behalf of the Commission on Phytosanitary Measures in August 2017.

The annex is a prescriptive part of ISPM 27.

Language versions of DPs are available only for download via the IPP (as they are translated).

ISPM 27
Diagnostic protocols for regulated pests

DP 23: *Phytophthora ramorum*

Adopted 2017, published 2017

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1. Pest Information

Phytophthora ramorum Werres, de Cock and Man in't Veld, 2001 is an oomycete pathogen of unknown origin (Brasier *et al.*, 2004). It is considered to have been introduced into western North America and western Europe in the late twentieth century by the ornamental plant trade (Prospero *et al.*, 2007; Mascheretti *et al.*, 2008; Goss *et al.*, 2011; Grünwald *et al.*, 2012; Van Poucke *et al.*, 2012). *P. ramorum* attacks a wide range of trees and shrubs in nurseries and in the field, causing leaf blight, stem cankers, bleeding stem lesions and dieback.

In North America, the pathogen was found in the early 1990s causing mortality of *Quercus* (oak) trees and *Lithocarpus densiflorus* (tanoaks), mainly in California and Oregon (Rizzo *et al*., 2002). Named "sudden oak death" (SOD), this disease has now reached epidemic proportions in North America. The pathogen was originally considered as affecting only woodland plants but since 2003 nursery plants in several states of the United States of America have been affected. The disease has also been found in Canada (CABI, n.d.).

In Europe, *P. ramorum* has been observed in Germany since 1993 causing twig blight of rhododendron in nurseries and on mature bushes in gardens. In the Netherlands, it was found in 1998 on diseased *Viburnum* sp. (Werres and Marwitz, 1997; Werres *et al.*, 2001). The pathogen has now been recorded in more than 20 European countries, predominantly on ornamental plants in nurseries and in a few managed gardens. In 2009, however, *P. ramorum* was unexpectedly found infecting and killing large numbers of *Larix kaempferi* (Japanese larch) trees in southwest England. Heavy dieback and mortality of plantation *L. kaempferi* trees in western Britain and Northern Ireland have resulted in the felling of 600 000 trees (Brasier and Webber, 2010; Webber *et al.*, 2010).

This unexpected finding emphasizes that although many of its hosts are known, *P. ramorum* still poses a substantial threat to tree species and other ecologically important plants such as heathland species. The pathogen is, however, most commonly observed on *Camellia*, *Magnolia*, *Pieris*, *Quercus* (in particular the red oak species *Q. acuta*, *Q. agrifolia*, *Q. cerris*, *Q. chrysolepis*, *Q. ilex* and *Q. rubra*), *Rhododendron* and *Viburnum.* Disease symptoms, recent findings and lists of the known hosts for *P. ramorum* can be found in CABI (n.d.), COMTF (n.d.) and USDA-APHIS (n.d.).

P. ramorum has a complex life cycle and is adapted to cool temperatures, with 20 ºC being optimal. Although *P. ramorum* is soil-borne, deciduous, asexually produced sporangia are formed on the surface of infected leaves or twigs on some hosts and, depending on environmental conditions, are locally splash-dispersed or spread over long distances by wind and wind-driven rain (Davidson *et al.*, 2005). Rivers, streams and other waterways can also carry the sporangia and thus spread the pathogen (Defra, 2007). Sporangia that land on suitable hosts germinate to produce hyphae. In the presence of water, sporangia will release motile zoospores that encyst on the host surface, germinate and penetrate the host tissue, forming a colony from which more sporangia are produced. These sporangia repeat the cycle and with enough repetitions, under favourable environmental conditions, an epidemic can ensue. Different asexual spores, chlamydospores, are produced in abundance within infected plant tissue and allow *P. ramorum* to survive adverse conditions in infected stems and leaves on the plant, in plant debris on the soil surface, or in the soil (Grünwald *et. al*., 2012).

P. ramorum is a heterothallic species and may produce sexual oospores, but this requires both mating types. No evidence exists that natural crossing of these mating types has occurred in nature although crossing has been achieved in the laboratory (Brasier and Kirk, 2004). Currently, mating type A1 is the predominant type in Europe while A2 is the predominant type in North America (Werres and Kaminski, 2005). There are four clonal lineages known, with the first three designated as: NA1 (mating type: A2; distribution: North America; environment: forest and nurseries); NA2 (mating type: A2; distribution: North America; environment: nurseries); and EU1 (mating type: predominantly A1, rarely A2; distribution: Europe and North America; environment: nurseries and gardens) (Grünwald *et al.*, 2009). The fourth, a new lineage designated as EU2, was discovered recently in Northern

Ireland and western Scotland and is associated in particular with *L. kaempferi* (Van Poucke *et al.*, 2012).

2. Taxonomic Information

Name: *Phytophthora ramorum* Werres, de Cock and Man in't Veld, 2001

Synonyms: None

Taxonomic position: Chromista, Oomycota, Peronosporea, Peronosporales, Peronosporaceae

Common names: Sudden oak death (SOD), ramorum leaf blight, ramorum shoot dieback and sudden larch death

Reference: MycoBank MB#474485

3. Detection

Laboratory studies have shown that the time between foliage infection and visible disease expression is typically between 3 and 14 days, depending on host and temperature. However, the period may be longer in the field and on different plant parts (Defra, 2007). Leaves selected at random can be checked for surface contamination or latent infection by baiting (section 3.4.2) or molecular methods (section 3.6). The use of fungicides in the field can make it more difficult to detect infected plant material by isolation on agar media (Hamelin *et al.*, 2000; Shishkoff, 2014). Fungicides may suppress symptom development as well as the viability of the pathogen, which may lead to false negative test results.

This diagnostic protocol describes well-established methods for the detection and identification of *P. ramorum.* It is not a comprehensive review of all methods available for the diagnosis of infection by *P. ramorum*. Detection of *P. ramorum* can be achieved by serological, biological and molecular methods. Serological methods can be used first as a screening test for the presence of *Phytophthora* spp., but may yield false negative or false positive results (Kox *et al.*, 2007). When a *Phytophthora* species has been detected by a serological method, the identity of the species must be confirmed by isolation and morphological identification or by molecular methods according to the flow chart in Figure 1. If identification of *P. ramorum* represents the first finding for a country, the laboratory may wish to have the diagnosis confirmed by another laboratory.

3.1 Symptoms

Several disease syndromes caused by *P. ramorum* have been described. The symptoms within each syndrome can vary widely depending on the host. The most commonly observed host symptoms are described below and are illustrated in Figures 2 to 6. Additional disease symptoms can be found on several websites (USDA-APHIS, 2009; COMTF, n.d.; EPPO, n.d.; Fera, n.d.).

3.1.1 Bleeding canker

Despite the name sudden oak death, which is the most common name used for tree dieback caused by *P. ramorum* (McPherson *et al.*, 2001), the following symptoms can be observed on many tree species and can take several years to kill mature trees. Typically, symptoms include lethal cankers around the lower trunks of infected trees, from which dark red to black sap may ooze (called bleeding cankers or tarry spots) (Figure 2). Removing the outer bark under and around oozing areas often reveals dead and discoloured inner bark with a black zone line around the edge of the necrosis. The foliage of infected trees may die prematurely, with leaves remaining on the branches after death. Trees that show these symptoms may suddenly die. It should be noted that these symptoms are not restricted to an infection caused by *P. ramorum*; they may also be hastened by other plant pathogens (including other *Phytophthora* species) or be associated with non-pathogenic disorders or insect pests.

3.1.2 Shoot dieback

On *Rhododendron* spp., diseased twigs often have brown to black lesions that usually develop first at the tip and then spread towards the base (Figure 3). Mid-stem lesions can also be found. The cambial tissue of diseased twigs is often discoloured. Shoots and stems may have cankers near ground level, resulting in rapid wilting of shoots and causing the leaves, which remain attached, to hang down (Figure 4). Infection on *Viburnum* spp. usually occurs at the base of the stem causing plants to wilt and collapse very quickly (Figure 5). Brown necrosis can often be seen spreading into stems and twigs and leaf spots may also be observed. Infection on *Pieris* spp. tends to cause petiole blackening, leading to stem cankers and aerial dieback.

3.1.3 Leaf blight

On *Rhododendron*, *Camellia*, *Kalmia* and *Pieris* species, black–brown lesions occur on leaves, usually at the tip but often at the petiole end (Figure 6(A) and (B)). Disease develops across infected leaves, often following the midrib, and eventually leads to premature leaf fall. On *Magnolia* spp. and *Rhododendron* spp., multiple small spots can also be observed, eventually merging into larger necrotic areas.

3.1.4 Needle blight

P. ramorum causes needle blight and dieback of young shoots of the conifers *Pseudotsuga menziesii* (Douglas fir), *Sequoia sempervirens* (coastal redwood), *L. kaempferi*, *Taxus baccata* (English yew) and *Abies grandis* (grand fir) (Figure 6(C)). Typical symptoms observed on *Larix* are needle infections, shoot dieback, and branch and trunk cankers. Infected shoot tips wither and wilt and infected needles appear blackened. Early needle abscission of infected needles also occurs.

3.2 Sampling and sample preparation

Different techniques for sampling and sample preparation as described below are recommended depending on the material being tested. Samples should be kept cool and sent to the diagnostic laboratory in strong closed plastic bags or containers, or double-bagged for next day isolation, as prolonged transit times or raised temperatures can reduce the likelihood of successful isolation and detection. Placing a small amount of damp tissue with the plant material will reduce sample desiccation and may increase the chance of isolation. However, in sealed self-closing plastic bags, excessive moisture can hasten tissue degradation and saprophytic activity. Storage at 2–8 °C is highly recommended to prolong sample life but storage for longer than seven days reduces the ease of isolation.

3.2.1 Plant material

When sampling bleeding cankers from trees, the outer bark around the canker should be removed to reveal the inner bark and the margin of necrosis. Pieces of phloem and xylem can then be excised from across the leading edge (the junction between healthy and necrotic tissue) and sent for testing. Symptomatic shoots and twig samples approximately 15 cm long, spanning the leading edge of an infection, should be taken while for leaves, several, showing a range of typical symptoms, should be taken.

Non-symptomatic plants can be sampled by taking leaves at random following statistical norms. The leaves sampled are bagged together and submitted for testing.

3.2.2 Water

Water samples should be at least 1 litre in volume and be taken from the surface of the area being tested, preferably where the water is flowing and is not below 4 °C or deeper than 15 cm. The water samples should be kept cool (5–20 °C) during storage and transport and tested within 48 h of

collection. Rainwater can also be collected and tested. Water bait bags, sometimes called "bobs" (muslin bags containing leaves for baiting), are an alternative, very effective method of on-site testing of water (Defra, 2007; USDA-APHIS, 2014). They consist of cut or whole leaves of rhododendron (*Rhododendron catawbiense* 'Grandiflorum', *R.* 'Cunningham's White' or *R. ponticum*) in muslin bags containing polystyrene to aid flotation. They have been used extensively in field situations to check water sources, including streams and irrigation ponds, for *P. ramorum* (Defra, 2007). Bait bags are best deployed where the water is flowing, however slow, rather than still. Bait bags can be used when the water to be tested is above 4 °C (Defra, 2007).

3.2.3 Soil or plant debris

About 500 g of soil or plant debris should be taken from the sampling site. This should be placed in a sealed container or bag. Alternatively, cut rhododendron leaves in bait bags (section 3.2.2) (without the polystyrene) can be buried in the soil or the plant debris for later collection, provided it will remain moist.

3.3 Detection by serological methods

In this diagnostic protocol, methods (including reference to brand names) are described as published, as these define the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

Serological methods may be used only to pre-screen samples for the presence of *Phytophthora* spp. A low level of false negative and false positive results may occur (Kox *et al.*, 2007). Different formats are available, including lateral flow devices (Forsite Diagnostics[1]) and ImmunoStrip Tests (Agdia[1]), which are both suitable for field use, primarily to screen out negative samples. Larger format enzyme-linked immunosorbent assays (ELISA) are also available (from Neogen[1], Lexington[1] or Agdia[1]), and are more suitable for laboratory use.

3.4 Isolation and culture from symptomatic or asymptomatic material

3.4.1 Isolation from plant samples

Symptomatic samples can be washed with water to remove loose surface contamination. At least four 1 cm^2 pieces should then be excised from the leading edge of infection on each sample and plated on one of the semi-selective isolation media described in section 3.5.

As much of each piece of tissue as practically possible should be slid under the media to force any *Phytophthora* present to grow through the media. A maximum of ten leaf pieces should be placed on each plate. Leaf pieces from different sampling sites (e.g. nurseries) or different hosts or locations within a site (i.e. subsamples) should be placed on different plates. Sporangia are formed more readily on unsealed plates (P. Giltrap, personal communication, 2014). The plates are incubated in daylight or in the dark (the dark favours chlamydospore production) at between 18 and 25 °C, and examined for *Phytophthora* growth after three to seven days. Samples plated onto media containing rifampicin should be incubated in the dark because rifampicin is inactivated by light. Growth should occur within ten days but morphological features can be seen after three days in some cases.

[1] In this diagnostic protocol, methods (including reference to brand names) are described as published, as these define the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

Where no semi-selective medium is used, surface sterilization is recommended. For example, the 1 cm^2 pieces can be dipped in an aqueous solution of bleach (1% active sodium hypochlorite) for 2–5 min depending on the thickness of the material (e.g. thin leaves may need less time than thicker stems) or 70% ethanol for 30 s, then rinsed in sterile distilled water and dried. The stem sections are split lengthwise before plating to aid culture growth.

Isolation of *P. ramorum* from woody tissue is difficult and can lead to false negative results. For woody tissue, therefore, the use of more than one method of detection for a sample is advisable. Isolation is as for soil or plant debris (section 3.4.3), covering the woody material in Petri's mineral solution and using whole or cut rhododendron leaves as bait, which are then plated or tested by molecular methods.

Non-symptomatic plants may be tested by baiting (section 3.4.2).

3.4.2 Isolation from water samples

In the laboratory, water samples are placed in a sterilized container of appropriate volume with a large surface area (e.g. a Ziploc[1] 946 ml square disposable plastic box wiped with 50% ethanol and dried before use). To promote infection from zoospores, a sterilized metal screen or cheese cloth may be used in the box to keep floating debris from touching the leaf baits. At least four 1 cm^2 pieces of healthy rhododendron leaf that has not been treated with fungicide are placed on the water surface. Alternatively, fully developed rhododendron leaves that have not been treated with fungicide and have been cut several times on the leaf margin with a sterile scalpel can be used. *R.* 'Cunningham's White', *R. catawbiense* 'Grandiflorum' and *R. ponticum* are recommended because they are highly susceptible to *P. ramorum*; however, many other rhododendron species are as susceptible (De Dobbelaere *et al.*, 2010).

The box is sealed and incubated at room temperature (18–25 °C). Within three to seven days, symptoms of *P. ramorum* infection usually develop if the pathogen is present; however, the lack of symptoms is not conclusive evidence for the absence of *P. ramorum*. The bait leaves should be plated as described in section 3.4.3 or used directly for DNA extraction. Alternatively, whole or partial leaf baits can be slipped under the selective media with the aid of a sterile spatula to help discourage bacterial contamination and allow the suspect *Phytophthora* to grow through the media. It can then be excised from the surface and transferred to a non-selective medium.

Where bait bags have been used, the rhododendron leaves are retrieved after three to seven days, and washed and plated (section 3.4.1) or used directly for DNA extraction.

Baiting with rhododendron has been demonstrated as detecting *P. ramorum* at sporangial concentrations of 1 to 40 000 per litre of water (Defra, 2007). Other baiting substrates have been described, such as *Pyrus communis* (pear fruit) (Themann *et al.*, 2002), but rhododendron leaves have been used most commonly, work very well and are easy to handle.

Baiting is not specific to *P. ramorum* and may pick up other *Phytophthora* species, as well as *Pythium* species. Using selective media when plating out helps reduce the growth of other organisms, making morphological identification of *P. ramorum* easier.

3.4.3 Isolation from soil or plant debris samples

Approximately 250 g soil to be tested is placed in a large sterilized plastic box, covered with about 500 ml Petri's mineral solution (1 litre distilled water with $CaNO_3$ 0.4 g; $MgSO_4 \cdot 7H_2O$ 0.15 g; KH_2PO_4 0.15 g; and KCl 0.06 g) or sterile demineralized water, and whole or cut rhododendron leaves are placed as bait on the surface of the solution, as described in section 3.4.2. Plant debris can be treated in the same manner. The box is incubated for three to seven days, then the sample is checked for the presence of *P. ramorum* by plating (section 3.4.1) or molecular methods (section 3.6). Where bait bags have been used, these are treated as for water samples (section 3.4.2).

3.5 Isolation media

For isolation, P_5ARP(H) (pimaricin, ampicillin, rifampicin, pentachloronitrobenzene, hymexazol) culture medium (Jeffers and Martin, 1986) is recommended, as this is semi-selective for *Phytophthora* spp. and on it, characteristic features of *P. ramorum* are readily observed. Hymexazol is included in this medium to suppress *Pythium* spp. and can be particularly useful when working with soil and water. Hymexazol has been shown to slow the growth of certain *Phytophthora* spp., including *P. ramorum*; however, adding up to 25 mg/litre hymexazol has been shown to have minimal effects on *P. ramorum* (Murphy *et al.*, 2007).

P5ARP(H) medium is made by adding 17 g cornmeal agar to 1 litre distilled water, stirring thoroughly, then autoclaving at 121 °C for 15 min before cooling to 50 °C in a water bath (EPPO, 2012). Additions, where necessary, are prepared by suspending them in 10 ml sterile distilled water or dissolving them in ethanol before adding to the medium. For 1 litre P5ARP(H) medium, 5 mg pimaricin, 250 mg ampicillin (sodium salt), 10 mg rifampicin (dissolved in 1 ml of 95% ethanol), 100 mg pentachloronitrobenzene and 75 mg (final concentration: 22.5 parts per million (ppm)) hymexazol (30% active substance) are added to the cooled (50 °C) medium, which is then stirred thoroughly and poured onto plates. The plates should be stored at 2–8 °C in the dark and used before five to seven days have elapsed since they were made (Jeffers and Martin, 1986).

The final concentration of hymexazol should be considered when making any amended medium. When isolating the pathogen from leaves or woody tissue, hymexazol can be considered optional. Another semi-selective medium including hymexazol and similar bactericides is PARP-V8 (Fergusson and Jeffers, 1999).

Another medium that can be used for isolation is cherry decoction agar. Cherry juice is made by boiling 1 kg cherries, free of stones and petioles, in 1 litre tap water for approximately 2 h. The juice is filtered through muslin or cheesecloth, poured into bottles, sterilized at 110 °C for 30 min, adjusted to pH 4.5 with 1 N KOH or 1 N HCl, and stored until use. In a bottle containing 0.8 litre distilled water, 20 g Technical Agar No. 3 is added and the mixture is sterilized at 121 °C for 15 min. Immediately after sterilization, 0.2 litre sterilized cherry extract is added, mixed well and sterilized at 102 °C for 5 min (Gams *et al*., 1998).

For extended culturing, isolates should be transferred to carrot piece agar, made by first finely grating 50 g carrots. Twenty-two grams of Technical Agar No. 3 is dissolved in 1 litre water in a 2 litre beaker, and stirred thoroughly before adding the grated carrots and stirring again. When the contents are thoroughly mixed, the beaker is covered with foil and placed into a steamer for 1 h. Before removing it from the steamer, thorough stirring of the medium is recommended. The medium is then transferred to bottles, ensuring that the carrot pieces are divided equally between them. The bottles are autoclaved at 121 °C for 15 min before the medium is poured onto plates, which are stored at room temperature (Gams *et al*., 1998).

3.6 Detection by molecular methods

Molecular tests have been developed to detect *P. ramorum* from culture or *in planta* using conventional or real-time polymerase chain reaction (PCR). Many of these methods were compared by Kox *et al*. (2007) and Martin *et al.* (2009). For this protocol, four methods have been selected based on the experience obtained by laboratories with them and the availability of validation data, and these methods are described below. However, other PCR methods can be used. PCR methods will detect non-viable *P. ramorum* in infected plant material, which would not be detected by isolation and culture (Bilodeau *et al.*, 2007). Real-time PCR may be preferred for high throughput, routine testing as the closed-tube format reduces the risk of carrying over contamination due to processing of amplification products (e.g. for nested PCR or gel electrophoresis).

3.6.1 Preparation of material

When testing symptomatic plant material, it may be beneficial to sample from the leading edge of the lesion. Depending on the sample matrix (leaves or stems, or soil), different methods may be used for homogenization or disruption of the tissue. Plant tissue (from leaves) or mycelium (from cultures) may be disrupted using a tissue pulverizer or bead beater. Pre-freezing in liquid nitrogen can be beneficial for disruption. Various grinding methods can be used, providing they produce a homogenously ground sample; for example, mortar and pestle with liquid nitrogen (for leaves and cut stems), bead mills, TissueLyser (Qiagen[1]) or the Homex grinder (Bioreba[1]) (for cultures and tough woody tissue).

3.6.2 DNA extraction

DNA extraction from plant material or from cultures can be performed using commercial kits (e.g. the NucleoSpin Plant II Extraction Kit (Macherey-Nagel[1]) or the DNeasy Plant Mini Kit (Qiagen[1]), following the manufacturers' instructions. For DNA extraction from cultured isolates, the same kits can be used. DNA should be stored at −20 °C until use. Refer to the source papers in the following sections for the extraction methods originally used; however, laboratories may find that alternative extraction techniques work equally well.

3.6.3 Conventional PCR

There are several *P. ramorum*-specific conventional PCR methods described in the literature. Two of these are described below.

3.6.3.1 Conventional PCR of Kox et al. *(2002) targeting* P. ramorum

The primers Phyto 1 (forward) and Phyto 4 (reverse) from the internal transcribed spacer (ITS) ribosomal (r)DNA were developed by M. Garbelotto (Hayden *et al*., 2004) and used for the detection of *P. ramorum* by conventional PCR (Kox *et al.*, 2007). The primers are listed below, and the details for the PCR are in Table 1.

Phyto 1: 5′-CAT GGC GAG CGC TTG A-3′
Phyto 4: 5′-GAA GCC GCC AAC ACA AG-3′

Table 1. Master mix composition, cycling parameters and amplicons for conventional PCR with primers Phyto 1/Phyto 4

Reagent	Final concentration
PCR-grade water	–†
10× PCR buffer	1×
$MgCl_2$	1.5 mM
dNTPs	200 µM
Primer Phyto 1	0.2 µM
Primer Phyto 4	0.2 µM
DNA polymerase	0.5 U
DNA (volume)	5 µl
Cycling parameters	
Initial denaturation	95 °C for 15 min
Number of cycles	35
- Denaturation	94 °C for 15 s
- Annealing	62 °C for 1 min
- Elongation	72 °C for 45 s
Final elongation	72 °C for 10 min
Expected amplicons	
Size	687 bp

† For a final reaction volume of 25 µl.

bp, base pairs; PCR, polymerase chain reaction.

3.6.3.2 Conventional PCR of Ioos et al. *(2006) targeting* P. ramorum

This PCR is based on the amplification of DNA from intronic regions using two pairs of specific primers: TRP-PRAM-F (forward) and TRP-PRAM-R (reverse) from intron TRP1, and GPA-PRAM-F (forward) and GPA-PRAM-R (reverse) from intron GPA1. The primers TRP-PRAM-F/TRP-PRAM-R can be used for detection and GPA-PRAM-F/GPA-PRAM-R for confirmation, and both pairs of primers have been fully validated and characterized (Ioos *et al.*, 2006). The primers are listed below, and the details for the PCR are in Table 2.

TRP-PRAM-F: 5′-GAG TAG AAA CTT CGG GAA TG-3′
TRP-PRAM-R: 5′-GTT CGG CAC ATT AAC GCA G-3′
GPA-PRAM-F: 5′-TAA GGA ACA AGG TAC CAA AG-3′
GPA-PRAM-R: 5′-CTC AGG AAT TCA CTC TCA CG-3′

Table 2. Master mix composition, cycling parameters and amplicons for conventional PCR with primers TRP-PRAM-F/TRP-PRAM-R and GPA-PRAM-F/GPA-PRAM-R

Reagent	Final concentration
PCR-grade water	–[†]
10× PCR buffer	1×
$MgCl_2$	2 mM
dNTPs	200 µM
Bovine serum albumin	0.60 µg/µl
Primer TRP-PRAM-F or GPA-PRAM-F	0.45 µM
Primer TRP-PRAM-R or GPA-PRAM-R	0.45 µM
DNA polymerase	0.5 U
DNA (quantity/volume)	2 µl (30–80 ng)
Cycling parameters[‡]	
Initial denaturation	95 °C for 3 min
Number of cycles	35
- Denaturation	94 °C for 30 s
- Annealing	58 °C for 30 s
- Elongation	72 °C for 1 min
Final elongation	72 °C for 7 min
Expected amplicons	
TRP-PRAM-F/TRP-PRAM-R	527 bp
GPA-PRAM-F/GPA-PRAM-R	248 bp

[†] For a final reaction volume of 20 µl.

[‡] The maximum temperature ramping rate should be used between steps.

bp, base pairs; PCR, polymerase chain reaction.

3.6.4 Real-time PCR

There are several *P. ramorum*-specific real-time PCR methods described in the literature. Two of these are described below.

3.6.4.1 Real-time PCR of Hughes et al. *(2006) targeting* P. ramorum

The primers and probe described by Hughes *et al.* (2006) target the ITS-1 region of the nuclear ribosomal (nr)RNA gene. Primer and probe sets have been developed that target other genes such as genes for cytochrome oxidase subunit I (*COXI*) (Tooley *et al.*, 2006), beta-tubulin and elicitin (Bilodeau *et al.*, 2007) and the ras-related Ypt1 protein (Schena *et al.*, 2006).

Hughes *et al.* (2006) reported a limit of detection of 10 pg genomic DNA, and no cross-reactivity with 29 species of non-target *Phytophthora*, with the exception of *Phytophthora lateralis*, which was detected at or above concentrations of approximately 10 ng per 25 µl reaction. For a full list of species used for the assessment of specificity, see Hughes *et al.* (2006).

The primers and probe are listed below, and the details for the PCR are in Table 3.

Pram 114-Fc: 5′-TCA TGG CGA GCG CTG GA-3′

Pram 190R: 5′-AGT ATA TTC AGT ATT TAG GAA TGG GTT TAA AAA GT-3′

Pram 134-T probe: 6-FAM 5′-TTC GGG TCT GAG CTA GTA G-3′ TAMRA

Table 3. Master mix composition and cycling parameters for real-time PCR with primers Pram 114-Fc/Pram 190R and probe Pram 134-T

Reagent	Final concentration
PCR-grade water	–[†]
10× PCR buffer	1×
$MgCl_2$	6.0 mM
dNTPs	240 µM
Primer Pram 114-Fc	300 nM
Primer Pram 190R	300 nM
Probe Pram 134-T	100 nM
DNA polymerase	1 U
DNA (quantity/volume)	1 µl (20–100 ng)
Cycling parameters	
Initial denaturation	95 °C for 10 min
Number of cycles	40
- Denaturation	95 °C for 15 s
- Annealing	–
- Elongation	60 °C for 1 min
Expected amplicons	
Size	n/a

[†] For a final reaction volume of 25 µl.

n/a, not applicable; PCR, polymerase chain reaction.

For the real-time PCR carried out by Hughes *et al.* (2006) the cycle threshold (Ct) value was assessed using a default threshold setting of 0.2 ΔRn (fluorescence units).

Under the Hughes *et al*. (2006) conditions, samples with Ct values less than 36 may be considered positive for *P. ramorum*. Ct values between 36 and 40 may be a result of aerosol contamination or cross-reaction with non-target DNA at high concentrations (e.g. *Phytophthora foliorum* or *P. lateralis*). Samples giving these results should be resampled or retested and if the result is still in doubt, the presence of *P. ramorum* confirmed by another method described in the protocol. Samples with Ct values of 40 are considered negative. However, the cut off Ct value should be verified in each laboratory when implementing the test for the first time.

3.6.4.2 Real-time PCR of Schena et al. *(2006) targeting* P. ramorum

Schena *et al*. (2006) developed a multiplex real-time PCR based on the *Ypt1* gene to detect *Phytophthora ramorum*, *P. kernoviae*, *P. citricola* and *P. quercina* in infected plant material. For *P. ramorum*, in a singleplex PCR, the authors report a limit of detection of 100 fg per 25 µl reaction, and there is no cross-reaction with *P. lateralis*. The primers and probe for detecting *P. ramorum* in the singleplex PCR are listed below, and the details for the PCR are in Table 4.

Yram4F: 5′-TTT GTC AGT GAC CTC TCT CTC TCT C-3′

Yram3R: 5′-GCA TAA GTA TAA GTC AGC AAG CCT GT-3′

YramP probe: 6-FAM 5′-AGA ACA CGA TCC CCT CGT CAG CAG TC-3′ BHQ

Table 4. Master mix composition and cycling parameters for real-time PCR with primers Yram4F/Yram3R and probe YramP

Reagent	Final concentration
PCR-grade water	–†
10× PCR buffer	1×
$MgCl_2$	5.0 mM
dNTPs	200 µM
Primer Yram4F	330 nM
Primer Yram3R	330 nM
Probe YramP	130 nM
DNA polymerase	0.5 U
DNA (quantity/volume)	1 µl (10–100 ng)
Cycling parameters	
Initial denaturation	50 °C for 2 min
	95 °C for 10 min
Number of cycles	40
- Denaturation	95 °C for 20 s
- Annealing	–
- Elongation	62.5 °C for 20 s
Expected amplicons	
Size	n/a

† For a final reaction volume of 25 µl.

n/a, not applicable; PCR, polymerase chain reaction.

The real-time PCR of Schena *et al*. (2006) uses a qPCR Core Kit. Amplifications are performed using a Chromo 4[1] Detector, and data acquisition and analysis are realized using the Opticon Monitor software version 2.03 (MJ Research[1]) supplied with the thermocycler.

A cut off Ct value of 36 (corresponding to the detection of 100 fg of target DNA) was obtained with the PCR described by Schena *et al*. (2006). The cut off Ct value should be verified in each laboratory when implementing the test for the first time.

3.6.5 Controls for molecular tests

For the test result obtained to be considered reliable, appropriate controls – which will depend on the type of test used and the level of certainty required – should be considered for each series of nucleic acid isolation and amplification of the target pest or target nucleic acid. For PCR, a positive nucleic acid control and a negative amplification control (no template control) are the minimum controls that should be used. The use of an internal control assay for the detection of host plant DNA, to be used in multiplex with the pathogen-specific assay, in parallel singleplex reactions, or in parallel tests for conventional and real-time PCR, can assist in the interpretation of *P. ramorum*-negative results. The use of a plant internal control is highly recommended to confirm the quality of the extracted DNA, especially where molecular methods are being used as a primary screen.

Positive nucleic acid control. This control is used to monitor the efficiency of the test method (apart from the extraction). Pre-prepared (stored) genomic DNA, whole genome amplified DNA or a synthetic control (e.g. cloned PCR product) may be used. A good positive control for *P. ramorum* is DNA extracted from a host plant (e.g. *Rhododendron*) infected with *P. ramorum* with a Ct value near the limit of detection (LOD).

Negative amplification control (no template control). This control is necessary for conventional and real-time PCR to rule out false positives due to contamination during preparation of the reaction mixture. PCR-grade water that was used to prepare the reaction mixture is added at the amplification stage.

Internal control. To eliminate the possibility of PCR false negatives due to DNA extraction failure, nucleic acid degradation or the presence of PCR inhibitors, primers and probe targeting plant internal control DNA (e.g. *COX* as used by Hughes *et al*. (2006)) can be incorporated into the protocol.

The internal control primers can be used in a multiplex reaction with the pathogen-specific primers or they can be used in parallel singleplex reactions. Performing the reactions in singleplex may help to avoid a reduction in the sensitivity of detection of *P. ramorum*. Laboratories may choose to establish a cut-off Ct value to be used to identify samples for which extraction or amplification has not failed but was suboptimal (which could lead to false negative results). The appropriate cut-off Ct values may need to be determined for each sample type (host, tissue, etc.). Samples with failed internal controls should be plated onto selective media to try to derive a culture for DNA extraction and subsequent PCR. A dilution (e.g. 1:10) of the DNA extract can also help to overcome a problem due to the presence of inhibitors.

Alternative internal controls may be used. For example, Hayden *et al*. (2006) describe a universal primer and probe set targeting a conserved region of the small subunit of the rDNA gene, which was developed to detect any eukaryote.

3.6.5.1 Additional controls (optional)

Positive extraction control. This control is used to ensure that target nucleic acid extracted is of sufficient quantity and quality for PCR and that the target is detected. Nucleic acid is extracted from infected host tissue or, if suitable infected material is not available, healthy plant tissue that has been spiked with the target.

Negative extraction control. This control is used to monitor contamination during nucleic acid extraction. The control comprises nucleic acid that is extracted from uninfected host tissue and subsequently amplified. It is recommended that multiple controls be included when large numbers of positives are expected.

Alternatively, extraction blanks (sterile water) can be processed with the samples to be tested if sufficient uninfected host tissue is not available. This will allow contamination of extraction reagents and cross-contamination between samples to be identified.

4. Identification

P. ramorum may be identified either by its growth characteristics and morphology in culture or by sequence analysis.

Possible confusion in morphology and cultural characteristics is most likely to occur with *Phytophthora palmivora* while *Phytophthora hibernalis, P. lateralis* and *P. foliorum* may give a cross-reaction in the conventional PCR test (section 4.2).

A flow chart for the diagnosis of *P. ramorum* on symptomatic plant material is given in Figure 1. A positive diagnosis can be based on morphology; however, experience with the identification of *Phytophthora* species is required. Further PCR or sequencing is recommended.

A very low percentage of cross-reactivity has been observed with Hughes *et al.* real-time PCR primers, when *P. foliorum* or *P. lateralis* are present in very high concentration. The Ct values are usually more than 36, and for those cases, morphological (section 4.1) or sequencing (section 4.2) studies of pure cultures are needed for a conclusive identification.

4.1 Morphological identification

4.1.1 Cultural characteristics and morphology

The growth characteristics and morphological features of *P. ramorum* on agar, described in Werres *et al*. (2001), can be affected by the type of agar, substrate or host plant (P. Giltrap, personal communication, 2014). Colonies on carrot piece agar, PARP-V8 agar and cornmeal agar are submerged, showing pronounced (PARP-V8 agar) or weak (carrot piece and cornmeal agar) concentric rings. On cherry decoction agar, colonies have an appressed aerial mycelium with weak rosette-like patterns. Sporangia are ellipsoid, elongate-ovoid, caducous, often with a short pedicel, semipapillate, hyaline, 45.6–65 × 21–28.3 µm, single but in clusters; chlamydospores are numerous, thin-walled, globose, hyaline to brown, mostly 46–60 µm, and terminal or intercalary. Generally, characteristic chlamydospores allow accurate identification of *P. ramorum* in culture. Possible confusion in morphology and cultural characteristics is most likely to occur with *P. palmivora*. The key characteristics are illustrated in Figures 7, 8, 9 and 10. The features that are essential for accurate identification, as formed on examples of selective and non-selective media, are given in Table 5.

Table 5. Growth characteristics of *Phytophthora ramorum* on selective and non-selective media

Characteristic	P5ARP(H)[†] (selective)	Carrot piece agar[†, ‡] (non-selective)
Colonies	Relatively slow growing, approximately 2 mm per day	Weak rosette-like pattern, pronounced concentric rings, growth rate approximately 3 mm per day
Mycelia	Weakly coralloid, growing within the agar with little superficial growth, no hyphal swellings. Superficial, fluffy growth may be observed when growing out of plant material and coralloid appearance can differ according to the host out of which the mycelium is growing[§].	Aerial mycelium sparse, no hyphal swellings
Sporangia	Produced abundantly on the agar surface, semipapillate, caducous with short (5 µm) or no stalk. Size: 40–80 × 20–32 µm, average 24 × 52 µm; average length/width ratio: 2.16.	
	Ellipsoid, frequently in small clusters and relatively narrow, initial sporangium commonly producing secondary, smaller sporangia. When growing out of plant material, can appear papillate when about to germinate. Sporangia with constrictions (central or at pedicel end) have been observed[§], particularly when growing out of plant material.	Ellipsoid, spindle-shaped or elongated ovoid, single or in clusters
Chlamydospores	More common in older colonies (seven to ten days) unless growing out of plant material. Very large (up to 80 µm diameter), hyaline to pale brown to brown. Hyphal swellings present.	After three days' incubation in the dark, in the older parts but very often also in the young parts of the colony. Up to 88 µm diameter, thin-walled, hyaline to pale brown.

Source: Werres *et al.* (2001).

[†] On P5ARP(H), characteristics can be observed after four to six days' incubation at 20 °C, 12 h light/12 h dark. On carrot piece agar, characteristics can be observed after three to five days' incubation at 20 °C in darkness.

[‡] Sexual structures can be observed on carrot piece agar after pairing with an opposite mating type; for example, *Phytophthora cryptogea* (Werres and Kaminski, 2005). A *P. ramorum* × *P. ramorum* pairing is also possible *in vitro* (not with all isolates) (Brasier and Kirk, 2004) and in rhododendron twigs (Werres and Zielke, 2003).

[§] P. Giltrap, personal communication, 2014.

If no sporangia are produced on agar, sporulation can be encouraged by cutting 6 mm plugs from four-day-old colonies and placing these in a sterile Petri dish, mycelium side up, along with enough sterile tap water or Petri's mineral solution to be level with the top of the plugs but not covering the mycelium. Non-sterile pond water or soil extract water can be used, provided contamination with *P. ramorum* has been ruled out. The dishes are placed in the dark at 18 °C or cooler for 24–48 h. This should encourage sporangia to form on the edge of the plugs. Clusters of *P. ramorum* sporangia may be seen also in the water, having broken away from the agar plug.

A positive morphological identification would be recorded if caducous, semipapillate sporangia in the correct size range and shape with short pedicels (5 µm) were observed along with the characteristic chlamydospores.

4.2 Molecular identification

The following tests are recommended for identification of *Phytophthora* species, including *P. ramorum*, from clean cultures. The conventional PCR and real-time PCR methods described in section 3.6 for *in planta* detection of *P. ramorum* are species-specific and are used for detection of the pathogen in infected material or in cultures. Molecular diagnostic tests detect DNA, not the viable organism, and cross-reaction with closely related species, including *P. lateralis*, *P. hibernalis* and *P. foliorum*, is possible at high DNA concentrations with some methods. In addition, environmental samples (infected samples) that have very low titre can yield negative results, so care should be taken in the interpretation of results when testing DNA extracts from cultures, which may be at a higher concentration than extracts from plant material. ITS sequencing is described in section 4.2.1 as an example of a method that may be used for species level identification of *Phytophthora* isolates. Sequencing can also be performed for other genes such as *COXI* and *II* (Martin & Tooley, 2003; Martin *et al.*, 2004) and *Ypt1* (Schena *et al.*, 2006).

4.2.1 ITS sequencing for species level identification using the primers of White *et al.* (1990)

The identity of *P. ramorum* isolated in culture can be confirmed by sequencing the amplified ITS-1, 5.8S and ITS-2 region of the nrRNA gene with the primers listed below and the PCR described in Table 6. These primers can be used to generate amplification products for sequencing from all species of *Phytophthora*.

ITS5: 5′-GGA AGT AAA AGT CGT AAC AAG G-3′
ITS4: 5′-TCC TCC GCT TAT TGA TAT GC-3′

Table 6. Master mix composition, cycling parameters and amplicons for conventional PCR with primers ITS5/ITS4

Reagent	Final concentration
PCR-grade water	–[†]
10× PCR buffer	1×
$MgCl_2$	1.5 mM
dNTPs	200 µM
Primer ITS5	0.2 µM
Primer ITS4	0.2 µM
DNA polymerase	0.5 U
DNA (quantity/volume)	1 µl (50–500 pg)
Cycling parameters	
Initial denaturation	95 °C for 1 min 25 s
Number of cycles	34
- Denaturation	92 °C for 35 s
- Annealing	62 °C for 55 s
- Elongation	72 °C for 50 s
Final elongation	72 °C for 10 min
Expected amplicons	
Size	800–900 bp

[†] For a final reaction volume of 25 µl.

bp, base pairs; PCR, polymerase chain reaction.

Amplification products may be visualized by agarose gel electrophoresis: a single amplicon of 800–900 base pairs is produced by DNA from *Phytophthora* spp. The remaining amplification product can be purified using a suitable PCR purification kit following the manufacturer's instructions and the purified amplicon can be two-way sequenced with ITS5 (forward) and ITS4 (reverse) primers. The quality of the resulting sequence should be checked by visual assessment of the electropherograms. Consensus sequences may be built from the forward and reverse reads and compared with published sequences using the Basic Local Alignment Search Tool (BLAST) (National Center for Biotechnology Information, United States; http://www.ncbi.nlm.nih.gov/). In order to make a correct identification of the generated sequences to *Phytophthora* species level, use of the GenBank accession number that corresponds to the ex-type of *P. ramorum* P10103 (WPC) is recommended, which is FJ801269.

The following steps are suggested for processing sequences by BLAST (http://blast.ncbi.nlm.nih.gov/Blast.cgi?PAGE_TYPE=BlastSearch&BLAST_SPEC=blast2seq&LINK_LOC=align2seq):

(1) select "Align two or more sequences using BLAST" (under Specialized BLAST)

(2) paste the obtained sequence in a FASTA format in the first box

(3) paste the GenBank accession number (FJ801269) in the second box

(4) select "Highly similar sequences (megablast)"

click on BLAST.

In the absence of a >99% match to *P. ramorum*, phylogenetic trees may be compiled to assess intraspecific and interspecific variation in order to make the identification.

4.2.2 Controls for molecular tests

The required controls are a negative amplification control and a positive nucleic acid control for the PCR. See section 3.6.5 for more details on controls for molecular tests.

5. Records

Records and evidence should be retained as described in section 2.5 of ISPM 27 (*Diagnostic protocols for regulated pests*).

Cultures of *P. ramorum* can be stored on carrot piece or oatmeal agar slopes at room temperature or in sterile distilled water at 5 ºC. DNA can be stored at −80 °C or −20 °C.

6. Contact Points for Further Information

Further information on this protocol can be obtained from:

Fera Science Ltd. (Fera), Sand Hutton, York YO41 1LZ, United Kingdom (Ann Barnes; e-mail: ann.barnes@fera.co.uk; tel.: +44 (0) 1904 462494 or Jennifer Tomlinson; e-mail: jenny.tomlinson@fera.co.uk; tel.: +44 (0) 1904 462000 extension 3207).

A request for a revision to a diagnostic protocol may be submitted by national plant protection organizations (NPPOs), regional plant protection organizations (RPPOs) or Commission on Phytosanitary Measures (CPM) subsidiary bodies through the IPPC Secretariat (ippc@fao.org), which will in turn forward it to the Technical Panel on Diagnostic Protocols (TPDP).

7. Acknowledgements

The first draft of this protocol was written by K.J.D. Hughes (Fera, United Kingdom), M.E. Palm (USDA-APHIS-PPQ-Molecular Diagnostic Lab, United States of America) and S.C. Brière (Canadian Food Inspection Agency, Canada). It was adapted from the European and Mediterranean Plant Protection Organization (EPPO) diagnostic protocol on *P. ramorum*, which was drafted by G.C.M. van Leeuwen (Plant Protection Service, Netherlands), C.R. Lane and K.J.D. Hughes (Fera, United Kingdom), and S. Werres and S. Wagner (Federal Biological Research Centre for Agriculture and Forestry, Germany). A. Schlenzig (Science and Advice for Scottish Agriculture, United Kingdom) reviewed the first draft of this present diagnostic protocol.

The protocol was updated by A. Barnes, P. Giltrap and J. Tomlinson (Fera, United Kingdom), S.C. Brière (Canadian Food Inspection Agency, Canada) and Z.G. Abad (USDA-APHIS-PPQ-Center of Plant Health Science and Technology, United States of America).

L. Laurenson (Fera, United Kingdom) assisted with reviewing comments relating to molecular detection and identification received from the IPPC first consultation period.

8. References

The present annex may refer to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

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9. Figures

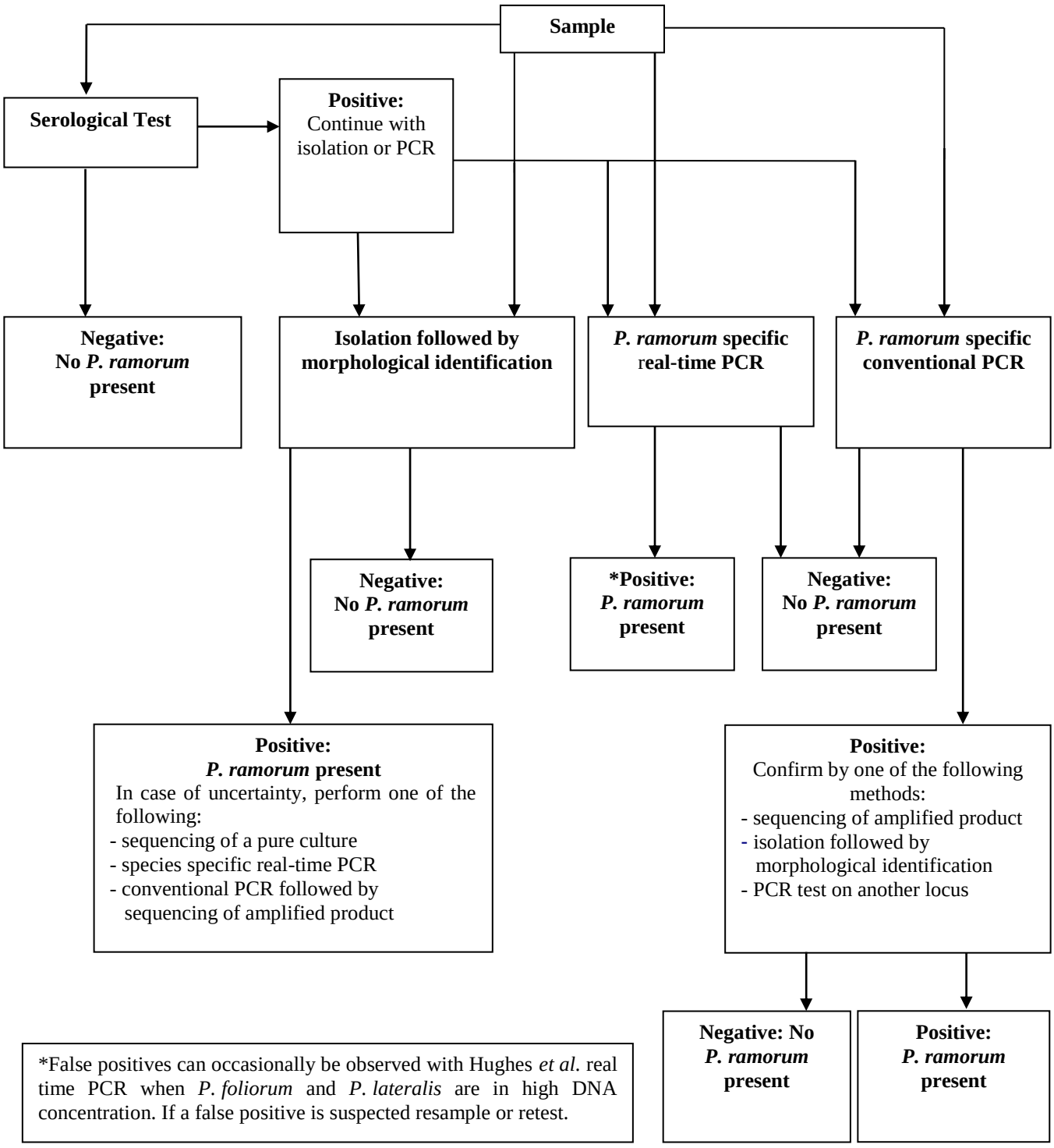


Figure 1. Flow chart for the diagnosis of *Phytophthora ramorum* on symptomatic plant material. PCR, polymerase chain reaction.

2

3

4

5

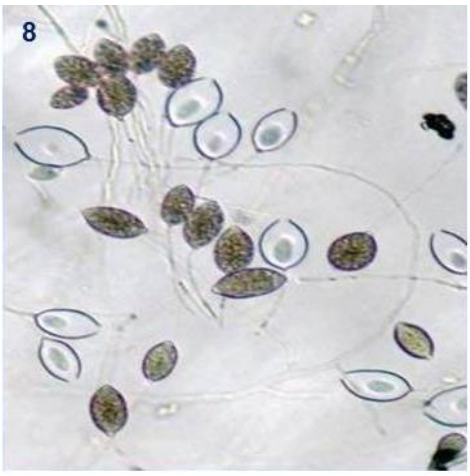
6A

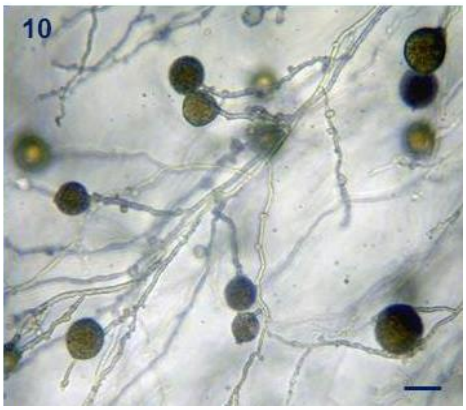
6B

6C

Figures 2–6. *Phytophthora ramorum* symptoms on different hosts: **2** *Quercus*, bleeding canker; **3** *Rhododendron*, shoot dieback; **4** *Rhododendron*, shoot tip wilt; **5** *Viburnum*, stem base discoloration; **6**(A) *Rhododendron*, leaf blight; **6**(B) *Camellia*, leaf blight; and **6**(C) *Larix*, needle blight.

Photos courtesy Fig. 2 M. Garbelotto, UC Berkeley, United States of America; *Fig. 3 J.C. Bienapfl, USDA-APHIS-CPHST Beltsville Laboratory, MD, United States* of America*; Figs 4 and 5 P. Beales and D. Crossley, Fera, United Kingdom; Fig. 6(A) Joseph O'Brien, USDA Forest Service, https://www.forestryimages.org; Fig. 6(B) S. Ashby, Department of Environment, Food and Rural Affairs, United Kingdom; Fig. 6(C) © Crown copyright.*





Figures 7–10. Typical morphological features of the asexual phase of *Phytophthora ramorum* on P5ARP(H) isolation medium (section 3.5): **7** coralloid mycelium and sporangia; **8** sporangia attached to sporangiophores; **9** sporangium semipapillated, caducous, with short pedicel (scale bar: 10 µm); and **10** characteristic chlamydospores (scale bar: 30 µm).

Photos courtesy Z.G. Abad, USDA-APHIS-CPHST Beltsville Laboratory, MD, United States of America.

Publication history

This is not an official part of the standard

2004-11 Standards Committee (SC) added subject: *Phytophthora ramorum* (2004-013).

2006-04 Commission on Phytosanitary Measures (CPM) added work programme topic: *Fungi and fungus-like organisms* (2006-006).

2015-03 Expert consultation on draft diagnostic protocols (DPs).

2015-06 Technical Panel on Diagnostic Protocols (TPDP) revised draft.

2016-01 TPDP recommended draft to SC for approval for first consultation (2016_eTPDP_Jan_01).

2016-03 SC approved draft for first consultation (2016_eSC_May_03).

2016-07 First consultation.

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2017-05 SC approved draft to be submitted to the 45-day DP notification period (2017_eSC_May_12).

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ISPM 27. **Annex 23**. *Phytophthora ramorum* (2017). Rome, IPPC, FAO.

Publication history last updated: 2017-08

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The annex is a prescriptive part of ISPM 27.
Language versions of DPs are available only for download via the IPP (as they are translated).

ISPM 27
Diagnostic protocols for regulated pests

DP 24: *Tomato spotted wilt virus*, *Impatiens necrotic spot virus* and *Watermelon silver mottle virus*

Adopted 2017, published 2017

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1. Pest Information

The genus *Tospovirus* includes the plant-pathogenic, thrips-transmitted members of the family *Bunyaviridae*. Tospoviruses are transmitted exclusively by thrips belonging to the family Thripidae, subfamily Thripinae (Riley *et al.*, 2011). There are 11 definite members of the genus *Tospovirus*, of which *Tomato spotted wilt virus* (TSWV) is the type species, and at least 15 tentative members (King *et al.*, 2012). The latest information on classification of the genus *Tospovirus* may be obtained from the International Committee on Taxonomy of Viruses (see http://ictvonline.org). Tospoviruses have been classified according to serological differences but more recent classifications are based on molecular data (de Avila *et al.*, 1993). Viruses in the family *Bunyaviridae* have genomes composed of three negative or ambisense single-stranded RNAs that occur as ribonucleoprotein complexes (RNPs). Characteristic pleomorphic virus particles are formed by enclosure of RNPs in a host-derived membrane studded with surface projections composed of virally encoded glycoproteins. The viruses of this family are quasi-spherical, enveloped plant viruses 70–110 nm in diameter (Mumford *et al.*, 1996b; EPPO, 1999a).

Tospoviruses cause devastating crop losses because of their wide distribution, broad host range (approximately 1 000 plant species) and the circulative replicative relationship between the virus and its thrips vector. This diagnostic protocol covers the three most economically important tospoviruses: TSWV, *Impatiens necrotic spot virus* (INSV) and *Watermelon silver mottle virus* (WSMoV). Examples of economically important hosts for TSWV are *Arachis hypogaea* (peanut), *Capsicum annuum* (sweet pepper), *Carica papaya* (papaya), *Lactuca sativa* (lettuce), *Nicotiana tabacum* (tobacco), *Solanum lycopersicum* (tomato) and *Solanum tuberosum* (potato) (EPPO, 1999a). Ornamental hosts for TSWV include *Alstroemeria* spp., *Antirrhinum* spp., *Begonia* spp., *Celosia* spp., *Gerbera* spp., *Impatiens* spp., *Iris* spp. and *Zinnia* spp. (EPPO, 1999a). INSV also causes significant damage in vegetable crops as well as in ornamental plants, including *Ageratum* spp., *Begonia* spp., *Chrysanthemum* spp. and *Impatiens* spp. (EPPO, 1999b; Windham *et al.*, 1998, revised in 2015). WSMoV is a pathogen of cucurbits, the principal hosts being *Citrullus lanatus* (watermelon) and *Cucumis melo* (melon) (EPPO, 1999c). Spread or movement of all three of the viruses and their vectors on infected nursery stock is common, making detection and removal of infected material crucial.

TSWV is one of the most widespread plant viruses and occurs in countries of Africa, Asia, Central America and the Caribbean, Europe, North America, Oceania and South America (EPPO, 1999a). INSV has a more restricted geographic distribution than TSWV, being present within Africa, Asia, Australasia, Central America and the Caribbean, Europe and North America (EPPO, 1999b). WSMoV is currently restricted to Asia and possibly parts of South America (EPPO, 1999c). The limited distribution described for the latter two viruses may reflect the fact that they were distinguished only recently (EPPO, 1999b).

The three viruses are all transmitted and spread in nature by thrips (*Frankliniella* spp. and *Thrips* spp.), which acquire the virus during the larval stages and transmit it via the adults. The viruses are not reported to be seed- or pollen-transmitted or mechanically transmitted by contact between plants. However, experimentally, they may be transmitted mechanically or by grafting (EPPO, 1999a, b, c).

2. Taxonomic Information

Name: *Tomato spotted wilt virus* (TSWV)

Synonyms: *Pineapple yellow spot virus* (EPPO, 1999a)

Taxonomic position: *Bunyaviridae, Tospovirus*

Common names: None

Name: *Impatiens necrotic spot virus* (INSV)

Synonyms: None

Taxonomic position: *Bunyaviridae*, *Tospovirus*

Common names: None

Name: *Watermelon silver mottle virus* (WSMoV)

Synonyms: *Watermelon silver mottle tospovirus*; *Watermelon silvery mottle virus*; *Watermelon tospovirus*; TSWV-W (EPPO, 1999c)

Taxonomic position: *Bunyaviridae*, *Tospovirus*

Common names: None

3. Detection

All plant parts of infected hosts, except seeds and pollen, can potentially harbour the three viruses. Lists of hosts of TSWV, INSV and WSMoV hosts are provided in EPPO (1999b), (1999a) and (1999c), respectively.

Tospoviruses generally induce symptoms that include leaf necrosis, chlorosis, ring patterns, mottling, silvering, local lesions and stunting. Symptoms depend on the strain of the virus, the host plant, and the environmental conditions at the time of infection and plant growth. However, in combination with other information such as the presence of thrips, symptoms can be an indicator of the presence of a tospovirus. More detailed symptom descriptions for TSWV, INSV and WSMoV are given below and have been described also in Cho *et al.* (1987), Lisa *et al.* (1990), Yeh *et al*. (1992), Daughtrey (1996) and Chatzivassiliou *et al.* (2000).

TSWV symptoms on tomato include leaf bronzing, curling, necrotic spots, necrotic streaks and stunting of the plants. Fruit symptoms are usually either irregular yellow–orange flecks and occasionally rings on red and green fruits, or necrotic lesions or rings on other fruits. Ripe fruits of affected plants have paler red or yellow skin. Affected plants may have severe necrosis and sometimes die prematurely. On *C. annuum*, the first symptom is vein yellowing, which is usually followed by chlorosis, stunting and yellowing of the plant, chlorotic line patterns or mosaics with necrotic spots on leaves, and necrotic streaks on stems extending to terminal shoots. Yellow spots or necrotic streaks may be observed on ripe fruits (EPPO, 1999a). On *L. sativa*, the main symptom is the appearance of numerous necrotic lesions; other symptoms include leaf discoloration and one-sided growth. On *N. tabacum*, necrotic lesions, necrotic rings and chlorotic rings are observed on leaves.

INSV symptoms on New Guinea impatiens hybrids include stunting, leaf spots and black discoloration at the leaf bases. A range of symptoms occur on ornamental plant hosts such as *Alstroemeria* spp., *Gladiolus* spp. and *Lobelia* spp., and on vegetable crops such as *C. annuum*, *Cichorium endivia* (endive), *Cucumis sativus* (cucumber) and *L. sativa* (EPPO, 1999b).

WSMoV symptoms on *C. lanatus* include foliar mottling, crinkling, yellow spotting and narrowing of leaf laminae as well as the growth of small, malformed fruits with necrotic spots or silver mottling, a reduced fruit set, severe stunting, shortened internodes, upright growth of branches and tip necrosis. On *C. melo*, foliar mottling, stunting, upright growth of branches and tip blight are observed (Yeh *et al.*, 1992; EPPO, 1999c).

Appropriate sample selection is important for the detection of tospoviruses because they can be unevenly distributed in naturally infected hosts. Virus titre is likely to be low in hosts that have been infected recently by viruliferous thrips, depending on environmental conditions and on the host species or cultivar. Symptomatic leaves (or parts of symptomatic leaves, for example around necrotic lesions) should be used when available. It is recommended that newly expanded leaves should be selected rather than senescing material. Leaves should be stored at 4 °C for no more than seven days before processing, or at −80 °C if storage for an extended period is required.

Detection and identification of TSWV, INSV and WSMoV can be achieved using biological, serological or molecular tests following the flow diagram shown in Figure 1. Lateral flow tests may be used as a preliminary screening tool for virus detection in symptomatic material.

The tests described in Figure 1 are the minimum requirements to detect and identify the three viruses (e.g. during routine diagnosis of a pest widely established in a country), but further tests may be required where the national plant protection organization (NPPO) requires additional confidence in the identification (e.g. detection in an area where the virus is not known to be present). For example, sequencing of amplicons generated using molecular tests may be done. When a virus is suspected to be present in a new region or host it is recommended that both a serological test and a molecular test be used for detection.

The recommended techniques for the tests are described in the following sections. In all tests, positive and negative controls must be included.

In this diagnostic protocol, methods (including reference to brand names) are described as published, as these define the original level of sensitivity, specificity or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

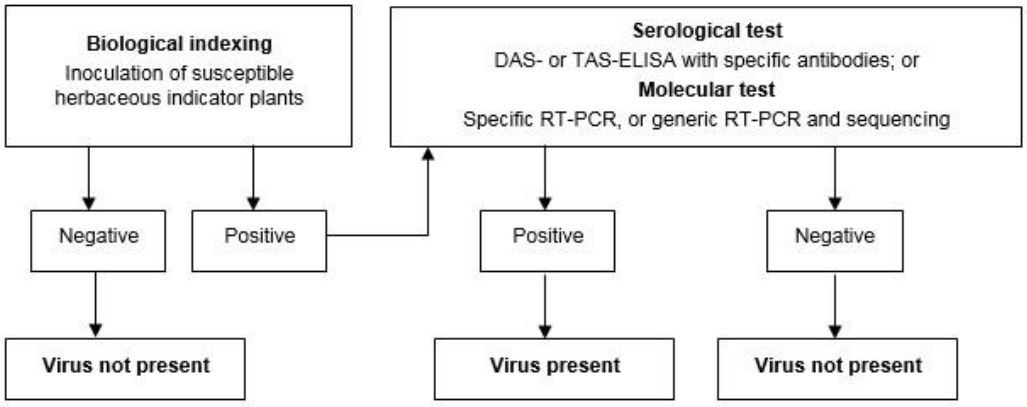

Figure 1. Minimum requirements for the detection and identification of *Tomato spotted wilt virus*, *Impatiens necrotic spot virus* and *Watermelon silver mottle virus* (e.g. for the routine diagnosis of a pest widely established in a country).

DAS-ELISA, double-antibody sandwich enzyme-linked immunosorbent assay; RT-PCR, reverse transcription-polymerase chain reaction; TAS-ELISA, triple-antibody sandwich enzyme-linked immunosorbent assay.

3.1 Biological detection

Herbaceous indicator species used to detect TSWV, INSV and WSMoV are given in Table 1. At least two species and at least two plants per species should be used, and positive and negative controls should be included in biological tests.

Indicator plants should be propagated from seed, planted in a well-drained soil mixture and maintained in an insect-proof facility at approximately 20–25 °C. Indicator plants should be kept in the dark for 24 h before inoculation to enhance susceptibility. Plant material to be tested should be macerated with chilled inoculation buffer (0.01 M phosphate buffer, pH 7.0, containing 1% sodium sulphite) using a chilled mortar and pestle; approximately 1 g tissue to 4 ml buffer. Tospoviruses are very labile, therefore buffers should be kept ice-cold and inoculum used as soon as possible after preparation. Sap

extract should be applied to the leaves of young plants with a small amount of Celite (Imerys Minerals California, Inc.[1] (mixed with sap) or carborundum powder (applied lightly to leaves). Using a gloved finger, the sap should be gently rubbed down the top surface of the lamina away from the plant stem. The inoculum should be allowed to sit on the leaves for a minimum of 1 min, then the leaves should be washed carefully to remove any residual abrasive powder. Following inoculation, the indicator plants should be maintained at either approximately 20 °C (for TSWV and INSV) or approximately 20–25 °C (for WSMoV). Symptoms usually develop within 7 to 28 days, depending on the indicator plant and the inoculum type and concentration.

Herbaceous indexing is considered to be a reliable and sensitive method of detection, but there are no quantitative data published on its specificity, sensitivity or reliability. It is not a rapid test (symptom development requires at least seven days after inoculation), it requires dedicated facilities (such as temperature-controlled greenhouse space) and the symptoms may be confused with those of other pests (in particular other tospoviruses). However, virus concentration is often greater in infected herbaceous indicator species than in the natural host plants. TSWV, INSV and WSMoV can be detected more reliably by other tests described in the protocol by testing inoculated herbaceous indicator plants.

Table 1. Selected herbaceous indicator species for *Tomato spotted wilt virus*, *Impatiens necrotic spot virus* and *Watermelon silver mottle virus*

Species[†,‡]	Family	Symptoms	Reference
Tomato spotted wilt virus			
Petunia hybrida cultivars Pink Beauty and Minstrel	Solanaceae	Local necrotic lesions on inoculated leaves, not systemic	Brunt *et al*. (1996); Kormelink (2005)
Nicotiana tabacum cultivars Samsun and White Burley; *Nicotiana glutinosa*; *Nicotiana clevelandii*; *Nicotiana rustica*	Solanaceae	Local necrotic lesions on inoculated leaves, systemic necrotic patterns and leaf deformation	Brunt *et al.* (1996); Kormelink (2005)
Nicotiana benthamiana	Solanaceae	Chlorotic to necrotic ring spots, local lesions on inoculated leaves, systemic chlorosis, mosaic stunting	Vaira *et al.* (1993); Louro (1996)
Cucumis sativus	Cucurbitaceae	Chlorotic spots with necrotic centres, not systemic	Brunt *et al.* (1996); Kormelink (2005)
Datura stramonium	Solanaceae	Chlorotic and necrotic spots and rings on inoculated leaves,	Vaira *et al.* (1993)

[1] In this diagnostic protocol, methods (including reference to brand names) are described as published, as these define the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

Species[†,‡]	Family	Symptoms	Reference
		systemic mosaic and mottling	
Lycopersicon esculentum cv. Marmande	Solanaceae	Chlorotic to necrotic spots and rings on inoculated leaves, systemic mosaic, systemic chlorosis and necrotic spots	Vaira *et al.* (1993); Brunt *et al.* (1996)
Impatiens spp.	Balsaminaceae	Chlorotic to necrotic spots or rings on inoculated leaves, systemic chlorotic to necrotic spots	Daughtrey *et al*. (1997)
Impatiens necrotic spot virus			
Impatiens spp.	Balsaminaceae	Some necrotic spots or rings, systemic chlorotic or necrotic spots	Brunt *et al.* (1996)
Nicotiana tabacum cv. White Burley	Solanaceae	Local necrotic lesions on inoculated leaves (some isolates)	Vaira *et al.* (1993); Daughtrey *et al.* (1997)
Nicotiana benthamiana	Solanaceae	Chlorotic to necrotic ring spots or local lesions on inoculated leaves, systemic chlorosis and stunting	Vaira *et al.* (1993); Daughtrey *et al.* (1997)
Nicotiana clevelandii	Solanaceae	Local necrotic lesions on inoculated leaves, systemic mosaic	Vaira *et al.* (1993)
Datura stramonium	Solanaceae	Chlorotic spots or systemic mosaic	Vaira *et al.* (1993); Daughtrey *et al.* (1997)
Petunia hybrida	Solanaceae	Small necrotic spots on inoculated leaves, not systemic	Daughtrey *et al.* (1997)
Lycopersicon esculentum	Solanaceae	Variable between isolates, lesions on inoculated leaves only	Vaira *et al.* (1993); Daughtrey *et al.* (1997)
Watermelon silver mottle virus			
Nicotiana benthamiana	Solanaceae	Systemic mottling	Yeh *et al.* (1992)
Datura stramonium	Solanaceae	Local lesions on inoculated leaves, systemic mottling or necrotic spots	Yeh *et al*. (1992)

Species†,‡	Family	Symptoms	Reference
Petunia hybrida	Solanaceae	Local lesions on inoculated leaves, not systemic	Yeh *et al*. (1992)
Chenopodium amaranticolor; Chenopodium quinoa	Chenopodiaceae	Local lesions on inoculated leaves, not systemic	Yeh *et al*. (1992)
Cucumis sativus	Cucurbitaceae	Systemic chlorotic spots and mottling, rolling of leaf edges	Yeh *et al*. (1992)
Nicotiana rustica	Solanaceae	Local lesions, systemic necrotic spots and mottling	Yeh *et al*. (1992)

† The indicator species are in the order recommended for each virus.

‡ The names used in the table are the names mentioned in the references cited (e.g. *Lycopersicon esculentum* is used in the listed references while the accepted binomial name for tomato is *Solanum lycopersicum*).

3.2 Serological detection

3.2.1 Lateral flow tests

Lateral flow tests can be done on symptomatic material in the field and they provide results within a few minutes. However, there are no quantitative data available on the specificity, sensitivity or reliability of lateral flow tests, and false negatives and false positives may occur. Positive tests must be confirmed by additional serological or molecular tests.

Lateral flow tests are commercially available for TSWV and INSV and may be used to rapidly detect these viruses. No tests are currently available for WSMoV. The tests are designed for use with symptomatic material. Different formats are available from Agdia[2], Forsite Diagnostics[2] and Neogen[2], and the tests should be done according to these manufacturers' instructions. There is no positive or negative control; rather, there is an internal control to verify the test has performed as it should.

3.2.2 DAS-ELISA and TAS-ELISA

Double-antibody sandwich (DAS)-enzyme-linked immunosorbent assay (ELISA) or triple-antibody sandwich (TAS)-ELISA should be performed using kits that have been assessed for their reliability and specificity. Some tests may cross-react with other tospoviruses. All tests should be done according to the manufacturer's instructions. ELISA is highly recommended for screening large numbers of samples.

Samples should be tested in duplicate using two wells on the microtitre plate, and with appropriate controls run alongside. Positive controls can be infected tissue or virus maintained in indicator plants (frozen at −80 °C or lyophilized). Negative controls should preferably be healthy plant material from the same species as that being tested as well as extraction buffer. A healthy negative control is important as certain plant extracts, for example *Fuchsia*, may give false positive results (Louro, 1996).

[2] In this diagnostic protocol, methods (including reference to brand names) are described as published, as these defined the original level of sensitivity, specificity and/or reproducibility achieved. The use of names of reagents, chemicals or equipment in these diagnostic protocols implies no approval of them to the exclusion of others that may also be suitable. Laboratory procedures presented in the protocols may be adjusted to the standards of individual laboratories, provided that they are adequately validated.

The ELISA methodologies, including reagents, were validated in a European Union DIAGPRO test performance study (SMT 4-CT98-2252) (EPPO, 2004) with all laboratories accurately detecting TSWV and INSV (antisera source: Neogen-Adgen[1]) and WSMoV (antiserum source: DSMZ[1]). The respective antisera reacted only with the homologous virus species. Although test performance studies have been conducted, identification based on serological methods can be affected by cross-reactions (See Supplemental Data in Hassani-Mehraban *et al*., 2016).

3.2.3 Interpretation of ELISA results

The recommendations for the interpretation of ELISA results described below are based on the EPPO protocol PM 7/125 (1) (EPPO 2015).

The serological test will be considered valid only if:

- the positive controls included in the test produce the expected colour or colorimetric response
- and the negative controls included in the test produce a negative response and do not produce a response similar to the positive control.

The ELISA is considered positive if the average optical density (OD) value from each of the duplicate sample wells is ≥2× the OD value of the negative control of healthy plant extracts. When using polyclonal antibodies, it is essential that the negative controls are as similar as possible to the matrix tested in the same plate.

The ELISA is considered negative if the OD value from each of the duplicate sample wells is <0.1 or is <2× the OD value of the negative control of healthy plant extracts.

The test should be repeated when duplicate wells differ by more than 50% OD value.

3.3 Molecular detection

Molecular methods may be more expensive or time-consuming than serological methods, especially for large-scale testing. However, molecular methods are generally more sensitive than serological methods (see, for example, Chu *et al*. (2001)). The reverse transcription (RT)-polymerase chain reaction (PCR) method described in this diagnostic protocol enables the detection of TSWV, INSV or WSMoV using species-specific primers, or tospovirus species (including *Groundnut ringspot virus* (GRSV) and *Tomato chlorotic spot virus* (TCSV) as well as TSWV, INSV and WSMoV) using genus-specific primers. Liu *et al*. (2009) described primers for RT-PCR detection of INSV that target the nucleoprotein gene and generate an amplicon approximately 364 base pairs (bp) in size, but no data were provided on cycling parameters or specificity. The protocols described below give some indication of specificity.

Real-time RT-PCR methods have been published for TSWV but not for INSV or WSMoV. However, the specificity of the TSWV method published by Roberts *et al.* (2000) and Dietzgen *et al*. (2005) has not been reported, while the method of Boonham *et al*. (2002) cross-reacts with GRSV and TCSV. Detection of a tospovirus using real-time RT-PCR may result in an inability to confirm the identity of the virus using other methods because of the inherent sensitivity of real-time RT-PCR. If it is used as a confirmatory test then the issue of the lack of specificity of the real-time RT-PCR may not be a concern. The real-time RT-PCR method described by Boonham *et al*. (2002) has been used for monitoring the presence of viruliferous thrips, and can detect viruses even in individual thrips.

In addition, both Chen *et al.* (2012) and Hassani-Mehraban *et al.* (2016) described generic and specific primers for use in RT-PCR for the detection and/or identification of tospoviruses. This protocol provides the sequences of the generic primers that can be used for the detection of TSWV, INSV and/or WSMoV. Sequence analysis of the amplicons obtained by the tests described by Hassani-Mehraban *et al.* (2016) can be used for provisional identification of the species. The specific primers for TSWV, INSV and WSMoV described in the latter publication were used only to confirm the identity of isolates and have not been fully validated or optimized for routine use.

For molecular tests, plant extracts that are fresh or frozen (stored between −20 and −80 °C for periods of up to one year) can be used. Extraction of RNA should be done using the RNeasy Plant Mini Kit (Qiagen[1]), SV Total RNA Isolation System (Promega[1]) or any other appropriately validated protocol, according to the manufacturer's instructions.

3.3.1 Conventional RT-PCR

The generic primers of Mumford *et al.* (1996a) for tospoviruses are:

S1 UNIV-forward (F): 5′-TGT A (G/A) TG (T/G)TCCAT(T/A)GCA-3′

S2 UNIV-reverse (R): 5′-AGA GCA AT (T/C) GTG TCA-3′

The primers of Mumford *et al.* (1994) and (1996a) for TSWV (primers L1 and L2) and INSV (primers S1 and S2) are, respectively:

L1 TSWV-R: 5′-AAT TGC CTT GCA ACC AAT TC-3′

L2 TSWV-F: 5′-ATC AGT CGA AAT GGT CGG CA-3′

S1 INSV-F: 5′-AAA TCA ATA GTA GCA TTA-3′

S2 INSV-R: 5′-CTT CCT CAA GAA TAG GCA-3′

The primers of Chu *et al.* (2001) for WSMoV are:

WSMoV-NR: 5′-ACA GAA AGG TTA GCA CTG AA-3′

WSMoV-NF: 5′-ACA GAG GAC TCC ACT CCC GG-3′

The RT reaction is done in a microfuge tube containing 10 µl reaction mixture composed of: 0.2 µM reverse primer (S2 UNIV-R, L1 TSWV-R, S2 INSV-R or WSMoV-NR), 1 mM dNTPs, 2 µl of 5× M-MLV buffer, 100 U M-MLV reverse transcriptase, 0.5 U RNase inhibitor and 1 µl RNA sample. The cycling parameters are: 37 °C for 1 h.

Following RT, 40 µl of PCR reaction mixture is added to the tube. The mixture is composed of: 0.2 µM forward primer (S1 UNIV-F, L2 TSWV-F, S1 INSV-F or WSMoV-NF), 1.5 mM $MgCl_2$, 5 µl of 10× Taq polymerase buffer and 1.25 U Taq DNA polymerase. The reaction is performed under the following thermocycling parameters: 5 min at 94 °C; 30 cycles of 1 min at 94 °C, 1 min at 48 °C (S1 and 2 UNIV primers), 50 °C (WSMoV-NR/NF primers) or 55 °C (S1/S2 INSV and L1/L2 TSWV primers) and 1 min at 72 °C; followed by a final extension for 10 min at 72 °C. The PCR products are analysed by gel electrophoresis.

The S1/S2 INSV and L1/L2 TSWV primers produce a 602 bp and a 276 bp amplicon with INSV and TSWV, respectively. The WSMoV-NR/NF primers produce a 700 bp amplicon with WSMoV. The generic S1/S2 UNIV primers produce an 871 bp amplicon with TSWV, INSV and other tospoviruses, or a 933 bp amplicon with WSMoV.

Broad-spectrum degenerate primers of Chen *et al.* (2012) for *Tospovirus*:

gM410-F: 5′-AAC TGG AAA AAT GAT T(T/C) (A/T/C/G) (T/C) TTG TTG G-3′

gM870c-R: 5′-ATT AG(C/T) TTG CA(T/G) GCT TCA AT(A/T/G/C) AA(A/G)G C-3′

First strand complementary DNA (cDNA) synthesis is carried out at 50 °C for 30 min and terminated by heating at 94 °C for 2 min followed by PCR amplification carried out as follows: 35 cycles of 94 °C for 30 s, 52 °C for 30 s and 72 °C for 30 s, with a final extension step of 72 °C for 10 min.

The degenerate primers gM410-F and gM870c-R were designed based on the NSm gene sequences of a range of tospoviruses including TSWV, INSV and WSMoV and they amplify a 0.5 kb fragment. All tospoviruses included in the study, except peanut chlorotic fan-spot virus (PCFV), were detected including the viruses targeted in this protocol. No amplification was observed with healthy controls or with non-tospoviruses included in the study (Chen *et al.*, 2012).

Primers for generic detection of American clade 1 tospoviruses (including TSWV and INSV; Hassani-Mehraban *et al.*, 2016):

AM1-F: 5′-GGG GGA TCC AGA GCA ATT GTG TC-3′

AM1-R: 5′- CTT TGC TTT TCA GCA CAG TGC A-3′

Primers for generic detection of Asian clade 1 tospoviruses (including WSMoV; Hassani-Mehraban *et al.*, 2016):

AS-EA-F: 5′-GGG GGA TCC AGA GCA ATC GAG G-3′

AS1-R: 5′-GCT TCA GTC CTC TTA AAT GTC C-3′

Following RNA extraction, 1 µl RNA extract is added to the following reaction mixture: 16.0 µl water, 5 µl One-step RT-PCR buffer (Qiagen[1]), 1 µl dNTPs (10 mM each), 0.5 µl forward primer, 0.5 µl reverse primer, 1 µl One-step RT-PCR enzyme mix (Qiagen[1]).

Reverse transcription is done at 50 ˚C for 30 min; followed by denaturation at 95 ˚C for 15 min; then 35 cycles consisting of denaturation at 94 ˚C for 30 s, annealing at 50 ˚C (American clade 1 primers) or 52 ˚C (Asian clade 1 primers) for 30 s, elongation at 72 ˚C for 60 s; terminal elongation at 72 ˚C for 5 min; then maintained at 20 ˚C.

American clade 1 and Asian clade 1 primers will produce amplicons of approximately 760 and 370 bp, respectively.

In the DIAGPRO test performance study laboratories detected TSWV, INSV and WSMoV accurately, but there were insufficient molecular data to compare detection with the serological tests. The specificity of the molecular tests has been evaluated by Mumford *et al.* (1996a) and Chu *et al*. (2001). Mumford *et al.* (1996a) showed that the primers S1 INSV-F and S2 INSV-R were specific under the conditions of the study for INSV and did not cross-react with TSWV, TCSV or GRSV. Hassani-Mehraban *et al*. (2016) listed at least 29 tospovirus species, not all of which are officially recognized by the International Committee on Taxonomy of Viruses (http://www.ictvonline.org/virusTaxonomy.asp) and not all of them were tested for cross-reactions by Mumford *et al.* (1996a). The broad-spectrum degenerate primers described by Chen *et al.* (2012) were able to detect isolates of TSWV, INSV, WSMoV and other tospoviruses. Species identification was possible by restriction fragment length polymorphism (RFLP) analysis or sequence analysis of the amplicon. The American clade 1 and Asian clade 1 primers described by Hassani-Mehraban *et al.* (2016) also have been shown to detect isolates of TSWV, INSV and WSMoV, respectively. Provisional species identification was possible by sequence analysis of the amplicons.

3.3.2 Real-time RT-PCR

The real-time RT-PCR described by Boonham *et al*. (2002) was used to detect all isolates of TSWV included in the analysis. Positive results were observed also with the tospoviruses TCSV and GRSV, but no reactions were observed with INSV, WSMoV, *Iris yellow spot virus* (IYSV) or *Chrysanthemum stem necrosis virus* (CSNV). The total volume of the reaction was 25 µl, and reactions were carried out in 96-well reaction plates using the TaqMan EZ RT-PCR Kit (PE Biosystems[1]), but with the addition of 25 U M-MLV reverse transcriptase (Mumford *et al*., 2000).

Cetyl trimethylammonium bromide (CTAB) extraction was carried out as described by Boonham *et al*. (2002). Leaf tissue (100–200 mg) was ground to a fine powder in liquid nitrogen using a mortar and pestle then placed in a sterile microcentrifuge tube. The ground tissue was mixed with 1 ml homogenizing buffer (2% CTAB, 100 mM Tris-HCl, pH 8.0, 20 mM ethylenediaminetetraacetic acid (EDTA), 1.4 M NaCl, 1% Na_2SO_3, 2% polyvinylpyrrolidone (PVP)-40). After incubation at 65 °C for 10 min, two chloroform:isoamyl alcohol (24:1) extractions were carried out. RNA was precipitated out of the aqueous layer by combination with an equal volume of 4 M LiCl, incubation overnight at 4 °C, and centrifugation for 30 min. The pellet was resuspended in 200 µl Tris-EDTA (TE) buffer containing 1% sodium dodecyl sulfate (SDS). To this was added 100 µl of 5 M NaCl and 300 µl ice-

cold isopropanol, then the suspension was incubated at −20 °C for 30 min. Following a 10 min centrifugation the pellet was washed with 70% ethanol, re-pelleted and dried.

After CTAB extraction the final pellet was resuspended in 50 µl diethylpyrocarbonate (DEPC)-treated water, and 1 µl RNA was used to prepare the final volume of 25 µl for the reaction (Mumford *et al*., 2000). Plates were cycled at 48 °C for 30 min, 95 °C for 10 min, and 40 cycles of 60 °C for 1 min and 95 °C for 15 s. Using suitable positive and negative controls each laboratory or user should validate the cycle threshold (Ct) values that represent a positive result. When positive results are obtained, TSWV-specific primers may be used to confirm identity as can RFLP analysis or sequence analysis of amplicons obtained by conventional RT-PCR.

Primers:

TSWV-CP-17-F: 5′-CTC TTG ATG ATG CAA AGT CTG TGA-3′

TSWV-CP-100-R: 5′-TCT CAA AGC TAT CAA CTG AAG CAA TAA-3′

Probe:

TSWV-CP-73T: FAM-5′-AGG TAA GCT ACC TCC CAG CAT TAT GGC AAG-3′TAMRA

3.3.3 Controls for molecular tests

For the test result obtained to be considered reliable, appropriate controls – which will depend on the type of test used and the level of certainty required – should be considered for each series of nucleic acid isolation and amplification of the target pest or target nucleic acid. For RT-PCR a positive nucleic acid control, an internal control, a negative amplification control (no template control) and a negative extraction control are the minimum controls that should be used.

Positive nucleic acid control. This control is used to monitor the efficiency of the test method (apart from the extraction) and, with RT-PCR, the amplification. Pre-prepared (stored) virus-derived nucleic acid, whole genome amplified DNA or a synthetic control (e.g. cloned PCR product) may be used.

Internal control. For conventional and real-time PCR, plant internal controls (e.g. a housekeeping gene (HKG) such as mitochondrial *nad5* (*NADH dehydrogenase 5*), or the ribosomal RNA gene) should be incorporated into the protocol to eliminate the possibility of PCR false negatives due to nucleic acid extraction failure or degradation or the presence of PCR inhibitors. The internal control primers should preferably be used in a duplex reaction with the target virus primers. However, because this may be difficult to achieve without reducing the sensitivity of the test, it is recommended, where practical, to run a duplex reaction of the virus primers with the HKG primers and also a simplex reaction with only the virus primers. Alternatively two separate simplex reactions (one for the plant marker and one for the target virus) may be performed. An RT-PCR using internal control primers (primers designed to detect a sequence conserved in plants such as the 5S ribosomal RNA gene (Kolchinsky *et al.* (1991)) may be used to confirm that RNA of sufficient quality for amplification has been extracted.

The *NADH dehydrogenase 5* gene fragment has been shown to be a reliable indicator of the performance of the extraction procedure and RT step for conventional RT-PCR (Menzel *et al*., 2002). The *nad5* primers are: sense, 5′-GAT GCT TCT TGG GGC TTC TTG TT-3′; and antisense, 5′-CTC CAG TCA CCA ACA TTG GCA TAA-3′. The primers have been tested against many plant species, including *S. tuberosum* and other *Solanum* species (*S. bonariense*, *S. dulcamara*, *S. jasminoides*, *S. nigrum*, *S. pseudocapsicum*, *S. rantonnetii*, *S. sisymbriifolium*), *Acnistus arborescens*, *Atropa belladonna*, *Brugmansia* spp., *Capsicum* spp., *Cestrum* spp., *Iochroma cyanea*, *Nicotiana* spp. and *Physalis* spp. (Seigner *et al*., 2008).

When an internal control is not mentioned in the description of a PCR method, the laboratory should choose an internal control and validate it.

Negative amplification control (no template control). This control is necessary for conventional and real-time RT-PCR to rule out false positives due to contamination during preparation of the reaction

mixture. PCR-grade water that was used to prepare the reaction mixture is added at the amplification stage.

Positive extraction control. This control is used to ensure that nucleic acid from the target virus is of sufficient quantity and quality for RT-PCR. Viral nucleic acid is extracted from known infected host tissue or healthy plant tissue that has been spiked with the virus. This helps validate the extraction procedure, ensuring that if the target virus is present in the plants being tested detection should occur.

The positive control should be approximately one-tenth of the amount of leaf tissue used per plant for the RNA extraction. If bulking of samples is done then the quantity of positive control should be adjusted accordingly (e.g. if ten lots of 20 mg sample are bulked for RNA extraction, then the positive control should consist of 2 mg infected leaf + 198 mg healthy plant tissue). If this is not detected then the test should be repeated or the bulking rate reduced until reliable detection is achieved.

For RT-PCR, care needs to be taken to avoid cross-contamination due to aerosols from the positive control or from positive samples. The positive control used in the laboratory should be sequenced so that this sequence can be readily compared with sequences obtained from PCR amplicons of the correct size. It is possible that the control and the PCR amplicon may have the same sequence even in the absence of contamination, particularly if the target region is conserved. Alternatively, synthetic positive controls can be made with a known but unusual sequence that, again, can be compared with PCR amplicons of the correct size.

Negative extraction control. This control is used to monitor contamination during nucleic acid extraction and/or cross-reaction with the host tissue. The control comprises nucleic acid that is extracted from uninfected host tissue and subsequently amplified. If suitable uninfected host tissue is not available clean extraction buffer may be used. It is recommended that multiple controls be included when large numbers of positive samples are expected.

3.3.4 Interpretation of PCR results

For both conventional PCR and real-time PCR, the pathogen-specific PCR will be considered valid only if:

- the positive control produces a product of the correct size for the virus
- the negative extraction control and the negative amplification control do not produce a product of the correct size for the virus.

If the *nad*5 internal control primers are used, the negative extraction control, the positive extraction control (if used) and each of the test samples must produce a 181 bp amplicon (*nad*5). Failure of the samples to amplify with the internal control primers suggests, for example, that the RNA extraction has failed, the nucleic acid has not been included in the reaction mixture, the RT step has failed, compounds inhibitory to PCR are present in the RNA extract, or the RNA or DNA has degraded.

The test on a sample will be considered positive if it produces an amplicon of the correct size.

Using real-time RT-PCR Roberts *et al*. (2000) showed that TSWV can be detected reliably in as little as 500 fg total RNA, and the method is approximately ten-fold more sensitive than detection by agarose gel analysis of amplicons with ethidium bromide staining. The real-time RT-PCR assay described by Dietzgen *et al*. (2005) was able to detect TSWV in a bulked sample of 1 infected leaf in 1 000 uninfected leaves, while ELISA could detect only 1 in 200 or 1 in 800, depending on the host.

4. Identification

As described in section 3.1, herbaceous indicators may be used for virus identification but at least two plant species and at least two plants per species should be used. In addition, positive and negative controls should be included in the test.

ELISA-based methods may be used for identification. As described in section 3.2.2, in an EU DIAGPRO test performance study all participating laboratories were able to accurately detect TSWV, INSV and WSMoV using the appropriate antiserum. Confirmation using a second method is recommended due to potential cross-reactions as described by Hassani-Mehraban *et al*. (2016).

As described in section 3.3.1, under the conditions of the validation studies, the primer pairs used for RT-PCR each produce an amplicon of a distinct size that can be used to identify the virus present in a sample. The amplicons may be sequenced to confirm identification, especially in situations where the virus is detected for the first time.

Real-time RT-PCR is not being recommended for identification because the specificity of the methods described by Roberts *et al*. (2000) and by Dietzgen *et al*. (2005) is unknown, while the method of Boonham *et al*. (2002) cross-reacts with GRSV and TCSV.

When positive and negative controls give the expected results, sequence analysis of the PCR product is usually not necessary except to specifically identify tospoviruses amplified using generic primers. Sequencing should also be done when an NPPO requires additional confidence in the result; for example, detection of a pest in an area where it is not known to occur. The International Committee on Taxonomy of Viruses states that when the nucleocapsid (N) protein sequence shows less than 90% amino acid identity, a different tospovirus species is indicated (Plyusnin *et al*., 2012).

5. Records

Records and evidence should be retained as described in section 2.5 of ISPM 27 (*Diagnostic protocols for regulated pests*).

In cases where other contracting parties may be affected by the results of the diagnosis, in particular in cases of non-compliance and where the virus is found in an area for the first time, the following records and evidence and additional material should be kept for at least one year in a manner that ensures traceability:

- the original sample (labelled appropriately), kept frozen at −80 °C or lyophilized and kept at room temperature (note that lyophilization will affect viability)
- RNA extractions and RT-PCR amplification products, if relevant, kept at −80 °C.

6. Contact Points for Further Information

Further information on this protocol can be obtained from:

Plant Pest and Disease Programme, Fera Science Limited, Sand Hutton, York, Y041 1LZ, United Kingdom (http://fera.co.uk/plantClinic/index.cfm; tel.: +44 1904 462000; fax: +44 1904 462111).

Department of Entomology, University of Wisconsin, 237 Russell Labs, 1630 Linden Drive, Madison, WI 53706, United States of America (Thomas German; e-mail: tlgerman@wisc.edu; tel.: +1 608 262 2956; fax: +1 608 262 3322).

A request for a revision to a diagnostic protocol may be submitted by NPPOs, regional plant protection organizations (RPPOs) or Commission on Phytosanitary Measures (CPM) subsidiary bodies through the IPPC Secretariat (ippc@fao.org), which will in turn forward it to the Technical Panel on Diagnostic Protocols (TPDP).

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8. References

The present annex may refer to ISPMs. ISPMs are available on the International Phytosanitary Portal (IPP) at https://www.ippc.int/core-activities/standards-setting/ispms.

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