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Acronyms

CABI	Centre for Agriculture and Biosciences International
CIPF	International Convention Phytosanitary Protection
CPs	Contracting Parties
CPM	Commission on Phytosanitary Measures
CWA	Crop Watch Africa
DLIS – FAO	FAO Locust Watch
EFSA	European Food Safety Authority
EIOS	Epidemic Intelligence from Open Sources (for Animal Health)
EMC	Emergency Management Centre
EMPRES	Emergency Prevention System
EPPO	European and Mediterranean Plant Protection Organization
EPPRD	Emergency Plant Pest Response Deed
EPs	Emerging Pests
EUROPHYT	European Union Notification System for Plant Health Outbreaks
FAO	Food and Agriculture Organization
FG	Focus Group
GERDA	Global eradication and response database
IAEA	International Atomic Energy Agency
IC	Implementation and Capacity Development Committee
ICS	Incident Command System
IMF	International Monetary Fund
IPP	International Phytosanitary Portal
IPPC	International Plant Protection Convention
IPRRG	International Pest Risk Research Group
ISPM	International Standard for Phytosanitary Measures
ISTA	International Seed Testing Association
JICA	Japan International Cooperation Agency
MoU	Memorandum of Understanding
NPDN	National Plant Diagnostic Network
NPPLAP	National Plant Protection Laboratory Accreditation Program
NPPO	national plant protection organization
NROs	National Reporting Obligations
OIE	World Organisation for Animal Health
OIRSA	International Regional Organization for Agricultural Health
PCE	Phytosanitary Capacity Evaluation
POARS	Pest Outbreak Alert and Response System
POARSC	Pest Outbreak Alert and Response Systems Committee
PRA	Pest Risk Analysis
RPPO	regional plant protection organization
SINAVIMO	National Surveillance and Monitoring System
SOP	Standard Operating Procedures
SPG	Strategic Planning Group
USAID	United States Agency for International Development
WHO	World Health Organization

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1 Introduction

1.1 Background

During The Commission on Phytosanitary Measures (CPM)-14 (2019), the concept of emerging pests and emergency issues was discussed. Several countries expressed their concern regarding the situation with *Spodoptera frugiperda* (Fall armyworm) and strongly supported exploring how the IPPC community could develop and/or strengthen global Pest Outbreak Alert and Response Systems.

In addition, during the CPM-14 (2019) session on “Successes and challenges in implementing the IPPC”, the RPPO Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA¹) shared its well-established emergency alert and response system, which had helped to eradicate an incursion of the Central American flying locust (*Schistocerca piceifrons piceifrons*) within 18 hours of its detection. This outcome occurred because of excellent coordination among high level authorities and established procedures for timely communication and actions.

The International Regional Organization for Agricultural Health (OIRSA) and the Food and Agriculture Organization (FAO) have organized simulation exercises to help build the capacities of the national plant protection organizations (NPPOs) in the region, to respond to pest outbreaks. A video of the simulation highlighting all measures taken by Nicaragua against *Fusarium oxysporum* f.sp. *cubense* Tropical Race 4 (TR4) is available on the Instituto de Protección y Sanidad Agropecuaria (IPSA) website². The International Plant Protection Convention (IPPC) Secretariat attended this simulation exercise to better understand how the OIRSA system functions.

CPM-14 (2019) requested that the CPM Bureau draft an action plan for an IPPC pest emergency system to be submitted to CPM-15 (2020) with input from the Strategic Planning Group (SPG). The IPPC Secretariat developed the document and the SPG suggested that this be aligned with the one of the development agenda items listed in the IPPC Strategic Framework (2020-2030) entitled “Strengthening Pest Outbreak Alert and Response System”. It is within this agenda item that the concepts of “emerging pests” and “emergency situations” are embedded. It was agreed that the scope would be limited to quarantine or potential quarantine pests.

A draft action plan has been drafted with input from the FAO Locust and Transboundary Pests, the CPM Bureau (June 2019), the SPG (2020), Technical Consultation to regional plant protection organizations (TC-RPPOs) (2020-21), the Standards Committee (SC), and the Implementation and Capacity Development Committee (IC) (2020). In particular, the IC agreed that a project supporting this work was aligned to the IPPC Strategic Objectives outlined in the IPPC Strategic Framework (2020-2030), and “had strategic value and provides a competitive advantage”.

Preventing pests is indeed very cost effective. A recent synthesis has shown that invasions of insects alone cost a minimum of US\$76.0 billion per year globally³.

1.2 Calls to gather experiences and resources on the topic

CPM-14 (2019) had requested that updates on emerging pest situations be added to the CPM agenda as a standing item. A Call for Pest Outbreak Alerts from contracting parties had been issued in preparation of CPM-15 (2020). As the CPM in April 2020 was cancelled, the responses received were not presented.

¹ Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) website <https://www.oirsa.org/>

² IPSA video on *Fusarium oxysporum* f. sp. *cubense* Tropical Race 4 (TR4) simulation in Nicaragua in August 2019: <https://www.ipsa.gob.ni/NOTICIAS/itemid/157/SIMULACRO-IPSA-ANTE-UN-POSIBLE-BROTE-DE-LA-MARCHITEZ-POR-FUSARIUM>

³ InvaCost, a public database of the economic costs of biological invasions worldwide available at <https://www.nature.com/articles/s41597-020-00586-z>

A Call for phytosanitary technical resources related to Pest Outbreak Alert and Response Systems was made in 2020 and four technical resources were received for tracking the distribution of pests in response and were posted on the International Phytosanitary Portal (IPP).

1.3 Linkages with existing FAO initiatives on pests of concern

Experiences in dealing with Fall Armyworm (*Spodoptera frugiperda*) have been considered, including how coordination mechanisms and networks can be set at the national, sub-regional, regional and global levels to help ensure appropriate and efficient action is taken. An FAO-IPPC Fall Armyworm Technical Working Group on “Quarantine and Phytosanitary Measures” was established and is managed by the IPPC Secretariat. It forms part of an overall Fall Armyworm Global Action Plan. Guidelines for the prevention of Fall Armyworm were published and represents one of the components in the toolbox.

The IPPC Secretariat is also involved in an FAO project aiming to draft a strategy for the whole of Latin America to prevent *Fusarium oxysporum f. sp. cubense* Tropical Race 4 (TR4) from spreading. An IC Team was established in September 2021 to help respond quickly to this TR4 outbreak.

1.4 Activity of the CPM Focus Group on Pest Outbreak Alert and Response Systems in 2021

In July 2020, on behalf of the CPM, the CPM Bureau established a CPM Focus Group (FG) on Pest Outbreak Alert and Response Systems and requested the IPPC Secretariat to issue a call for experts. In December 2020, the CPM Bureau selected 16 experts⁴ including representatives from the CPM Bureau, SC, IC, experts from each FAO region (with the exception of the Near-East region as no nominations were submitted), and an expert from an RPPO. Experts also included representatives from the FAO, the Center for Agriculture and Biosciences International (CABI), the World Animal Health Organization (OIE), the International Atomic Energy Agency (IAEA), the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD) and the International Society for Plant Pathology (ISPP).

The FG met virtually each month from January to September 2021. In addition, 15 sub-meetings were held to complete the twelve tasks defined in its Terms of Reference. To ensure delivery, each of the 12 tasks defined in the Terms of References (ToRs), was led by an FG expert, supported by additional FG experts. Task teams met to discuss each topic extensively in correlation with other related tasks. Over 20 side meetings were also organized to advance work on these tasks.

Presentation sessions were also organized whereby managers of existing pest outbreak alert and response systems presented details of the operations of their systems. The following systems were presented: FAO Emergency Prevention System (EMPRES); European and Mediterranean Plant Protection Organization (EPPO) system; European Food Safety Authority (EFSA) system; European Union Notification System for Plant Health Outbreaks (EUROPHYT); French epidemiological platform; FAO use of the Epidemic Intelligence from Open Sources (EIOS) for Animal Health; Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) system; Centre for Agriculture and Biosciences International (CABI) system; Cropwatch; Pacific Community (SPC) system; Australian system; North America Plant Protection Organization (NAPPO) system, USA National Plant Diagnostic Network; World Organization for Animal Health (OIE) system EIOS; Pest Lens; Argentinian Network of Experts (SINAVIMO) and FAO Emergency Management Center for Animal Health and related tools. A study describing many of these prominent alert and response systems was drafted and will be published in the first quarter of 2022. In addition, the FG⁵ formulated detailed recommendations related to each task presented in this report.

⁴ Membership List Focus Group for Strengthening Pest Outbreak Alert and Response Systems
https://assets.ippc.int/static/media/files/publication/en/2021/02/Focus_Group_for_Strengthening_Pest_Outbreak_Alert_and_Response_Systems_Membership_List_2021-02-16.pdf

⁵ IPP Publications: <https://www.ippc.int/en/publications/>

All decisions were based on the experience of the experts, and knowledge and analysis of existing pest alert and response systems captured in the study described above. All meeting reports have been posted on the IPP.

In light of the work done so far by the FG, the considerations presented in this document are made for the development, implementation and maintenance of a Pest Outbreak Alert and Response System. A new name was sought to indicate the global nature of the system. However, the FG had varying ideas so this issue will need to be considered further with the help of a communications expert. It is acknowledged that the sector already has many acronyms and that a single word may better convey the message. In the meantime, this system will be abbreviated as “POARS” in this document.

The FG considers the POARS as a combination of people, organizations, information and tools, coordinated by the IPPC Secretariat. Thus the “system” is more than a software or computer system as is sometimes implied.

Analysis and careful considerations, coupled with consistent and progressive work allowed for the completion of all the tasks defined in the Terms of Reference of the FG POARS. A summary of the findings and recommendations were presented to the Strategic Planning Group in October 2021⁶. The SPG thanked the FG for the outstanding preliminary outcomes and report.

1.5 Structure of this report: Tasks and Recommendations

The following Twelve Tasks are addressed in this report:

1) *identify and review* existing material and experiences on the topic.

A separate study has been drafted in this regard. In order to establish a Global IPPC Pest Outbreak Alert and Response System, information on existing national, regional and global systems was assembled and analysed to determine their overall components, strengths and weaknesses. The study reviews the following systems: the World Organization for Animal Health (OIE) system EIOS; FAO use of the Epidemic Intelligence from Open Sources (EIOS) for Animal Health; the FAO Emergency Prevention System (EMPRES); the FAO Emergency Management Center for Animal Health; the European and Mediterranean Plant Protection Organization (EPPO) system; the European Food Safety Authority (EFSA) system; the European Union Notification System for Plant Health Outbreaks (EUROPHYT); Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) system; the North America Plant Protection Organization (NAPPO) system; the Pacific Community (SPC) system; the Centre for Agriculture and Biosciences International (CABI) system; Cropwatch Africa; the Australian system; the USA National Plant Diagnostic Network; PestLens; the French epidemiological platform; and the Argentinian Network of Experts (SINAVIMO). The analysis of these systems found that outbreak alert and response systems are valuable when they provide timely and actionable information, taking note of the fact that different audiences have different needs. Challenges identified related to weaknesses in surveillance systems at the national level, and the need for verification and management of data. However, the utilization of technologies to gather, analyse and share information and knowledge among different stakeholders provides promising opportunities. To work effectively, systems also need to be legally and financially supported.

2) *discuss and agree* on the components necessary for an efficient and effective programme to Strengthen Pest Outbreak Alert and Response Systems, considering the pre-requisite for an effective global alert system is an effective NPPO system, including timely detection and diagnosis of new pests.

3) *examine* the practicalities needed for such a system including legal frameworks and liability issues for the IPPC Secretariat and FAO for distributing pest alert information, and consider how legal risk can be managed. This task was carried out in conjunction with Task 8.

⁶ Tenth session of the Strategic Planning Group meeting, October 2021:
https://assets.ippc.int/static/media/files/publication/en/2021/12/FINAL_SPG_Oct_Report_2021-12-07.pdf

4) *review and clarify* the roles of the FAO, the IPPC Secretariat, RPPOs, NPPOs, and other prominent institutions that are, or have been, involved in coordinating or supporting pest response programs, and how these entities may be positioned to work in a coordinated fashion in the future.

5) *establish* broad criteria for a pest to be considered in the framework of the programme (considering the RPPOs' work in this regard).

6) *identify* efficient methods for early identification of outbreaks and communication of alerts to NPPOs.

7) *identify* and prioritise the systems and tools that may be most useful to RPPOs and NPPOs who might be involved in a pest outbreak and consider how to efficiently establish a toolbox as a resource for NPPOs.

8) *review* how Contracting Parties could meet their National Reporting Obligations (NROs) in a timely manner and recommend changes to contribute to Strengthen a Pest Outbreak Alert System. This task was carried out in conjunction with Task 3.

9) *recommend* processes NPPOs could use to rapidly engage expertise and response resources

10) *consider* what tools are needed for the Pest Outbreak Alert and Response system and propose a way to present them, and if needed, develop them.

11) *review* and refine the action plan to Strengthen Pest Outbreak Alert and Response Systems considering the focus group discussions and inputs from the CPM Bureau, the TC-RPPO, the SPG, the IC and the SC. This task was carried out in conjunction with Task 12.

12) *consider* and estimate the resources required to establish and then operate a pest outbreak and alert system with components as determined in 2) above.

In this report, the 12 tasks will be presented as Recommendations, essentially the forward-looking, building blocks necessary to establish a comprehensive, functional, effective and sustainable system. It will also be a system that retains a degree of flexibility and dynamism, able to expand, change and develop where necessary as evidence, feedback and learning continuously informs its implementation going forward.

2 Recommendations for Task 2: Components of a plant pest, alert, detection, response and notification system

2.1 Overview

Task 2, the activities that gave rise to this Recommendation, compiles and describes the components needed for a global pest alert, detection, notification and response system which can be used by NPPOs and RPPOs. The components necessary for such a system are identified and described to cover a pre-pest infestation period as well as a detection and post-pest infestation period.

See the IPP components pages to relate to where relevant: <https://www.ippc.int/fr/core-activities/capacity-development/phytosanitary-system/>.

A study on certain existing systems was prepared by the secretariat and reviewed by the FG members to assist in the process. The study report considered plant, animal and human health pest and/or disease alert and/or response systems. From the study, components for alert and response systems were already identified; they were divided into components for alert and components for response and copied into this document under Tables 1 and 2 (see Appendix 1).

Much can be learned from existing systems and the wheel does not need to be re-invented. Also, much can be learned from more unfamiliar scenarios from animal and human health perspectives. Components for a global or regional pest alert, detection, response and notification system may differ from those used at a country level since the range of actionable pests as well the quarantine status of pests will differ between or amongst countries. In the case of *Spodoptera frugiperda* (Fall armyworm), the pest does not qualify as a quarantine pest for the Americas where it is native, but it does for almost all other countries in the world. However, it may lose its status as a quarantine pest if it fully establishes in its new territory but may still be an important migratory or transboundary pest similar to locusts.

The components on a global scale will have to function within a system which will encourage member countries to notify the detection of new pests in such a way that the data generated from that, will form alert information for other countries to utilise. For member countries that identify pests as quarantine pests, the components outlined here will assist in preparing contingency plans against the introduction or after the introduction of such pests. Such a global system comprises two distinct parts: a) a system to generate the alert for emerging pests and b) a system to respond to such alerts and pest incursions or outbreaks in the national or regional territory.

2.1 Components

Components described in Task 1 – the Study on Pest Outbreak Alert and Response Systems - were evaluated and reorganized as follows: a) overarching components, b) pre-presence to detection and c) post-detection components. See Appendix 1 for examples of components of different systems from the study.

2.1.1 Overarching components or major baseline components

These components serve as pillar upon which the POARS must be able to function. See Figure 1.

2.1.2 Policy model

Any system must have a reason why it is developed. It may not be a component to directly lead to the functionality of the system but it is important to ensure a mandate. Such may be already in place with regard to the obligations of member countries in terms of the 1997 IPPC (New Revised Text) but may have to be mentioned specifically to provide context. This applies largely for Articles IV on General Provisions relating to the organizational arrangements for national plant protection and VIII on International cooperation. The policy document could be seen as an executive summary. In addition, it should describe how the system will function and be funded. An analogy to such a document could be the Plant Health Australia's Emergency Plant Pest Response Deed (EPPRD). Although the EPPRD is

a document utilized at a national country level, there may be relevant aspects which the POARS should adopt. Another example of such a document at country level is the South African Emergency Plant Pest Response Plan. These would include aspects regarding the mandate, confidentiality of information, management, role players and funding of the POARS.

2.1.3 Legal Framework

The legal framework should be part of the overarching components but differs from the policy model. At the level of the NPPOs, it allows swift enforcement of an alert and response system. Without a legal framework in place, no emergency action can be implemented. This means valuable critical time is lost and the probability of pest introduction (establishment) and spread is increased. The POARS can provide a link to different pieces of legislation from different NPPOs and RPPOs. It can also provide a link where NPPOs can post their legislation. Such a link can also refer to different International Standard for Phytosanitary Measures (ISPM) dealing with response such as ISPM 9 *Guidelines for Pest Eradication Programmes*. Such information will make it easier for NPPOs and RPPOs to conduct a review of their legal frameworks, ensuring they can undertake alert and response activities already linked to an obligation to conduct pest surveillance.

2.1.4 Financial Model

The extent of the financial model will depend on the overall scope of the interventions of POARS. The financial model can be seen as a component as it needs to describe ways in which all other components are funded. The entire system and its components depend on the funding. The funding model should describe ways and agreements on how to fund such a system in a sustainable manner over the long term. This should include development and maintenance costs in terms of the system itself. Funds should be secured at the national and regional levels for rapid interventions. There may also be additional costs which should be identified. Such funds could include, for example, support for research of specific pests which would assist countries develop surveillance and response strategies, travel costs of specialists and technical cooperation projects.

The financial model should be transparent and describe the mechanisms in place to obtain funding and the donors or sponsors who provide funding. Recommendation for Task 12 “consider and estimate the resources required to establish and then operate a pest outbreak and alert system with components” relates to this.

2.1.5 Data management and Communication

A data management and communication strategy should be developed under the IPPC POARS as IPP could serve as the basis for the POARS. The scope, specifications and users’ requirement of POARS need to be defined in order to provide programmers sufficient information to develop the IT system. The details addressed under Task 6 “identify efficient methods for early identification of outbreaks and communication of alerts to NPPOs” relates to this.

The POARS may include:

- *Characteristics of the computer system itself.* This should be an electronic web-based system (hardware and software) which is used to run the different components. This will depend on the scope of the system. Existing servers could be used or additional servers or cloud server capacity may need to be acquired. Such a system may create a lot of data and several cloud servers may have to be used. An example is Crop Watch Africa (CWA) which uses cloud-based servers to capture, manage and backup data.
- *Communication attributes.* The system should be as easy as possible to use by end users, in particular, the reporting aspect of the system. An end user in a developing country must be able to put an alert on the system when a quarantine pest is detected. This can be done through a mobile or tablet application; however, since there are many such applications already in existence, the global system may have to be able to communicate to a number of apps. The Biosecurity Africa pest reporting app system, a customized pest reporting application of CWA

is simplified in such a manner to alert an NPPO operative about a new observation or suspicion of a new pest from the field. This can be verified or investigated later by the NPPO. Likewise, in a global system, the NPPO should be able to communicate the information to the system after verification.

In addition to the collection of official information from NPPOs, the collection of non-official communication could be added to detect early, at global scale, an epidemic situation change on particular crops not communicated by NPPOs. There are also various types of software to monitor online information and media searches such as the IT platform used by EFSA. Such approaches could be utilized at a country level as well.

This component should also cater for capturing non-official, non-verified information regarding pests. This can intensify possible alerts through non-official communication collected by web-scraping (epidemic intelligence) for epidemic change.

2.1.6 Oversight of the POARS

At the global level, a governing mechanism would be set to establish the system and maintain it. The governing mechanism should also be able to ensure technical cooperation from scientists, experts or international organizations such as the FAO or IAEA. This suggestion speaks to recommendations provided for Task 4 - “review and clarify the roles of the FAO, the IPPC Secretariat, RPPOs, NPPOs, and other prominent institutions that are, or have been, involved in coordinating or supporting pest response programs, and how these entities may be positioned to work in a coordinated fashion in the future”.

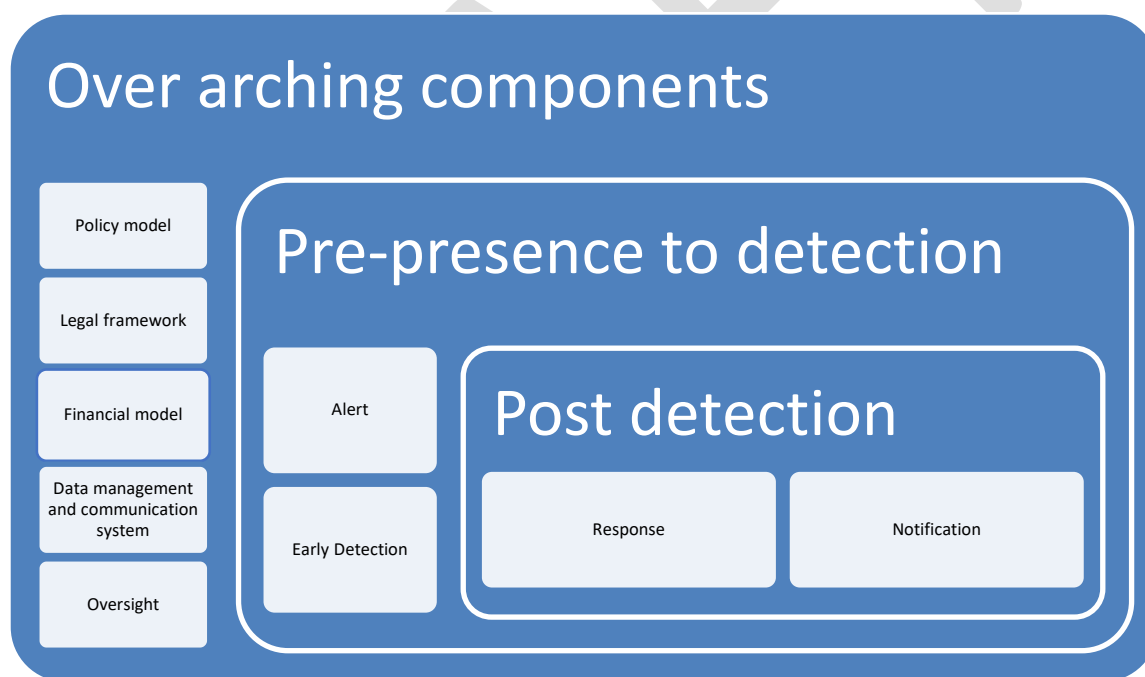


Figure 1. Basic components of an alert and response system

2.2 Pre- Presence to Detection

NPPOs should be able to follow and track the movement of quarantine pests at the global level. Within the global alert system, such components can be built in to assist countries to prepare for early detection of a new pest and potential invasion. See Figures 2, 3 and 4.

2.2.1 Alert

An alert system component which operates on a global scale must be able to ensure that the most prevalent pests are identified, prioritized in some way and communicated without time laps. Horizon scanning, pest prioritization and forecasting are described below.

i. Horizon scanning

Horizon scanning tools such as the Medisys platform is useful to detect pests which are increasing their distribution or extending their host range. Information obtained by horizon scanning exercises available worldwide can serve as a starting point. National surveillance activities will also be a source of information for the alerts. Transparency from NPPOs about pest findings will be crucial for the success of the POARS. The criteria set in Task 5 "establish broad criteria for a pest to be considered in the framework of the programme" are to be used to decide when such pests are not only of a country/regional concern but of a global concern.

Criteria and a prioritization tool to list pests considered as an emerging threat are important to ensure a proper pest risk analysis can be developed. Assessment of emerging pests of concern and ranking should follow a simplified method that could be analogue to a Pest Risk Analysis (PRA). The assessment should be based on pest criteria such as biology, host range, dispersal capacity and adaptability, and economic and environmental impact (see the recommendations from Task 5). A decision tree may be used to systematically assess if the pest can be characterized as an emerging pest and for ranking the pest based on risk (i.e., probability of occurrence times consequences). While several pest assessment and ranking systems exist around the world, they should be based on the best science and expert judgement available. Existing mechanisms that assist countries in performing pest risk assessments of the identified emerging pests include the CABI Horizon Scanning and Pest Risk Analysis Tool.

ii. Forecasting and modelling

Forecasting and modelling components may have to be part of the system. Modelling climatic modelling systems such as CLIMEX may be very complex and/or expensive and would serve as a system in their own right. A simplified way to determine which pests to issue an alert for, need to be developed and incorporated within the global alert system. Other aspects which could/should be considered include global trading trends such as interception records of host commodities or new detection records in new areas. Specific pest or modelling experts could contribute to the sharing of forecasting information.

iii. Communication and partnering

Alerts must be of such a nature to be easily communicated. Ample pest information should be available and in an easily accessible format as part of the system, or hyperlinked to other sources such as CABI's invasive species compendium, EFSA, EPPO Global Database, etc. The communication component should also be able to develop a mapping mechanism so that pest movements are tracked by member countries. Pest Tracker (CAPS) and CWA already use systems like this to map the spread of a pest based on pest reports in a more real time manner. From the information available from reports, heat maps can also be developed (as is used for CWA). The heat maps show the significance (number of detections over time in each detection site) of a pest species in an area and could determine the direction of spread. It may also highlight areas where eradication may be possible, leading to pest free areas or areas of low pest prevalence.

Alerts can be sent as automatic emails, SMS or interactive messaging (such as Whatsapp) to the NPPOs. However, these messages may have to be limited to the highest priority pests to avoid a flood of information which may deter countries from participating.

There is the need to establish a global communication network of existing communication systems with the FAO Desert Locust Information Service, NAPPO Phytosanitary Alert System, EPPO Reporting Service, EPPO, EFSA, EMPRES for Transboundary Animal and Plant Pests and Diseases, GERDA and similar systems.

The communication component can also serve as a mechanism to develop links between scientists, experts, donors, industry groups and international organizations in a particular field.

Technical awareness or alert material and information of specific pests such as factsheets or datasheets may also be available such as those from EFSA and EPPO. NPPOs can also be encouraged to provide or share available information. However, standard templates may have to be developed for ease of capturing and communication and to ensure information is received and harmonized.

iv. Preparedness information

Alert pest information can be developed for the POARS which would improve countries' preparedness for pests qualifying as quarantine pests. Preparedness material may be linked back to pest information, detecting and responding to a pest. It could also provide links to possible training opportunities for NPPOs on certain pests. Each member country will have to develop their own guidelines or action plans on how to detect and respond to such pests within their own local/national legal mandate. Importantly, pest reporting information should be able to be shared through a global, regional and national pest information/communication system. Systems which incorporate monitoring and communication include EMPRES, CABI, OIRSA, COSAVE, EPPO, CAPS and CWA, among others.

v. Regulatory response actions to alerts

Pest information can assist member countries with the development of emergency actions if such pests qualify as quarantine pests within the phytosanitary legislation of each country. Emergency actions may be in line with pest detections or interceptions during imports or as a result of a pest incursion detected by a national or regional quarantine pest surveillance network. Some countries already implement emergency actions once a pest is identified as an imminent threat to enter a country. In some situations, amendments to the legislation of import requirements have to be conducted with short notice or immediate effect. Some examples are the brown marmorated stinkbug (*Halyomorpha halys*), *Spodoptera frugiperda*, *Xylella fastidiosa* and Tomato Brown Rugose Fruit Virus.

vi. Capacity development

Capacity development may include assistance in performing risk assessments/prioritisation, training on diagnostic protocols for pest identification, pest survey techniques, traps, lures and other equipment needed for surveillance aimed at early detection. It should also include simulations or emergency response drills on trap deployment for delimitation and characterization of a pest incursion as done by OIRSA.

To ensure detection surveys are rolled out properly, training courses should be made available for pest alerts. This can be implemented via a platform where member countries can network expertise for training. Detection or exclusion surveys carried out properly would also enable countries to provide reliable information to trading partners on the status of such pests in their respective territories. This, irrespective of the status (present or absent) in relation to ISPM 8 *Determination of pest status in an area*, can be reported on the POARS. It would essentially mean completing a notification loop of communication: namely from member countries to the alert system, back to member countries and (based on new country surveillance) back to the alert system. Thus, the POARS system could provide a platform for countries to report the result of their pest surveys on a more continuous basis. This can serve as an alert to other countries.

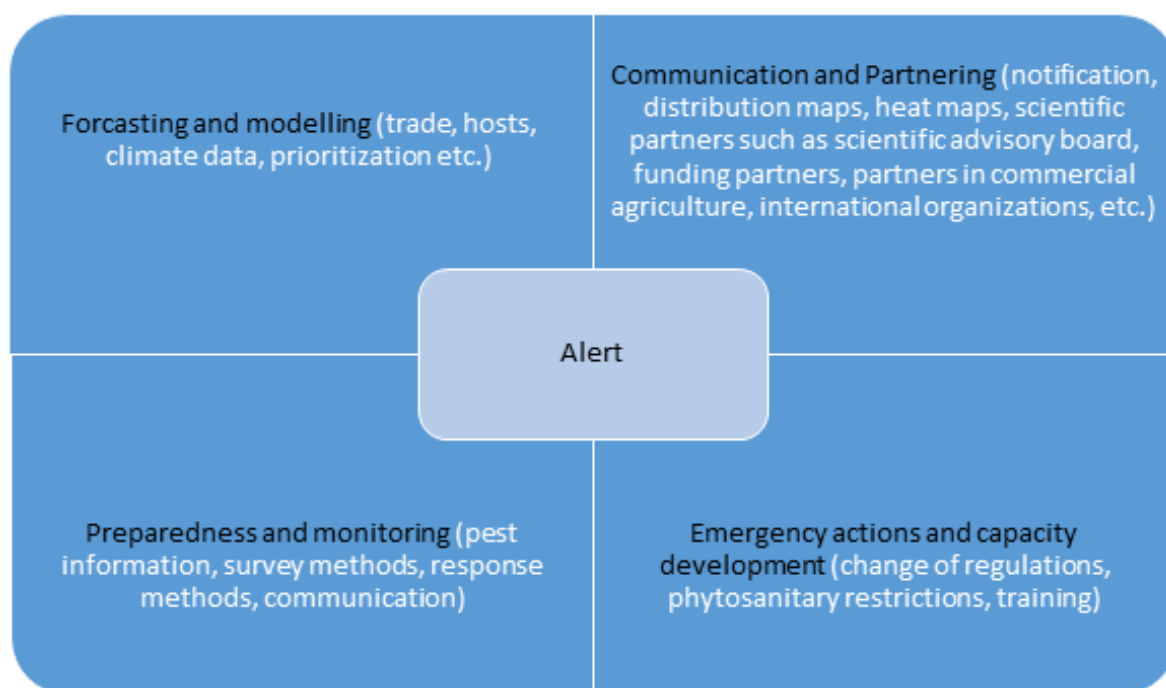


Figure 2: Components to alert and prepare NPPOs & RPPOs of emerging quarantine pests

2.2.2 Early Detection

i. Detection surveys

Standardized procedures or protocols for detection surveys can be made available to member countries on the POARS. It could provide links to relevant ISPM such as ISPM 6 *Surveillance* and to pest specific protocols such as the Appendix on Fruit Fly Trapping of ISPM 26 *Establishment of pest free areas for fruit flies* (Tephritidae). Links to ISPMs dealing with sampling (ISPM 31 *Methodologies for sampling of consignments*) and testing (ISPM 27 *Diagnostic protocols for regulated pests*) can be made available. In addition, other specific diagnostic protocols can also be accessed through communication with the Scientific Advisory Board (SAB) or other diagnostic networks, or commodity industry bodies such as the international seed federation and International Seed Testing Association (ISTA). The IPP Component page on Surveillance is also useful.

Whenever a member country receives an alert of a new emerging pest from the alert system, it may be critical to conduct the detection survey based on proximity to the last known outbreak or based on historical trade with host commodities from infested countries. All countries may not be able to fund such surveys and may have to look for funding elsewhere. A simple cost/benefit model such as the FAO/IAEA Cost-Benefit Analysis Model: A tool for fruit fly area-wide management (2007), could assist countries in their decision-making process. In addition, some pests which would be on the global alert list could generate different levels of international assistance, for example through the FAO and IAEA technical cooperation projects. Through the FAO initiative, Global Action for Fall Armyworm Control, many countries in Africa have been assisted to detect the pest and to monitor the prevalence of the pest. Assistance was provided through the provision of survey protocols, traps lures, training and pest reporting applications.

ii. Awareness and public education

Pest awareness is crucial to ensure proper alert systems can be implemented by member countries. Awareness must cut across pre detection, early detection, post detection and response. Basic pest awareness documentation could be made available on the POARS for member countries to implement immediately after an alert is placed on the system.

Awareness material through the alert system will be electronic and may also be used through social media as was done for the International Year of Plant Health 2020. An informed educated public is on its own, an early warning system.

Professional training, public information and education programmes are necessary to overcome professional and public resistance to pest surveillance and eradication interventions. They also educate the general public at large; by assisting reporting pest incursions, the public becomes a resource for early detection. This would also help reduce the risk of the unintentional release of pests. For example, the US inter-governmental Educational Programme “Don’t Pack a Pest” and the EPPO campaign “Don’t Risk it” are interesting resources.

Educational packages can be developed by countries and made available on the POARS to be included in educational systems from primary to tertiary level.

iii. Commodity inspections

Commodity inspections are a function and decision of the member country. Information shared through the POARS on sampling and diagnostic would also assist in this regard.

iv. Local reporting or notification systems

Reporting and notification are the prerogative of the countries. Information shared on the alert system such as sampling (ISPM 31), diagnostics (ISPM 27), procedures, pest information, awareness and documentation will assist countries to quickly ensure communities, researchers, producers or the general public can detect and report. A reporting application such as the Biosecurity Africa App through CWA, can help when a pest report or suspicious pest sighting is reported through the app to the NPPO directly. Within the framework of the IPPC NROs, the development of local reporting systems is important and should be encouraged within the alert system. This will encourage member countries to report on the global system. Figure 3 details components involved in the early detection of quarantine pests.

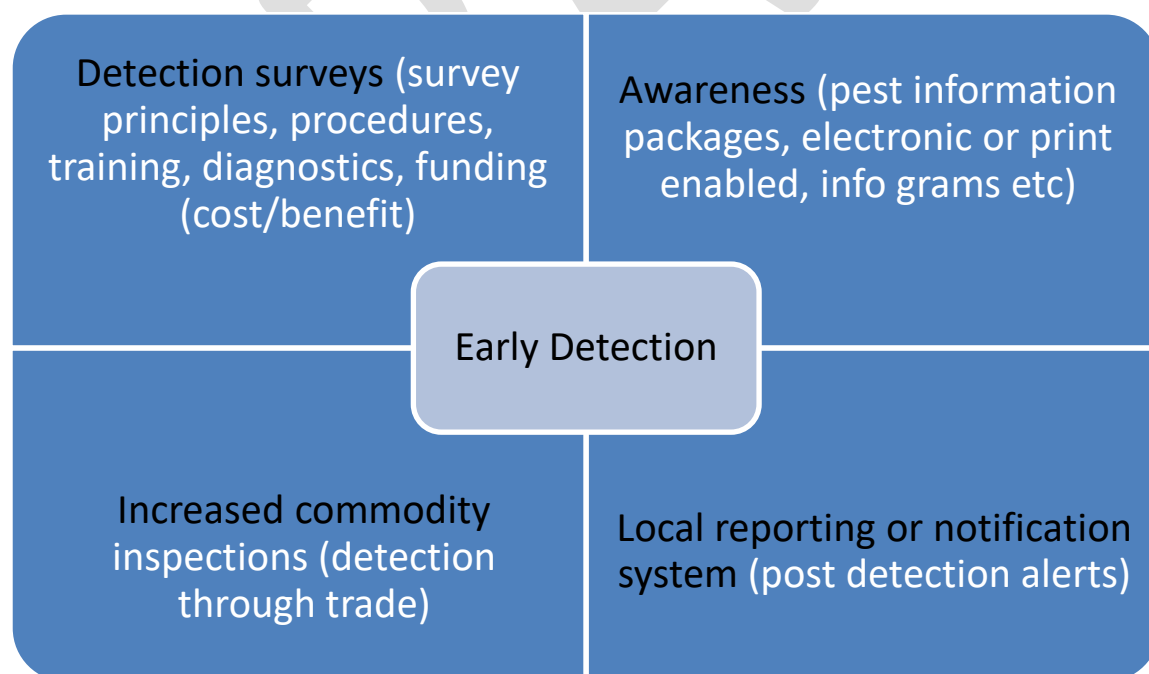


Figure 3: Components involved in the early detection of quarantine pests

2.3 Post detection

Post detection comprises of components dealing with response, pest entry notification and research as indicated in figure 4.

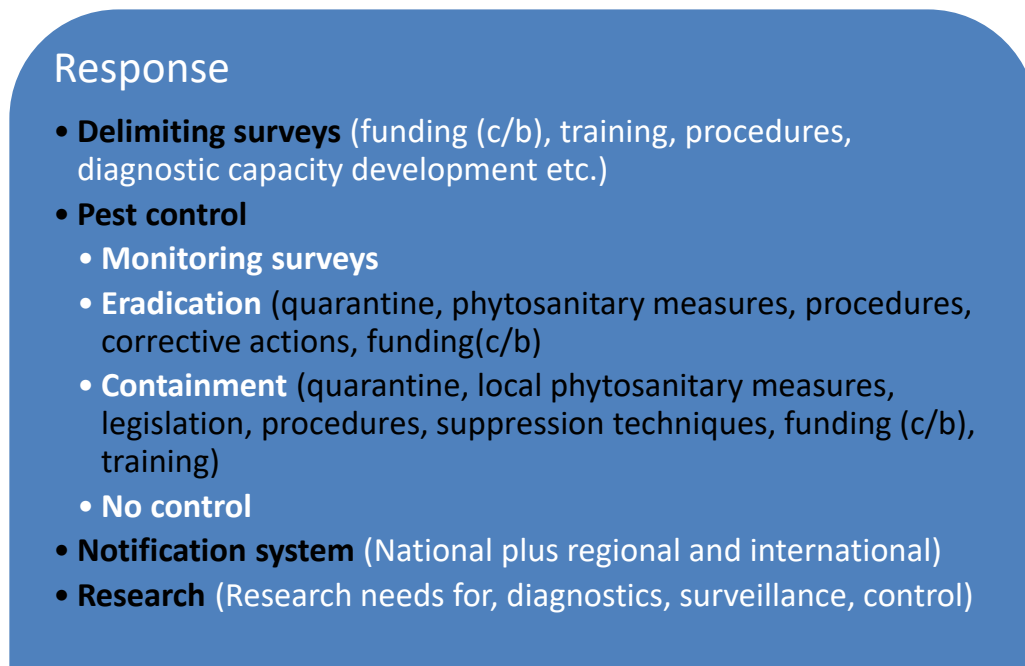


Figure 4: Post detection, response and notification

2.3.1 Response

An official response is required after an emerging pest prioritised on the POARS has been detected for the first time in the territory of a member country and is categorized as a quarantine pest. The POARS can provide basic mechanisms and information on phytosanitary procedures available through links in relevant general ISPM. These include ISPM 6, 8, 9, 17; ISPMs 26 *Establishment of pest free areas for fruit flies* (Tephritidae); ISPM 35 *Systems approach for pest risk management of fruit flies* (Tephritidae); and 37 *Determination of host status of fruit-to-fruit flies* (Tephritidae) if dealing with fruit fly pests as well as international guidelines including the Guide for Establishing and maintaining Pest Free Areas. The communication component of the POARS should be able to ensure response to outbreaks on a global scale by providing technical assistance and experts who can travel to affected areas. The response through the system can therefore be on a national, regional and global scales.

i. Delimiting surveys

Delimiting surveys are necessary to determine the extent of an outbreak. Such surveys will be specific for the type of pest under investigation. The POARS, through the communication component of the system, can provide technical data to conduct surveys for specific pests such as survey protocols, trap lures or guidance on how to sample and test for a pest. Relevant sources of general information on delimiting survey include international guidelines such as the *Guide for Establishing and Maintaining Pest Free Areas* (IPPC, 2019). How member countries conduct their delimiting surveys may be within their own prerogative. However, if the system allows for a way to ensure a mapping tool through the downloading of confirmed positive detection sites it will ensure closer to real time distribution records and proper mapped demarcated areas. This could be very useful when the relevant regulatory authority is ready to implement. Training and capacity development for member countries may follow depending on the funding arrangements. The extent of delimiting or continuation of the survey may also depend on available funding and the outcome of a cost-benefit analysis.

ii. Diagnostic capacity

The POARS should also link with diagnostic protocols used and diagnostic laboratories capable of carrying out the identification of pests. A network of accredited reference laboratories can therefore be developed for emerging pests.

iii. Decision on pest control

Depending on a cost-benefit analysis that takes into account technical aspects such as the biology and ecology of the pest and economic aspects such as damage levels and trade restrictions, the affected NPPO may decide to contain, eradicate or suppress the pest. Support for such a decision may be provided through the communication component of the POARS. More information can also be obtained from ISPM 9 *Guidelines for pest eradication programmes*.

a. Containment

After a delimiting survey demarcated areas where the pest was detected, the NPPO may have to implement phytosanitary measures to contain the pest in the area and regulate removal of host commodities through, within and out of the contained area. These activities will depend on the profile of the pest but the POARS may provide technical information regarding the type of measures the NPPO can implement to contain the pest successfully. It will depend on available funding of the affected NPPO and funding provided through the alert and response system for technical support. The affected area may also be placed in quarantine in terms of the phytosanitary legislation available in the affected country. Such a long-term pest management strategy should aim to suppress the pest in the affected but contained area.

b. Eradication

The affected NPPO may decide it is feasible to eradicate the pest outbreak. Corrective measures may have to be implemented to regain pest free area status following the phytosanitary legislation of the country if the pest presence may influence the NPPO's ability to trade. Some pests, if detected early, would be fairly easy to eradicate, while for others it may be more difficult as the conditions may differ as per their reproduction rate, available host material, climatic conditions and other factors. The IPP component page on eradication is a useful reference.

c. Ongoing monitoring and detection surveys

Regardless of the outcome of the control actions, the NPPO must continue implementing monitoring and detection surveys to ensure the pest has not breached the contained area or has not re-infested the eradicated area.

d. Deregulation or no official control

The NPPO may decide that the pest is already well established throughout its territory, or that regulatory control is not feasible, essentially acknowledging that it can no longer be regulated as per the definitions of regulated pests. In such cases, control will be carried out by producers themselves or through pest control organizations. The NPPO may have to decide to continue with monitoring to ensure that pest numbers do not get out of control.

2.3.2 Notification system

Although the communication component of such an alert system is described, there is also an obligation on an NPPO to officially report new pests. The system will provide the necessary tools to ease the reporting process for pests already categorized as emerging pests through the POARS. Regular new reports can also feed into the system which may provide an early alert if emerging pests are on the increase and may spread to more countries.

Communication of the results of delimiting surveys would be shared at a global level.

2.3.3 Research priorities

Limited technical information could be available for some pests and new research needs would be identified. The distribution of pests to new areas may also trigger new research needs such as better understanding of the biology and ecology of the pest. This should be a component of the POARS to coordinate and fund research needs through available donors. It could also contribute to streamlining research efforts. The research could focus on the establishment of priorities for novel technologies to enhance diagnostic capabilities, tools for early detection and for sustainable and environmentally friendly pest exclusion, containment, suppression and eradication such as the sterile insect technique and postharvest treatments.

DRAFT

3 Recommendations for Tasks 3 and 8: the practicalities, legal frameworks & NROs associated with an effective POARS

3.1 Overview

Task 3, as per the POARS Terms of Reference, is to: “examine the practicalities needed for such a system including legal frameworks and liability issues for the IPPC Secretariat and FAO for distributing pest alert information and consider how legal risk can be managed.”

Task 3 is related to Task 8, defined as “review how Contracting Parties could meet their National Reporting Obligations (NROs) in a timely manner and recommend changes to contribute to Strengthen a Pest Outbreak Alert System”.

In tackling these tasks and developing recommendations, the FG highlighted the risks inherent in distributing information on a pest distribution not reported directly by an NPPO. However, there are also advantages, especially for neighbouring countries and trading partners, to share publicly relevant information on pest occurrence. Therefore, the IPPC Secretariat and FAO will need to consider and manage those risks.

3.2 Distribution of information

Criteria will need to be determined on whether pest information can be shared or not, with the source of the information being a very important consideration. If the information is being reported directly by the affected country via NROs, then there are no concerns regarding the distribution of the information. However, the credibility of information provided by other sources will need to be assessed (peer-reviewed scientific paper, local newspaper, community science online reports, etc.). Whenever possible, the information should be validated by the NPPO before being shared. For example, the Epidemic Intelligence from Open Source (EIOS) information could be used to approach the country and request an official pest report, as is done by OIE. OIE also shares public information found through the EIOS with its restricted network.

It would also be important for the POARS to have a disclaimer (reviewed by Legal Services) stating that the FAO takes no responsibility for the validity of the information shared via this system. That being said, countries could still complain if data/information is publicly posted on the POARS and they are not in agreement with the fact that it is made easily accessible to other countries.

Decisions will also need to be made on the management of pest reports, as some countries may want some reports to be suppressed from the POARS. As reports made by NPPOs belong to that country, they can decide to remove it. However, it is recommended that the information be hidden or archived instead of deleted. Each contracting party could hide some information related to their country with sufficient reason.

Establishing criteria to decide if a piece of information will be shared via the POARS requires a fair bit of work. The POARS Focus Group recommends that the IC NROs sub-group of experts be established to determine how decisions will be made on whether a specific pest report should be shared. Pest reports could be classified in various levels, such as (1) from the NPPO, (2) from a scientific publication, (3) from the general public, etc. Naturally, some data sources are very difficult to confirm. Criteria that will be defined will need to be adopted by CPM when further work is conducted on this topic.

3.3 Challenges and proposed solutions in meeting NRO

In relations to Task 8, the FG POARS began by identifying challenges through a survey from the IPPC NROs [programme](#) endorsed by [CPM 10 \(2015\)](#). This is because IPPC Contracting Parties (CP)/NPPOs can experience varying challenges when it comes to meeting their NROs. Solutions to overcome challenges identified by the survey and by the FG POARS are being proposed as a way to strengthen the POARS.

The order in which the challenges are presented do not reflect their level of importance or priority.

Challenge: A poor understanding of national roles and responsibilities

Proposed Solution: This challenge could be addressed by improving capacity development and delivering presentations on the IPPC and NROs of contracting parties as needed. NROs could also be a standing point on the agendas of IPPC Regional Workshops or relevant meetings. The development of a visual document, such as an infographic, could be considered as it serves as an appropriate tool to explain the role of senior managers in the international area. Case studies outlining the benefits of reporting could also be developed and attached to a briefing document for senior management. The package could also be used to educate individuals and groups directly responsible for reporting on their obligations. This also addresses information bottlenecks at the middle management level.

Challenge: Decision-makers do not prioritize staff and financial resources to meet NROs and participate in the activity

Proposed Solution: Reporting information related to pest outbreaks through the IPP should be very easy to provide so that IPPC contracting parties do not need to spend a lot of time to meet their NROs. Each NPPO contact point nominates one IPP editor. NPPOs should devote time to train that editor on NROs and their importance. Training should be very easy with access to the support from the POARS. Plant Health Australia is an example of an inspiring model which then helps with resources and keeps governments more committed.

Challenge: Lack of political will

Proposed Solution: This challenge is linked to trade. It is possible that some countries are managing the pest outbreak themselves and prefer not to report internationally. NPPOs need an incentive to report, such as access to an emergency fund when dealing with a new pest outbreak. Recommendations for Task 4 speak to the possibility of the IPPC Secretariat and other donors providing funds. Also, the development of Public-Private Partnerships with producer organizations boosts political will as the “burden” is not entirely on the NPPO but rather a shared responsibility approach is followed.

Lack of availability of the information related to the pest itself and to the new outbreak makes senior management reluctant to report. The timeliness of reporting is also a function of internal processes. The filtration of the data has to move from the identifying laboratory and delimiting surveys, to the top of the NPPO before any report is generated. This can create significant delays. Therefore, NPPOs should promote the value of their plant protection programmes. As the likelihood of success in response actions to a newly detected outbreak is often linked to how early the detection has been made, the value of early and timely reporting and responses should also be promoted.

At times, the lack of a contingency plan binding the senior management makes meeting NROs more challenging. In South Africa, for example, pest response is able to follow an approved plan when a plan is in place, as contingency plans need to be brought to the senior management. Should a pest outbreak be detected, capacity development should include providing support for the development of a contingency plan. Contingency plans may vary in terms of terminology used in different areas and in their purpose. They can be referred to as preparedness plans, action plans or pest strategies. They can be separate documents or have separate headings in a specific document.

Any detection of pest not made directly by the NPPO such as research related detections, must be reported to the NPPO and the basis for this needs to be in the legislation. This type of report and associated data need to be verified before it is reported internationally.

Ultimately, if NPPOs are not honouring their reporting obligations, their status as contracting parties on the IPP status can be jeopardized and eventually lost. Such cases could also be presented to the

sanitary and phytosanitary measures as set out in the World Trade Organization as a non-compliance of the NROs with corresponding consequences.

Challenge: Countries provide information to trading partners on request as required by the IPPC but do not make bilateral information available globally because of trade concerns

Proposed Solution: In bilateral agreements and to reinforce the NROs, countries could ask that information related to new pest outbreaks is also be reported to the IPPC Secretariat.

Information is often only available when papers are published. As highlighted above, research related detections must be reported to the NPPO and the basis for this needs to be in the legislation. These types of reports, generated through scientific publications and associated data, need to be verified before they are shared internationally.

Challenge: Instability of human resources and organization

Proposed Solution: Donors should support the implementation of the Phytosanitary Capacity Evaluation (PCE) to strengthen the whole national phytosanitary system. The pest *Fusarium oxysporum* f.sp. *cubense* Tropical Race 4 presence in a conflict area in Mozambique threatens the whole African continent. UN Peace missions could have a role in Phytosanitary issues (to be linked with Task 4).

Challenge: Poor national organizational arrangements result in limited cooperation and coordination between national stakeholders

Proposed Solution: The PCE will bring people together to address this issue. Training may follow, with coordination and communication key to realizing successful outcomes. It is easier to report the expansion of a pest than to generate a new pest report. Therefore, processes should be in place for both of those situations to facilitate reporting in a timely manner.

As reporting is linked to results obtained during surveillance activities, for NPPOs with high numbers of monitoring points (such as borders, airports and ports), surveillance data consolidation could be a problem. The volume of trade, both within a country and between countries in a specific region of a NPPO, can also impact the volume of data to consolidate for reporting.

Challenge: Capacity development not undertaken or technical assistance not provided when needed

Proposed Solution: To be able to comply with their NROs, countries need to have minimum infrastructure (laboratories and equipment) and resources (expertise, materials, financial resources) available. This is a major constraint in some developing countries and the POARS could provide support in these situations. RPPOs should also play a more active role in capacity building and in assisting with identification and diagnostics.

Challenge: Poor or aggressive response from trading partners

Proposed Solution: This challenge is related to trade. A solution could be for the importing country to respond differently when they are informed of a new pest report. Importing countries should not immediately prohibit trade on all related commodities. For example, Canada is a large country and it is not necessarily justified to restrict trade of some commodities if the pest is present only in a small area. There is a need to recognize regulated areas and pest free areas. This links to the general dispute avoidance activity of the IPPC Secretariat. Countries also need to be careful when using data collated in databases. At times, websites report pests as present in the country but do not mention in which part of the country. Trading partners should not assume that the entire country is considered infested without verification.

The IPPC Secretariat should promote negotiations and dialogue between importing and exporting countries.

Challenge: Poor timeliness of response

Proposed Solution: It can take time for countries to follow up on new pest outbreaks and gather enough information to make a report. There are delays in all countries between the detection and the official report. There is a need for guidelines on when to report as NPPOs are often unclear if they wait for delimitation before reporting. Countries also need guidance on what to report as some countries may not see a particular outbreak as important to report. Changes in national legislation can assist NPPOs to receive new pest outbreaks or detections from sources such as universities, research organizations and/or producers at farm level. For instance, mandatory reporting of plant pests by stakeholders and the public as part of national legislation helps the NPPO to receive more information about pest presence and spread in their country. In those cases, a follow-up activity by the NPPO is often necessary to gather more precise information on location of the find(s) and confirm the report. This could cause delays and thus impact the timeliness of the response by the NPPO to other countries.

Challenge: Poor accuracy and verification of information

Proposed Solution: Accuracy of information has to be linked to diagnostic capacity. A network of accredited diagnostic laboratories by the NPPO would help to assist those NPPOs that do not have the capacity for identification. Some pests are difficult to identify accurately and require an expert in the specific field. Such pests may only be identified with extensive sequencing as they may be genetically very close to other pests, the latter which may not be actionable. An example is the Polyphagous Shothole borer or *Euwallacea fornicatus* which is part of a complex of species and needs sequencing to be able to distinguish between *Euwallacea perbrevis*, *Euwallacea fornicator* and *Euwallacea kuroshio*. When a new pest outbreak is detected, countries could immediately submit a report. If the identification was not initially accurate, the data could be subsequently revised. However, the liability of the NPPO related to those reports is an important consideration. Countries are usually reluctant to release a false report, preferring to wait for an official identification. For some countries with little lab diagnostic capacity, this can mean long delays. For example, regarding the Fall Armyworm in South Africa, while seven species were reported in the trap, only 20% were *Spodoptera frugiperda*. Countries often report on trap count rather than the identity of pests. As a follow-up, a questionnaire could be sent to some countries to understand their needs in regards to capacity development and technical assistance on this issue.

Challenge: Incomplete or outdated regulated pest lists

Countries may not adopt pest lists for which they feel they cannot survey or conduct proper diagnostic. Countries may not adopt extended pest lists because they fear possible trade implications if/when something is discovered and they are compelled to act. On the other hand, there are pests that are not regulated for a particular country but which may be important for another country.

It is therefore also important to invest in national collections of pests and gene banks, and the curatorship of them. Collections need constant funding as they are often kept and curated by non-for-profit organizations. Traditionally, collections were indexed by hand and not all countries have their collections on a database or published. As a result, some NPPOs may not be aware of which pests are occurring in their countries. The depletion of human capacity in the taxonomic field is also a concern to many countries. International donors may play a vital role in maintaining collections on a global scale. An NPPO would not know if a new pest is detected if one cannot compare it with collection data or published information.

Another important issue is that pest lists can be old and incomplete due to legislation not being up-to-date. Some lists are approved with legislation that are difficult to change, e.g., laws that have to be approved by parliament.

Challenge: In some instances, NPPOs may feel that it is more beneficial for them not to report new detections

In developing countries, food security is a much bigger concern than trade and the disincentives to report are even greater in these regions. Anything that might result in food scarcity, price increase, or disruption in informal trading systems will disincentivize reporting.

What is to gain by reporting? NPPOs are aware that the speed at which information travels in contemporary societies, means concealing information is not a viable option. Information will soon become available to the trading partner although the exact impact on trade will still depend on bilateral negotiations. In this case, the NPPO may be reluctant to officially report information already available publicly because the NROs could be seen as additional work. In those cases, where the pest report is publicly available, if the trading partners do not put in place new import requirements related to the new pest, then the exporting country may be under the impression that the official pest report is not needed. The data provided on the POARS should be the NPPO's preferred source of information in negotiations. For example, if a pest is reported in a country and the NPPO does not verify the report in a timely manner, other countries can use the information as a basis for trade request. On the other hand, if the NPPO confirms that the pest has not occurred or has been eradicated, the IPPC Secretariat should confirm that the importing country should not take restrictive measures. In addition, NPPOs reporting pest finds could be given more financial and technical support to promote prevention and control research to further encourage reporting. This may be only attractive to some developing countries.

Other questions to consider are: Will pest reporting help manage food production and economic challenges within the reporting country? Will pest reporting help administrators prepare for accidental introduction and invasion? There must be risk-based reasons for countries to want to report. In addition, understanding the implications of reporting on the existing trade that the country has with the trading countries (to whom the identified pests pose greater risk) is another concern that must be addressed.

In conclusion, the POARS is intrinsically dependent on pest reports from contracting parties. For the past several years, the IPPC Secretariat's work has been aligned to an NROs work plan under the guidance of the IC and IC Team on NROs. To incentivize these pest reports, the POARS FG exchanged with the IC Team on NROs and proposed the following:

- Providing capacity development on pest reports (e.g., during IPPC Regional Workshops), including at management level.
- Providing case studies of concrete benefits from reporting is also useful.
- Providing an incentive to report, such as access to an emergency fund when dealing with a new pest outbreak.
- Building a list of Contracting Parties that have demonstrated excellent NROs records as this will help build trust.
- Privately confronting Contracting Parties with information from other sources, such as Epidemic Intelligence from Open Sources (EIOS) and encourage CPs. My colleagues reported they really appreciated your kind opening words to officially report on these pests.
- Circulate information by email distribution lists in a timely manner to all RPPOs, NPPOs and all interested stakeholders who have signed up for these notifications.
- Make information available via notifications on online mobile platforms. Notifications and alerts must be triaged to avoid overload of information being received

4 Recommendations for Task 4: Clarifying roles at Global, Regional and National levels for Strengthening Pest Outbreak Alert and Response Systems

4.1 Overview

The overall objective of the POARS is to set up well-functioning pest outbreak alert and response systems which would initially be tested for a few pests of global concern (no more than four) in countries or regions where these pests qualify as quarantine pests or have the potential to qualify as quarantine pests. The system will facilitate the interconnection and activities of international, regional, and national governmental organizations and stakeholders and will support activities against emerging pest problems at global, regional and national levels. Member States should be proactive in protecting plant resources by proactively preventing and quickly responding to threats of pests capable of inflicting devastating effect on food production, security, trade and the environment.

To setup and implement POARS, the umbrella programme will coordinate activities and cooperate at the global level with relevant international organizations. The IPPC Secretariat would not be involved in field activities but will act as a convening body dedicated to networking.

The governance of the umbrella programme shall be established by defining the roles and responsibilities of all participating government organizations and stakeholders.

Considerations regarding relations with other bodies and stakeholders

1. The POARS must build synergies and avoid duplication with activities conducted by other organizations. The system must facilitate the interconnection and activities of international, regional, national organizations and other stakeholders, and will support activities against emerging pests. The system must be closely interconnected at all levels through clear communication channels. The FG considers the establishment of a global system framework (as described in Figure 5) imperative. The framework presents the participating organizations and stakeholders, and shows the interconnections. The proposed POARS Committee (or the pilot POARS Steering Group) would provide direction and oversight to the POARS.
2. The importance of RPPOs in assisting NPPOs and coordinating outbreak responses across their regions is emphasized below. As highlighted during the Strategic Planning Group (SPG) held in October 2021, RPPOs are all different in their settings and capacities. Their engagement in the POARS will therefore need to be flexible and is dependent on their will and characteristics. Their role would be determined on a case-by-case basis and could go from simple sharing of information to participation in response activities. NPPOs remain closer to the outbreak and response circumstances and the POARS would provide them with strategic and technical advice and capacity development.

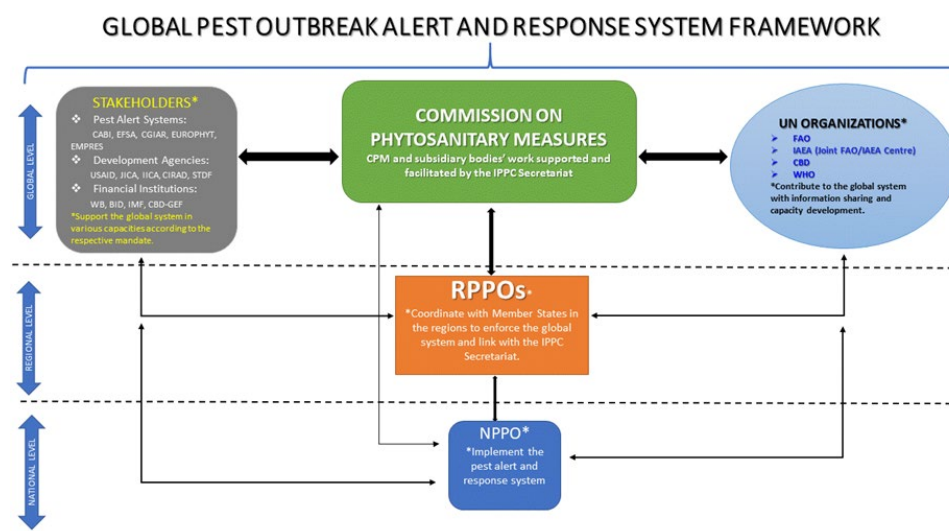


Figure 5: Proposed framework for POARS

- As happens in parallel systems related to animal health, stakeholders' meetings should be periodically organized to get information on the situation of individual emerging pests. These platforms can also function as spaces for stakeholders such as FAO offices, donors and international organizations, among others, to gain a better understanding of objective and functioning of the POARS.

4.2 Considerations related to the Governance of the POARS

In addressing its tasks laid out in their Terms of Reference, a key consideration of the FG has been how to operationalize a system such as the POARS, and what institutional arrangements would be most appropriate. The issues below were keenly examined:

4.2.1 Establishing POARS within CPM

The FG considered whether the POARS should be operationalized under the auspices of the Commission on Phytosanitary Measures (CPM) or through some other mechanisms. Similar systems in human and animal health are not always managed by the internationally recognized standard setting body for the sector, but the FG considers that the POARS should be established by and under the auspices of the CPM. The aims of the POARS are very closely aligned to the objectives of the Convention. As the CPM is mandated to promote the full implementation of the objectives of the Convention (Article XI), and it was the CPM that called for more attention to emerging pests, it is appropriate for the CPM to be the responsible body for the POARS. This does not preclude the CPM from changing this arrangement in the future.

This arrangement also supports the extensive cooperation that will be necessary for the POARS to be successful. The Convention recognizes the role of Regional Plant Protection Organizations (Article IX) and of International Cooperation (Article XIII).

Given the major endeavour envisaged for the POARS, the FG recommends setting up a POARS operational framework composed of government organizations and other organizations at a global, regional and national levels. A POARS Steering Committee would provide direction and oversight to

the global system. The FG has examined and laid out in detail, the roles for participating organizations such as the FAO and the IPPC Secretariat at the global level, as well as RPPOs, NPPOs and other organizations in the governance and operationalization of the POARS.

4.2.2 New subsidiary body responsible for POARS

The FG discussed whether the POARS should be established as part of the IC, or whether a new subsidiary body should be established. The FG ideally recommends that a new subsidiary body is established, provisionally entitled the Pest Outbreak Alert and Response Systems Committee (POARSC). This committee should be established to provide general direction to the POARS, ensure overall coordination between stakeholders' organizations globally and drive resource mobilization. There are several reasons for recommending a new subsidiary body:

- The establishment of the POARS is envisaged as a major endeavour that will make a significant contribution to the objectives of the Convention. It touches on many aspects of the work of contracting parties, and therefore merits a dedicated subsidiary body.
- From CPs concerns expressed at recent CPMs, particularly in the light of their experience with several emerging pests such as Fall Armyworm, it is clear that CPs want to see improved institutional arrangements and responses for addressing emerging pests. Establishing a new subsidiary body would be a clear and visible way to address these concerns.
- Current work in relation to pest outbreaks and responses is currently under the oversight of the IC. The IC has made major progress since its establishment but its Terms of Reference are broad and the FG understands that the IC already has a very full and broad workload. Implementing the POARS through an IC Subgroup would merely add to the IC's already heavy workload.
- By establishing the POARSC as a subsidiary body, a clear signal is provided that this is recognized as a top priority for the CPM, and one that therefore needs to be well-resourced. Similar systems in other areas are well supported and it is less likely that the necessary resources would be mobilized if the POARSC was established as an IC Subgroup.
- Furthermore, NROs are currently under the oversight of the IC and the FG agreed that the oversight of the pest reporting obligation should be transferred to POARSC, while the rest of the NROs would remain under the IC (IC Subgroup on NROs). Pest reporting is very important in identifying emerging problems, and timely reports would facilitate early responses to emerging problems. The effective functioning of POARS would rely on swift response, capacity building, networking and cooperation between different actors. Having these activities related to emerging pests under one umbrella structure would help ensure faster coordination and better use of resources. In most cases operational procedures are in place and can be used for the POARS as well. Some adaptations might be needed to enable swift actions in case of emergency responses.

It is proposed that this POARSC be comprised of ten members with relevant skills and experience in Pest Alert and Response Systems, including at least one member from an RPPO. Specifically:

- Seven members will be representatives from each of the seven FAO regions.
- Two members will be experts in subjects relevant to the work of the POARSC from academia, donors, international organizations or representatives from the private sector.
- One member would be a representative from a RPPO.

4.2.3 Functions of the POARS Committee

1. *Technical work programme*

- Identify resources and keep under review the capability required by contracting parties to implement the IPPC and POARS activities
- Identify available mechanisms such as technical cooperation projects to support contracting parties' implementation of the POARS in the event of a threat or incursion of an emerging pest
- Identify and propose strategies for contracting parties to enhance implementation of IPPC and POARS, including national reporting obligations, taking into account their specific capacities and needs
- Review contracting parties' challenges associated with the POARS
- Recommend to CPM priorities to improve the POARS, based on an analysis of outputs from the above activities
- Identify and recommend new technologies for early detection and response to emerging pest outbreaks which could enhance the POARS
- Monitor and evaluate actions under the IPPC Strategic Framework, other related strategies, frameworks and work plan(s)

2. *Effective and efficient management of the POARSC*

- Develop, agree and maintain a list of priorities for Global Pest System activities in alignment with CPM priorities
- Provide a review function on new projects related to the POARS to ensure they are aligned with the IPPC strategic objectives, have strategic value and a competitive advantage, and recommend them to CPM for approval
- Develop procedures and criteria for the production, oversight and approval of technical resources for alert and response
- Recommend to the CPM to establish and dissolve POARSC sub-groups, undertaking specific activities related to POARS and tasks, including those defined through Terms of Reference
- Provide oversight to POARSC sub-groups
- Establish *ad hoc* working groups to address specific issues
- Seek advice and/or input on matters relevant to its work from technical panels (through the IC) and other groups or organizations that assist the IPPC Secretariat
- Periodically review its functions, procedures and outcomes
- Monitor and evaluate the effectiveness of its activities and products
- Develop projects that contribute to achieving the implementation priorities agreed by CPM

3. *Working with the Secretariat*

- Provide guidance on alert and response activities for inclusion in the Secretariat's work plan.
- Assess and prioritize web and technical resources, as appropriate, that are relevant to implement the POARS and IPPC
- Promote dispute avoidance as an outcome of effective implementation
- Oversee the national reporting obligations processes
- Contribute to the development and maintenance of links with donors, partners and other public and private organizations concerned with alert and response in the phytosanitary area
- Contribute to the delivery of the IPPC Secretariat's Communications
- The Secretariat is responsible for coordinating the work of the POARSC and providing administrative, editorial, operational and technical support. The Secretariat advises the POARSC on the availability and use of financial and staff resources

4.2.4 Coordination mechanisms within POARSC

POARSC would collaborate with the IC, which in turn will coordinate with the Standard Committee to make standard setting and implementation complementary and effective on the basis of aligned priorities for the implementation of the POARS. This collaboration will take place at several levels (e.g., Secretariat, chairs, members, stewards and Sub-groups). The POARSC Chair will be responsible to ensure coordination with the IC and the SC Chairs POARSC, IC and SC. Collaboration will include:

- Alignment of priorities
- Development of implementation plans related to alert and response systems
- Analysis of responses to calls for topics and issues to be addressed
- Review of the Framework for Standards and Implementation jointly and making recommendations to the CPM for endorsement via the SPG

Three POARSC sub-groups would be established for species assessment, tools and NROs, and would meet regularly to implement the technical aspects of the POARS, including finalizing the procedure for evaluating species for declaration as emerging pests, and then implementing it.

For each pest declared as “emerging”, a POARSC Team could be formed, such as those recently set up for FAW or Foc TR4. The POARSC organogram, as a subsidiary body under the CPM, is presented in Figure 6.

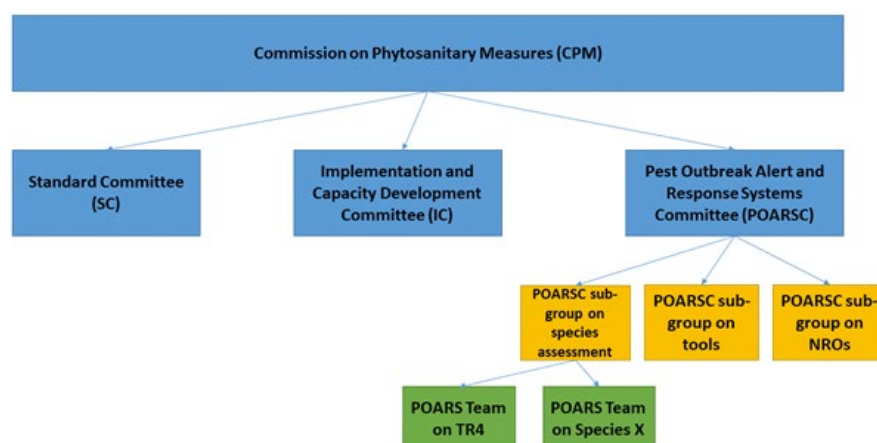


Figure 6: Organogram of the POARSC

To ensure synergies in between the activities of the various CPM Subsidiary bodies, the POARSC Chair should coordinate with the IC and the SC when necessary. In the teams, appropriate expertise on diagnostic should be ensured and linkage to relevant Technical Panel on Diagnostic Protocols discipline lead.

It is envisaged that some reorganization of the IPPC Secretariat would be needed to adapt to the establishment of a new subsidiary body. There would be a need for dedicated staff in the Secretariat to support the POARS and implement its programme. This activity should be financed partially from the regular budget as well as from extra budgetary funds. There should be a staff retention effort to keep expertise and build on experience gained across the years.

4.2.5 Learning from existing response systems

The FG undertook a detailed review of the most prominent alert and response systems across the world to work out how the POARS should be best set. As an example, in terms of costs of maintenance of the national Argentinian network for surveillance, the development and maintenance of software is approximately US\$30,000 per year. In addition, there is a team of the equivalent of three professionals working on their system.

The organogram of the Emergency Animal Health Unit within FAO is provided below as an example for animal health alone in Figure 7.

Exploratory discussions have already begun with the Emergency Management Center (EMC) for Animal Health manager to explore the feasibility of working together on a joint programme. This programme would help address emergency activities for both animal and plant health, in order to mutualize resources and to build on experience. The EMC for Animal health is placed under the FAO Emergency unit (OIR) in FAO.

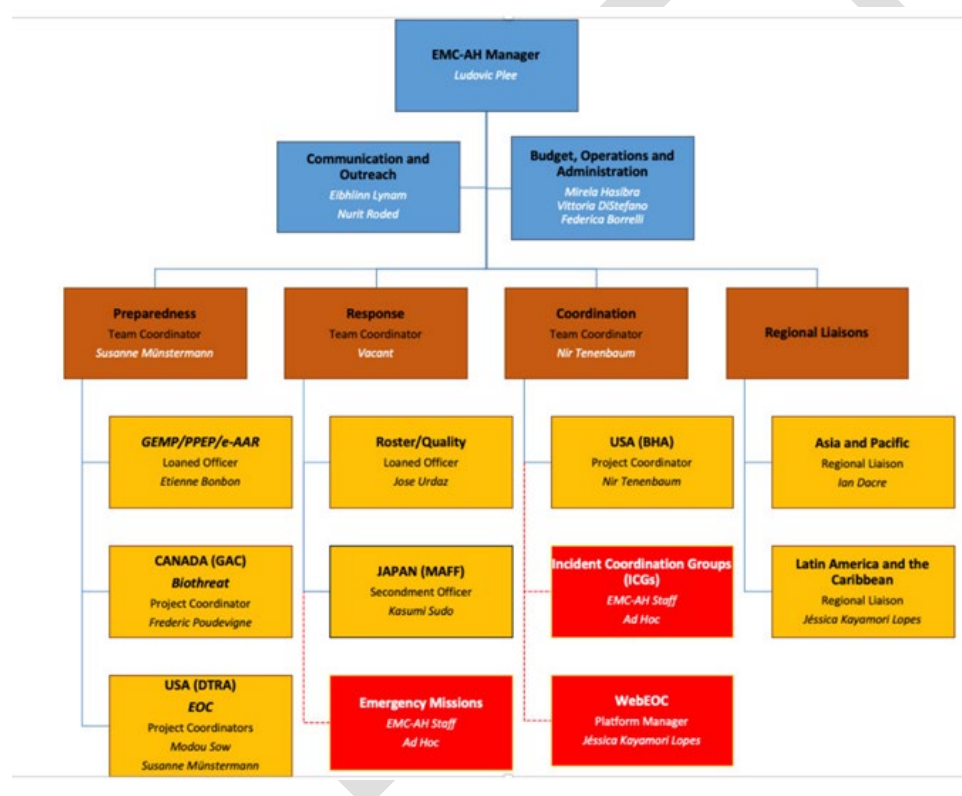


Figure 7: Organogram of the EMC for Animal Health within FAO

4.3 Operationalising POARS

In discussing the first steps required to operationalize POARS, the SPG expressed concerns about the challenges and long-term impacts of establishing a new CPM subsidiary body. To explore the potential cost benefits and return on investment, the FG suggests, in agreement with the SPG proposal, that initially a Steering Group should be established, following the model of the ePhyto Steering Group. This POARS Steering Group could be set up under the oversight of the CPM Bureau and be given a mandate of three years, with a request to report back to CPM. A proposed POARS Steering Group

Terms of Reference has been drafted as is presented in Appendix 2. It is not expected that representatives from international or regional growers and industry associations or other representatives from the private sector will need to participate in the Steering Group for the first three years. However, they could be integrated in the longer term.

In addition to initiating the POARS work plan, this Steering Group would analyse the pros and cons of setting up a POARSC and help to estimate the return on investment.

4.3.1 Supporting the IPPC Secretariat systems

The IPPC Global POARS, based within the IPPC Secretariat, may support the system by undertaking the following actions:

- (1) Implement an international governance body in the form of a Multi-institutional Steering Committee. The committee should provide directives and oversight to POARS.
- (2) Set-up a global pest portal. The portal should contain all relevant information on the objectives and mandate of the global system. It would serve as a repository for resources, including lists of experts, links to relevant entities involved in pest assessment, and information that will contribute to decision making support, preparedness plans and pest forecast tools. It should also include technical information such as pest alerts, pest information sheets, protocols and tools for pest surveillance and rapid response, and any other relevant information related to emerging pests.
- (3) Establish a network of stakeholders including international organizations actively involved in pest alert and emergency response such as FAO, IAEA, CABI, as well as available systems for pest monitoring and forecasting such as CBD, EMPRES, GERDA, CGIAR, French ESV Platform, FAO Locust Watch (DLIS – FAO). International and regional organizations such as CABI, EFSA, CGIAR, can facilitate information on emerging pests through databases and pest alert systems as well as expertise for conducting pest risk analysis.
- (4) Establish and articulate a network for resource mobilization in the event of an imminent threat, incursion or outbreak to facilitate advocacy initiatives with potential donors. International and regional development agencies such as USAID, JICA, IICA, CIRAD, IFAD and STDF can facilitate plant protection resources, including expertise to support capacity building for early detection and response to emerging pests in Member States. Funding organizations such as the World Bank, BID, IMF, CBD-GEF, STDF, Bill and Melinda Gates Foundation, WHO can support the establishment of a specific fund that can be rapidly mobilized to support emergency actions against emerging pest outbreaks.
- (5) Establish financial mechanisms to set aside funds that can be rapidly mobilized to support emergency pest situations, including sending experts and supplying necessary materials and equipment for an initial rapid assessment of the emerging pest problem.
- (6) Facilitate the recognition of Reference Laboratories with regional capacity to provide diagnostic services and assess the epidemiological situation in a country/region.
- (7) Establish a global pest outbreaks alert system to:
 - a. Provide a global pest portal to disseminate timely information about emerging pest threats and outbreaks. This portal should ensure a constant flow of information among different countries and regions through sharing experiences of dealing with emergency pest situations, ultimately creating synergies among stakeholders in this space.
 - b. Prepare and update lists of emerging pests of global and regional concern and the level of response needed based on their priority (following criteria defined in Task/Recommendation 5 of this report).
 - c. Document the global movement of these emerging pests.
 - d. Send alerts to NPPOs and RPPOs on verified identified pests and pest outbreaks.

- e. Support pest risk analysis/assessment for identified emerging pests of global and regional concern by liaising with RPPOs and the International Pest Risk Research Group (IPRRG) and providing access to data when available.
 - f. Provide up-to-date pest profiles or factsheets on those pests that include information such as the biology, host range, reproductive rate and adaptability.
 - g. Support capacity development of surveillance (including upstream surveillance) and diagnostic networks for early detection programmes.
- (8) Provide implementation and capacity development support to RPPOs and NPPOs so that they can contribute actively to the POARS.
- (9) Establish a global pest outbreaks response system to:
- a. Support capacity development for emergency response programmes.
 - b. Provide specific emergency response information and tools on pests, in the global portal.
 - c. Create an on-line registry and list of subject matter experts.
 - d. Support the creation of pest specific working groups for high priority emerging pests.
 - e. Provide clear guidance through pest prevention and eradication generic preparedness plans and protocols. The protocols should contain clear guidance such as;
 - i. A Strategic plan of the emergency response intervention.
 - ii. An operational structure similar to the Incident Command System.
 - iii. Specific surveillance procedures and tools including delimiting surveys.
 - iv. Containment, suppression and eradication procedures and tools.
 - v. Resources (financial, human, equipment) required for the emergency response.
 - f. Provide implementation and capacity development support for NPPOs and RPPOs to contribute actively to the global pest outbreaks response system.
 - g. Provide general guidelines for the RPPOs and NPPOs to develop public relations communication materials to prevent or overcome public resistance to pest eradication interventions.
 - h. Provide general guidelines to educate the public at large to become 'community scientists' and help identify and report pests. This contributes to the pest alert system and passive surveillance.
- (10) Establish cooperative agreements with international and regional plant protection organizations and stakeholders to cooperate in the POARS.
- (11) Form strategic alliances such as public-private partnerships with key stakeholders and entities, including direct beneficiaries such as the horticultural industry and civil associations.
- (12) Identify and communicate research and development needs and establish priorities for novel technologies for diagnostics, tools for early detection and for sustainable and environment friendly pest exclusion, suppression, and eradication in partnership with IFAD, BMGF, BIZ and CGIAR (research institutions and funding agencies).

4.3.2 FAO's and IPPC's support to system

The FAO, would support this global system with its current mechanisms such as technical cooperation projects (TCPs) for technology transfer, including diagnostics, surveillance and emergency response to emerging quarantine pests of concern. There will also be coordination with FAO national, sub-regional and regional offices and other partner international and regional organizations. In addition, collaborations with NPPOs and RPPOs will be necessary to develop and deploy comprehensive yet easy-to-use tools to support countries to respond quickly and effectively to outbreaks.

The IPPC Secretariat would pursue the IC and Standard Committee (SC) approved activities to support this global system, namely to:

- Draft and promote adoption of international standards on phytosanitary measures and guidelines aimed at preventing introduction of pests through pest risk analysis and pest risk management, including measures for early detection and emergency response.
- Draft and adopt specialized protocols to help NPPOs and RPPOs develop contingency plans (including information on pest diagnostics and survey methods), to build capacity for taking action and communicate more effectively with targeted audiences.
- Conduct international and regional workshops on phytosanitary schemes and specific ISPM including Pest risk analysis for quarantine pests (ISPM 11), Surveillance (ISPM 6), Requirements for establishment of Pest free areas (ISPM 4), Determination of pest status in an area (ISPM 8), Guidelines for pest eradication programmes (ISPM 9), etc.
- Plan and organize *ad hoc* expert group meetings and technical advisory panels to conduct analysis of emerging pest problems and advice *in situ* on phytosanitary schemes and policy.
- Provide content for web based (IPP) information to help stakeholders implement standards.
- Provide platforms for sharing information and experiences, such as IC meeting or IPPC Regional Workshops.

4.3.3 Role of RPPOs

At the regional level, the IPPC encourages CPs to cooperate on topics of interest about common serious plant pest risks. This is done by establishing RPPOs which function as coordinating bodies in plant protection matters among the Member States that conform the regions. Other regional institutions include FAO sub-regional and regional offices.

In general terms, the role of the RPPOs and other regional organizations and institutions should be to guide, support, coordinate and link the NPPOs with POARS. Specific actions may include:

- Maintaining continuous communication and coordination with the POARS Steering Committee (see Appendix 2 on Terms of Reference for more detail)
- Aligning with the POARS operating guidelines and working in close collaboration with the POARS
- Incorporating at regional level the elements of the surveillance and response system to support actions against emerging pest when required. This should include:
 - a. Collecting and disseminating to NPPOs information on emerging pest problems for the region, including lists of official pest reports.
 - b. Facilitating response by providing clear guidance to its Member States on general and specific surveillance and emergency response protocols available on the IPPC Global Framework (POARS) and on the RPPOs for emerging pests of regional concern.
 - c. Fostering international networks to support emergency response in Member States through mechanisms for collaboration that may include MOUs, Cooperative Agreements, Practical Arrangements and other means.
- Coordinating with NPPOs to enable the POARS in the event of an imminent emerging pest threat or a pest outbreak.
- Setting up a regional expert group that could technically assist in case of a regional outbreak.
- Establishing intervention teams (phytosanitary commandos) by identifying groups of subject matter experts for specific pests that can operate on site.
- Creating and activating communications channels and contact lists of officials to be contacted in emergency situations.
- Assisting NPPOs with the characterization of the emerging pest problem through setting up interviews with stakeholders including farmers and general public.

- Securing funds for intervention in case of an emergency.
- Maintaining, in a strategic location, a minimum stock of the necessary materials and equipment for pest surveillance and control ready for use during the emergencies.
- Conducting regional simulation exercises to prepare for possible outbreaks of pests of interest by RPPOs and to test contingency plans.
- Creating and maintaining regional databases and geographical information systems of emerging pest surveillance networks, in support of a rapid response in case of a pest incursions, outbreak or introduction.
- Conducting and/or facilitating emerging pests' upstream surveillance (horizon scanning) and Pest Risk Analyses/Assessment (PRA).
- Identifying through general surveillance or horizon scanning, regional emerging pests to be included in the POARS and in coordination with the IPPC Secretariat.
- Actively engaging with NPPOs in their NRO and encouraging them to meet their obligations in a timely manner.
- Actively supporting capacity building in Member States to facilitate NRO, including training and setting up an effective pest reporting system.
- Inspection and accreditation of Reference Laboratories with regional capacity to provide diagnostic services and assess the epidemiological situation in a country. Regional Reference Laboratories will complement the capacities of national diagnostic laboratories, especially in those cases where the capacity is not available in a country.
- Supporting the drafting of regional protocols and contingency plans for specific quarantine pests of interest for the region (including protocols on pest diagnostic, survey and control).
- Supporting Member Countries of the RPPOs to implement public information and education programmes, including communication material templates to prevent and/or overcome public resistance to pest eradication interventions.
- Supporting Member Countries of the RPPOs to implement programmes to educate the public at large so that they become 'community scientists' and help identify and report suspected pests, essentially becoming part of the global pest alert system.
- Collaborating with NPPOs and international organizations such as FAO in applied research to identify baseline information and technology gaps and develop comprehensive easy-to-use tools to support countries to respond quickly and effectively to emerging pest outbreaks.

4.3.4 Role of NPPOs

At the national level, the role of NPPOs of CPs is to actively protect the plant resources from potential damage that pests may inflict on agriculture, trade and the environment. This is done by preventing introductions of pests through enforcement of epidemiological surveillance systems and quarantine measures at points of entry and by implementing emergency response actions in the event of the incursion of an emerging quarantine pest.

In general terms, the role of the CPs through the NPPOs should be to execute the POARS. This may be done by undertaking the following specific actions:

- Have in place, a phytosanitary legal framework that allows a rapid response to emerging pest problems.
- Regulate emerging pests of concern.
- Reflect relevant ISPM in national phytosanitary legislation.
- Define contingency plans for emerging pests, including surveillance and response strategies while the pest is still absent.
- Establish national coordination committees as needed in response to emerging pests. A function of such committees should be to coordinate stakeholders.

- Prepare surveillance and response protocols for emerging pests and other relevant technical materials such as pest factsheets.
- Strengthen epidemiological surveillance systems by expanding surveillance networks to high-risk points of entry and by harmonizing procedures when possible.
- Plan, coordinate and execute pest surveillance activities and emergency response actions. The intervention should consider the following basic steps: 1) Detection, 2) Diagnostics, 3) Response (preventive actions), and 4) Declaration of emerging pests by the country.
- Implement prohibitions/restrictions on plant movements.
- Secure emergency funds for intervention in case of an emergency.
- Maintain open communication channels with the highest national authorities (e.g., Ministers) when dealing with pest outbreaks.
- Prepare communication material for stockholders and the general public.
- Maintain in a strategic location, a minimum stock of the necessary materials and equipment ready for use during the emergencies.
- Conduct national simulation exercises to prepare for possible pest outbreaks.
- Participate in regional simulation exercises.
- Conduct quality assurance of activities related to surveillance and response to emerging pest outbreaks.
- Customize and distribute national communication and capacity development materials for stakeholders.
- Implement public information and education programmes to overcome public resistance to pest eradication interventions and educate public at large so that they become “community scientists” to help identify and report suspected emerging pests, essentially becoming part of the global pest alert system.
- Conduct general surveillance or horizon scanning and PRA/Assessment. The PRA should be communicated to POARS when appropriate.
- Comply with NRO by being transparent and timely reporting pest outbreaks to the IPPC Secretariat and RPPOs.
- Participate in regional discussions on emerging pest outbreak alert and response systems, being fully aware of available related materials and activities and actively sharing experience in surveillance and control.
- Coordinate surveillance, diagnostics and data entry by partners in each country (Universities, NARS, private sector and citizens).
- Verify the pest detection data originating from other pest detection systems different from the official NPPO surveillance networks, before the data becomes part of the official pest reports.
- Collaborate with RPPOs and with international organizations such as FAO in applied research, identifying baseline information and technology gaps and develop comprehensive easy-to-use tools to support countries to respond quickly and effectively to emerging pest outbreaks.

5 Recommendations for Task 5: The broad criteria for a pest to be considered in the framework of the programme

5.1 Overview

In 2018, RPPOs discussed the issue of emerging pests during the 2018 Technical Consultation. They agreed to work further on the criteria for emerging pests, update the CPM-19 paper, and share it with the Technical Panel on Glossary to facilitate their discussions in the definition of an “emerging pest”. The discussions held during the meeting can be consulted in the [30th TC-RPPOs report](#).

In December 2018, the Technical Panel on Glossary discussed the definition of an “emerging pest” and proposed considerations and the following definition: “A **pest** for which the **pest risk** or impact for an **area** has recently increased substantially, due to changes in pest-intrinsic factors, hosts, **pathways** or environment related factors”. The [full report](#) can be consulted for further information. This definition was presented to the Standard Committee during its May 2019 meeting.

According to records from the SC May 2019 Meeting, SC Members “thought that the need for a definition of ‘emerging pest’ is not clear because the real question is how the IPPC community is going to address the issue. It was suggested that it might be premature to send the definition for consultation for inclusion in ISPM 5, as the term is currently not used in ISPMs nor in the Convention and development of the concept is still incomplete”. The SC invited the Bureau to consider the feedback on the term “emerging pest” from the May 2019 meeting of the SC, to provide further background for their discussions. Further details are provided in the [May 2019 SC report](#). During its [June 2019 meeting](#), the Bureau Discussion around emerging pests focused around the need for clarification of this term (see paragraph 144).

TC-RPPOs in 2019

The model previously developed/presented by Mr. Ward, the former Director General of EPPO, during the 31st TC-RPPO in November 2019 was tested with specific pests selected by RPPOs. This was done to evaluate its usefulness/accuracy in setting global and regional priorities for emerging pests.

The results were the following:

- *Fusarium oxysporum* c.sp. *cubense* TR4, *Spodoptera frugiperda*, Citrus Huanglongbing or HLB, *Xylella fastidiosa* and *Phytophthora ramorum* were assessed as priority emerging pests;
- Water Hyacinth (*Eichhornia crassipes*) was assessed as an important pest but not as a priority emerging one as it is very widespread worldwide.

The RPPOs concluded that the wording in the decision tree should be adjusted to be suitable for plants as well as pests and should also incorporate environmental and trade issues. The [full report of the 31st TC-RPPO \(2010\)](#) can be consulted.

5.2 Refining the criteria for a pest to be considered under the POARS

The FG was tasked with:

- Taking note of the decision tree and criteria on emerging pests set by the TC-RPPOs.
- Considering whether this initial work by the TC-RPPOs is relevant for the Task 5 - to “establish broad criteria for a pest to be considered in the framework of the programme (considering the RPPOs’ work in this regard)”.

The FG concluded that criteria for a pest to be considered under the POARS need to be defined. Relevant information, tools and resources available around the world should also be reviewed. For the definition of criteria, emphasis should be given to the emergence of a pest, either due to introduction in new areas or because of a change in its behaviour, such as changes in host range, or/and impact observed. Emerging pests are not necessary the known pests of high impact.

5.2.1 Definition of emerging pest

The FG members concluded that the definition of an ‘emerging pest’ would be beneficial as it will give a common understanding on which are the pests to be included within the scope of the activities. Such a term could be added in ISPM5. The term proposed by the Technical Panel on the Glossary is the following:

‘A pest for which the pest risk or impact for an area has recently increased substantially, due to changes in pest-intrinsic factors, hosts, pathways or environment related factors.’

However, this definition is considered to be too broad for the purpose of the POARS. The experts believe that the following aspects need to be taken into account:

- Only pests that are quarantined or are qualifying to be regulated as quarantine pests should be considered under the POARS activities and this needs to be clear in the definition as well
- The actions need to focus on pests that have, or can have if they enter in new areas, high impact in large areas

Therefore, **the following term is proposed for emerging pest** for which actions are to be taken by the POARS:

- ‘A pest qualifying as a quarantine pest for which the pest risk or impact for an area has recently increased substantially, due to changes in pest-intrinsic factors, hosts, pathways or environment related factors with potential damage reaching epidemic proportions’

The Standards Committee could support this group in harmonizing terminology related to the planning of prevention, preparedness and rapid response activities, in particular the terms contingency plan, emergency plan, prevention plan, preparedness plan, action plan and response plan.

5.2.2 Source of input for analysis for pests of concern

Information on pests which are considered emerging in parts of the world can be wide. NPPOs could send their information at regular intervals on the pest and a short justification. The outcomes of horizon scanning exercises and alert lists of RPPOs and other international organizations can also be useful inputs. The aim is to make best use of available information and resources spent. Continuous information on emerging pests could be sent to the IPPC Secretariat.

5.2.3 Criteria for defining potential pests for global action

The criteria considered important for deciding whether an emerging pest is of global or regional concern are the following:

- Not present in an area or recently introduced but not widespread (Quarantine pest).
- High risk for a regional or continental spread; the pest can spread via at least one pathway across regions or continents.
- Evidence of an increase in the risk.
- Has a wide host range or its hosts are widely distributed.
- Has a high rate of adaptability, reproduction and/or spread.
- Has large potential for devastating damage and economic loss, at least reaching epidemic proportions by affecting agricultural production, ecosystems and trade, across regions and continents.

The experts concluded that the decision tree proposed by the RPPOs needs further refinement. The focus on the continental ‘jump’ as a first step needs to be integrated with the characterization of a pest. Furthermore, the group believes that the scope cannot be only pests that entered/spread in different

continents but that the spread of a pest within the same continent should also fall within the scope. Cut-off criteria for the impact are deemed not necessary because of the wide-range of socio-economic conditions in the world. The outcome of such analysis/evaluation should not only be polyphagous pests. Criteria on impact would be integrated with the characterisation of the pest as well.

Currently, there are several tools for prioritisation of pests developed that serve various purposes. Such tools include decision trees, matrixes, dedicated IT tools that do multi-factor analysis and subsequent prioritisation. Qualitative and quantitative data are both used to make the analysis and further assessment.

The development of such tools requires adequate resources and time. The latter includes the necessary pilot phase and further adaptation phase after development. In the choice of the suitable approach, the resource intensity of the assessment is a key consideration.

5.2.4 Implementation

Once the criteria are defined and the tool is available, it is expected that the input of the 'potential emerging pests' will be continuous. As a result, the evaluation and subsequent recommendations of action (or not) needs to be a recurrent exercise, an annual or bi-annual activity.

Given the time necessary for defining the general criteria and the tool for assessment and follow-up prioritisation, the FG recommends the creation of a dedicated IPPC Expert Working Group for further development and piloting. The expert working group that will develop the tool could be the one that continues to conduct the analysis and produce these recommendations.

It is important to document the assessments and the follow-up relevant discussions. For that purpose, a dedicated page in the IPP website or a dedicated IT tool will be needed.

6 Recommendations for Task 6: Efficient methods for early identification of outbreaks and communication of alerts to NPPOs

6.1 Overview

Methods for early identification of outbreaks and communication of alerts involves several elements that need to be considered. 1) Horizon scanning and risk analysis (e.g., PestLENs, EFSA, EPPO) - The key to preparedness and early identification of outbreaks is to know what to be watching out for. Understanding *what* is out there is intel that is compiled by scanning literature and open press. The NPPO and/or RPPO will make a determination about whether a biohazard is a potential risk to the nation/region. This is based on environmental suitability for establishment should the pest arrive and whether the potentially impacted crop or plant system is important economically, environmentally, socially or for food security. This kind of intelligence is behind the reporting obligations and communications protocols established by the IPPC, to promote awareness and preparedness among countries in a region. 2) Pathway analysis – The IPPC defines a pathway as “any means that allows the entry or spread of a pest (IPPC, 2012). Another definition is “the mechanisms and processes by which non-native species are moved intentionally or unintentionally, into a new ecosystem.” A pathway is comprised of the entire chain of events and conditions that may lead to a pest or pathogen introduction. 3) Surveillance and Detection of an outbreak/incursion - Once a pest or pathogen has gotten through the pre-emptive barriers the NPPOs have in place, the earlier the detection, the better the chance for an effective response. As per ISPM6 "general surveillance", which can be any First Detector (citizen, farm worker, crop advisor, etc.) is often the first sign that something is happening (Cropwatch Africa, Sinavimo, NPDN). Targeted or specific surveys, usually delivered by NPPOs or scientists commissioned by NPPOs, are used to conduct detection surveys in various areas, determined by pathway analysis. Results of those surveys will determine if pests are present or not in the area. The surveillance may/may not be triggered by a prior alert of a significant risk (e.g., Cropwatch Africa, CAPS, OIE). A critical point is that most often, the first detector will not be the NPPOs. So, getting the first detectors to report to the NPPO, directly or indirectly, is key. 4) Diagnosis – Confirmation and identification of a detected exotic pest or pathogen involves subject matter experts and standardized diagnostic protocols. For many NPPOs, there are major capacity issues, such that networking of labs is essential to assure accuracy and confirm diagnoses (e.g. APHIS, NPDN, European Reference Laboratories). 5. Communications - When and how NPPO communicates/reports to RPPO and/or IPPC when there has been a first detection and confirmatory diagnosis is important. 6) Alerts - Pest report from NPPOs form the basis (along with other information) for pest alerts sent out by IPPC or RPPOs and other regional organisations (or POARS) to other NPPOs.

6.2 Components of early identification and communication of an outbreak

Horizon scanning – Several examples of horizon scanning efforts include Epidemic Intel from Open Sources (EIOS), which focuses on Animal Health. PestLens (www.pestlens.info), an open-source horizon scanning program, shares data pulled from published and open data sources to anyone who registers on the listserv.

Pest Risk Assessment - is outside of the scope of this Task. However, it should be acknowledged that this is the primary mechanism for prioritization and the driver of most surveillance activities.

Surveillance – is the primary mechanism for early pest detection. Surveillance programmes may include both specific and general surveillance.

Specific (Targeted) Surveillance

Specific surveillance is 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. (ISPM 6).

National and regional surveillance networks, operated by NPPOs, surveil for targeted quarantine pests. This is carried out with community involvement, through pest awareness programs and technology such as a pest sighting (CWA, Sinavimo, USDA Cooperative Agriculture Survey) and digital imaging applications. Trained para-taxonomists in NPPO laboratories network with first detectors who are equipped with identification guides and survey sampling patterns/or pest specific trap locations (www.aphis.usda.gov/aphis/ourfocus/planthealth/pest-detection/pest-identification; CABI; Bugwood). An example of a specific surveillance program structured on the early detection strategy is the United States Department of Agriculture (USDA), Animal and Plant Health Inspection Service (APHIS), Cooperative Agricultural Pest Survey (CAPS) program (Cooperative Agricultural Pest Survey [CAPS], 2021b, Animal and Plant Health Inspection Service [APHIS], 2020g, Kalaris et al., 2014). Similar programs exist in just about every country, and although they may be structurally different, all attempt to adhere to the principles of surveillance in ISPM 6 (2019).

General Surveillance

General surveillance is 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).

Without systematic and coordinated data capture at a granular level, early detection of new outbreaks is unlikely. First detections are often made by growers, gardeners, public garden specialists, crop consultants, plant breeders, entomologists and plant pathologists at Universities or National Agricultural Research Services (NARS). These First Detectors, i.e., the first people to identify and question the presence of something unknown or new, may or may not be in communication with National Plant Protection Officials. When they are networked, the general surveillance system improves chances for early detection and identification of an outbreak of an exotic pest or pathogen.

An example of networking the NPPO with subject matter experts and the community is seen in the National Surveillance and Monitoring System (SINAVIMO <https://www.sinavimo.gob.ar/>) of Argentina, which has built a relationship with specialists who do not belong to the NPPO. SINAVIMO databases collect, order, systematize and provide information regarding the condition of pests and main host crops throughout the national territory. It is the official portal of phytosanitary information of the Argentine Republic and contributes to the principles of transparency and cooperation established by the International Convention Phytosanitary Protection (CIPF). SINAVIMO has a network of experts made up of specialists linked to plant protection, including researchers in the different fields of plant health or in other areas of study, extension agents, consultants, advisors, etc., both independent and belonging to different public or private institutions. The experts of the network voluntarily provide information they generate in the field of their specialty and within the framework of their own activities. There is a pest detection communication system accessed through the website by completing the online form for the "Communication of Detections", as established by Senasa Resolution 778/2004:

<https://www.sinavimo.gob.ar/node/add/deteccion>.

Another example of networking external specialists with the NPPO is the connection between the USDA APHIS and the National Plant Diagnostic Network (NPDN) in the U.S. Plant diagnostic clinics exist in every state in state universities and/or State Departments of Agriculture. These laboratories are established with the mission of service to plant production systems and environments of each state. Clients are gardeners, master gardeners, crop producers, greenhouse operators, horticultural businesses,

landscape architects, plant breeders, crop consultants, etc. The client contacts the lab to schedule sampling or brings samples to the lab for pest or disease identification. The NPDN lab managers network among themselves regionally and nationally, but also to the USDA APHIS, and NPPOs in the United States. Any encounter of an unknown or potentially transboundary pest is considered a presumptive positive and immediately reported to APHIS. New samples are collected and sent to APHIS identifiers for confirmatory diagnosis. This networked system provides the NPPO an extensive network of First Detectors. The NPDN exemplifies a passive surveillance system that is pest specific rather than pathway specific.

Sampling

Whether general or specific surveillance, metrics of encounter are established by sampling protocols.

a. Sampling – Sampling is a science and occurs at multiple levels: ship holds, cargo containers, regional field crop surveys, horticultural nurseries, orchards, public lands, etc. Sampling protocols are designed for fitness of purpose.

Purposes for sampling are to:

- Declare ‘free from’ a pest or pathogen for phytosanitary movement assurance.
- Monitor for exotic invasive insects or pathogens along identified introduction risk pathways.
- Monitor population spread of a known invasive species (epidemiologic surveillance).
- Surveil regionally or locally for exotic quarantine or high-risk pests in field crops.
- Surveil for invasive pathogens on imported nursery stock.
- Surveil for hitchhiker pests on shipping containers and packing material.
- Surveil for pests in in-coming cereal grains and/or fresh produce.

Each of these purposes will have differing stringency requirements. Regardless of the reason for the sampling, protocols are often determined by likelihood of encounter, potential impact and consequences of missing the target. Sampling protocols tend to be based on statistical power analysis, but also use data compiled during risk analysis, and environmental and biological growth modelling. Some sampling protocols are highly standardized internationally (ISPM31), while others are location specific.

b. Surveillance data capture and standardization

In accordance with ISPM 6, surveillance data capture should be systematized by each NPPO. There appear to be no rules or guidelines at the IPPC level concerning standardized data capture for analysis. However, there are standards in how scientific names are used and codified (using EPPO code), with data concerning timing, location, and diagnostic verification recommended.

This is an area of global standardization that could use more attention.

6.3 Identification and Diagnostics

Only detections that are confirmed by an expert laboratory must be considered a ‘detection.’ In some cases, the official taxonomic identifier labs are only found at the NPPO level. However, in OIE and within the U.S. there are systems for accrediting expert identifier labs outside of the NPPL. The accreditation process typically is according to International Standards Organization 17025 standards for best laboratory practices and requires periodic audits of laboratory operations. It is also possible for extra-NPPO labs to be certified to diagnose a specific pest with a given validated diagnostic protocol and assay. An example of this is the National Plant Protection Laboratory Accreditation Program

(NPPLAP), in USDA APHIS. NPPLAP is responsible for supporting and evaluating laboratories that conduct testing on plant materials for regulated plant pathogens.

Communications and alerts are not the same activity and may be done by different actors:

Communications for situational awareness among 'need to know' parties

- NROs, if reported directly from lab identification, would speed up awareness
- Could be automated from a data capture system to regional NPPOs

Alerts have more granular information about how much, how bad, and what can be done about an outbreak

- Alerts are shared with different stakeholders (growers, extension services, etc.)
- Alerts take longer to prepare and require thorough confirmatory steps

Capacity to do any of these components are separate logistical operations. Early detection of an outbreak requires focused surveillance based on pest risk and pathway analyses. Identification requires an expert lab. Official communication of a pest finding is the responsibility of the NPPO and is called notification. Communication to all stakeholders affected by the pest problem is also the responsibility of the NPPO and a specific communication plan should be prepared for the priority pests. Other actors in addition to NPPOs can also help with communication. Alerts, informational rather than communication of an incident, need to have actionable messaging.

The POARS can help to strengthen each of the component activities by clearly identifying who does the different activities and making sure that the preparedness plans include fully coordinated systems from detection through alerting (See Recommendation for Task 4).

Early detection of an outbreak:

If there is a need to identify something that is occurring through query of NROs communications, it is possible to get an idea about where interceptions are occurring, but not about or not whether an outbreak or introduction has already occurred.

When looking at organizational capacity to early detection of outbreaks , the following must be noted:

- Outbreaks are post-border events, meaning an interception during routine operations at a border is not an 'outbreak'. It is reportable in interception incident reports, but the coordination among multiple potential entry points may be lacking.
- Pest risk pathway analyses can provide information on potential origin of a quarantine pest prior to its arrival in a country
- Risk analyses also highlight at-risk areas and vulnerabilities within a country and become part of the NPPO preparedness plans
- Linking NPPOs to other existing detection capacity (which is not yet part of the NPPO construct) would improve chances of quickly detecting a post-border outbreak event.
- First detectors are not identifiers, so coordination of likely first detectors with the NPPO and certified diagnostic labs is essential.

When looking at organizational capacity for accurate and timely identification, the following must be noted:

- When an outbreak is first detected, samples collected by any first detector must pass through the hands of an accredited identifier, whether botanist, pathologist or entomologist.
- Subsequent samples, during delimiting surveys and response, do not necessarily have to be confirmed by the NPPO expert lab each time. NPPO labs perform the first confirmatory diagnosis, whereas certified networked laboratories can perform subsequent diagnoses once a pest is known to occur in a region.
- Laboratory capacity for all potential quarantine pests and pathogens is generally lacking. Labs have assays for the things they are routinely looking for, but may not have capacity for confirmatory diagnosis in the case of a new emerging high consequence pests. Older and established technologies, such as ELISA, plating and microscopy are often available in all NPPO labs. However, more sophisticated diagnostic equipment, such as annually calibrated reverse transcription-polymerase chain reaction RT PCR equipment and supplies, are not available in every country. New technology is emerging, such as PRA, loop mediated isothermal amplification (LAMP), and shotgun sequencing that could put equivalent diagnostic tools in every NPPO and affiliated lab within the next 10 years. A concerted effort and research allocations could make this a reality.
- NPPOs can be assisted by having known and accredited regional laboratories to assist with diagnostic confirmations. Establishing tele-medicine capability in all NPPO labs, whereby all NPPO diagnosticians can be linked to a regional lab or expert lab for consultations, should be considered.

6.4 Communications and Alerts

At the NPPO Level

When a detection of a new outbreak is confirmed (via official laboratory diagnostic), the NPPO communicates this new detection using different tools. Media news releases, notices to industry and email distribution lists are example of tools frequently used. Information is also very often posted on the NPPO website and shared with social media. Broad national communications are useful to raise stakeholders' and public awareness, which contributes to early detection of other outbreaks and increases compliance with regulatory measures in place to control the new outbreak. Direct messaging to relevant industry associations is also used to ensure broad awareness of the issue. As per NRO, trading partners are also notified via official notices.

Similarly, when a threat is known, alerts are usually published by the NPPO. Information is posted on the NPPO website and then distributed broadly at the national level via email distribution lists and social media messaging. Direct messaging to industries at risk is also used as a mean to raise awareness.

At the RPPO Level

As per NRO, NPPOs will communicate new pest outbreaks and alerts at the RPPO level. The information is often shared with email distribution lists to interested stakeholders. Communications at the RPPO level must be timely so that neighbouring countries and trading partners can put measures in place to protect themselves from the new risk.

At the Global Level

Currently, communications and alerts related to pest outbreaks and alerts are mostly limited to information being posted on the IPP. The creation and implementation of the POARS should significantly improve international communications about merging outbreaks and alerts, resulting in better plant protection at the global level.

7 Recommendations for Task 7: Systems and Tools useful to RPPOs and NPPOs in a POARS

7.1 Overview

The POARS might comprise a range of procedures (manual and automated), as well as people and organisations, whereas tools might be individual items within a system that support or enable one particular activity. Thus, this recommendation focuses on tools that might be used within the different elements of POARS, particularly (as specified in the task) by RPPOs and NPPOs, though possibly also by other organisations as identified in Task 4 (the roles of the different actors in POARS). This recommendation also considers the other tasks, namely Tasks 1, 2, 6, 8 and 10.

The IPPC Secretariat already produces various materials which can be considered tools, including guides, training kits, e-Learning courses, videos, curricula and other implementation and capacity development technical resources. However, other tools not currently within these categories might also be appropriate to include in a toolbox.

Establishing a toolbox would involve collating existing tools, together with a mechanism for future addition of tools addressing priority needs. This recommendation considers existing tools, the process for making them available and the development of new tools.

Some tools are generic, and applicable to many or any species of pest. Other tools are specific to a species or group of species. In this section, recommendations are made on how to establish a toolbox. It is envisaged that the toolbox will comprise both generic and specific tools, but the specific tools would be for those species identified as “emerging” pests (Recommendations in Task 5). Recommendations on individual generic tools are presented in Task 10.

7.2 Current tools

The tools can be categorised or characterised in a number of ways:

(1) according to the phytosanitary activity they relate to, summarised from the sequence of pre- and post-detection activities listed under Task 2, and from the draft IPPC Prevention, preparedness and response guidelines for *Spodoptera frugiperda*;

(2) according to the type of tool

The main categories of phytosanitary activities are:

Pre-detection/prevention

- Horizon scanning
- Risk analysis
- Regulation
- Inspection
- Contingency planning
- Surveillance
- Diagnostics
- Risk communication

Post-detection/response

- Diagnostics

- Notification
- Response management
- Surveillance
- Eradication/containment
- Communication

Some activities are relevant both before and after a pest has been detected, including surveillance, diagnostics, communication.

IPPC tools, produced under the overall direction of the Commission on Phytosanitary Measures, through its subsidiary bodies, comprise:

- ISPMs and recommendations
- Guidelines/manuals
- Training materials

A **global pest matrix or database** containing Emerging Pests (EPs) and **corresponding rank** (high, medium, low priority) as well as available general and specific tools for EPs surveillance and response, should be developed by the IPPC Secretariat (possibly by a POARS Subgroup) and incorporated into the global system (POARS) web page. This global pest matrix will have the function of a database as it will be continuously populated with data.

The database (or global pest matrix) should provide access to the information concerning the emergency response tools and SOPs through links to the specific documents. The same database will indicate where are the **gaps** in terms of tools and SOPs and may be used for policy recommendations on where to direct R&D resources (under Task 7 a matrix that presents general and specific tools has been developed. The matrix has been populated with information on general tools and also with some tools for specific quarantine pests).

The procedure that will be used to assess and priorities EPs, e.g. decision tree/matrix/dedicated tool for criteria and prioritization, etc., and the pest database should be directly linked.

The procedure that will be used to assess EPs and the pest database should be part of a single system where the EP assessment tool will be feeding the EP database. Developing and maintaining the database might be a specific role of an POARS subgroup. Apart from this procedure to assess emerging pests and identify tools, it is expected that information on emerging pests and tools is also provided directly by NPPOs and RPPOs from horizon scanning and PRAs and even by entities such as EFSA which are actively engaged in preparing PRAs.

Other tools, produced by other organisations, such as NPPOs, RPPOs, regional and international organisations, comprise:

- Regional standards
- Guidelines/manuals
- Training materials
- Information
- Links to expertise
- Software/apps

Generic tools

There are a number of current tools of the various types covering many of the listed phytosanitary activities, and which (in some cases with modification/adaptation) could form part of the toolbox. The

FG set an excel table to analyze the tools in order to get a clear vision to make its recommendations. Some tools included are country specific but could be used as the basis for more widely applicable tools.

Species specific tools

There are large numbers of tools already available for specific pests or groups of pests, such as fruit flies. There have also been many other tools developed for individual pests, particularly when they become a significant problem. The IPPC website hosts a number of these tools under contributed resources. While this report does not attempt to collate these for any particular species, Recommendations for Task 4 focuses on this issue.

7.3 Establishing a toolbox

IPPC has processes for making tools available either by commissioning new materials or collating contributed resources. These procedures can be utilised /built on for establishing the POARS toolbox. At the moment, these processes are managed by the IC, but if, as is recommended, a POARSC is established as a subsidiary body, a decision would be required as to whether establishing and maintaining the POARS toolbox would remain within the Terms of Reference of the IC, or be transferred to the POARSC. It is proposed, at least in the short term, that IC will continue to have responsibility, as establishment of a new subsidiary body will take time.

For generic tools, the IC would commission new tools as necessary, based on but not limited to the categories of phytosanitary activity listed above. The IC will also issue calls for contributed resources on a particular topic that they have identified as high priority. Recommendations on these tools are provided in Recommendation 10.

For species specific tools, it is anticipated that once a pest is designated as “Emerging” (see Recommendation 5) a task team such as the Banana Wilt Foc TR4 team recently established, would undertake/organise the following steps:

- Collate existing tools for the species through a call for contributions as well as proactive searching
- Review/approve existing tools using current procedures (see below)
- Make approved tools widely available as soon as possible. In the short term this could be on the Phytosanitary System page (<https://www.ippc.int/en/core-activities/capacity-development/phytosanitary-system/>), but in the longer term, the FG recommends a dedicated POARS page/sub-site.
- Using the categories of phytosanitary activity above, assess gaps and the need for new tools for the species, and commission their development.

7.4 Utilising existing IPPC processes

The IPPC already has two relevant processes that could be used and/or adapted for establishing and maintaining the toolbox.

Process for the development of IPPC guides and training materials. IPPC Guides and Training materials are developed under the oversight of the IC with the participation of selected international experts. The process for producing the guides is published (see <https://www.ippc.int/en/publications/88591/>), and includes 9 steps:

- Topic submission, selection and prioritization.
- Development of the Specification

- Identification of resources and development of the work plan
- Establishment of the working group
- Development of the product
- Development of the implementation plan
- Publication and additional formats
- Language versions
- Periodic update

Process for soliciting and reviewing contributed resources. Contributed resources are phytosanitary technical resources that were not developed under the auspices of the IPPC, but which are considered appropriate for wider use. See <https://www.ippc.int/en/core-activities/capacity-development/guides-and-training-materials/contributed-resource-list/>. Organisations may submit resources which the IC reviews against published criteria to decide whether they are suitable.

Together, these two processes would be appropriate for developing and maintaining a POARS toolbox. Although the 9 steps for developing guidelines and training materials can be lengthy, the procedure notes that under some circumstances such as emergencies, “it may be appropriate to deviate from the process for the development of IPPC guides and training materials”, in which case “The IC will be informed and provided with the justification for deviating from the normal process”. The need for rapid publication of tools for an emerging pest could be considered as justification for deviating from this process.

Materials developed or made available through either of these processes, along with ISPM and CPM recommendations, are made available through the “Phytosanitary System” page on the IPPC website, developed in cooperation with members of the IC. The resources are categorised under different components or activities of a phytosanitary system, some of which (e.g., Surveillance, Diagnostics, Eradication) fall within the scope of POARS. Thus, while some elements of a POARS toolbox are already available there, some reorganisation of the material could be considered in the light of setting up the POARS.

One aspect that could be considered is the use of species-specific pages. If/when a species is declared as “emerging”, a page for all the relevant tools for that species could be established. This is to avoid having to search through all the different categories of resources. The current Phytosanitary System page indicates this possibility is already being considered.

A further possibility is that a database of tools could be established, with an online search page, allowing users to search by phytosanitary activity, type of tool or other parameters. This could be in addition to, rather than instead of, the current presentation of phytosanitary system resources.

7.5 Initial ideas on a Reference for implementing POARSC sub-group

The recommendations outlined above could be incorporated into the Terms of Reference for the sub-group or similarly suitable structure/body assigned with implementing POARS.

Responsibilities of the POARSC sub-group could include:

- a. Regularly review and identify new priorities for generic tools for development under the main categories of phytosanitary activity (as listed above)
- b. Liaise with and utilise, as appropriate, the Implementation Committee’s processes for (i) development of IPPC guides and training materials and (ii) soliciting and reviewing contributed resources
- c. When a pest is categorised as “emerging” as per Recommendation Task 5, rapidly review existing species-specific tools for the pest using the above areas of phytosanitary activity as a

framework for the review, identify those that qualify as contributed resources, and commission new tools to cover identified gaps

- d. Ensure all tools are made available online, such as through the POARS webpage.

DRAFT

9 Recommendations for Task 9: Processes NPPOs could use to rapidly/effectively engage expertise and response resources

9.1 Overview

The FG for this recommendation noted the need to identify gaps and lack of expertise at the national level. A baseline analysis, it was suggested, could identify matrixes, gaps in tools, diagnostic, communication, and resources. These gaps could then be addressed by providing concrete recommendations in order to improve the system and to make it more pro-active.

Technical and scientific expertise is needed to be able to respond rapidly and effectively after an outbreak. The pest specific expertise could be based on the occurrence of national and/or regional lists of quarantine pests.

The knowledge of the occurrence of the quarantine pests within space and time is essential to organize prevention actions and/or efficient response to an outbreak.

The expertise needed will depend on the situation and the response needed. For e.g., expertise in diagnosis of listed quarantine pests in cases of new pests, or expertise in preparedness and eradication of listed quarantine pests in cases of responses to outbreaks and delimiting surveys.

Three main skills are required to organize such a response: (i) Scientific and technical expertise on listed quarantine pests, (ii) Thematic expertise (diagnosis, risks, surveillance, management), (iii) Geographical expertise. A key expertise concerns the recognition of suspicious symptoms under field conditions because it is crucial for collection of appropriate samples for an efficient diagnosis. For this, both national and international expertise will be sought.

9.2 National expertise (related to Recommendation 7)

A country's ability to respond to an emerging pest will depend on local expertise at national and regional levels. Expertise should be engaged at any of the four components described in Recommendation 7. For each component, various materials and specific documents and organisations have to be developed or acquired for any of the main 10 sub-component described in Table 1.

Table 1: Components, Materials and Key Achievements required to a POARS response

Component	Sub-component	MATERIALS	KEY ACHIEVEMENTS
Technical			
	diagnosis	DNA extraction Commercial kits Commercial specific diagnosis kits	1-National diagnosis labs are trained and prepared
	sampling	EFSA survey cards and on-line story maps	2-Sampling protocols available
	biosafety	Disinfectant material Protection for clothes, shoes, mouths, hands	3-Establish list of effective products and manufacturers 4-Constitute a stock a disinfectant (alcohol, quaternary ammonium), gloves, masks, protections for clothes and shoes stored in public locations

Component	Sub-component	MATERIALS	KEY ACHIEVEMENTS
	outbreak	“blind” or announced simulations exercises of outbreak	5-Organization of simulations exercises.
	response	Technical trial of eradication or containment	6-Constitute a stock of (i) disinfectant, urea, pesticides to try eradication; (ii) signalisation material
Communication	preparedness	Share and/or create global template for flyers, disease EI factsheets	7-Communication to RPPO and Global level (tasks 4, 6, 8)
	alert	Hotline phone E-Mail box Emails and meetings with RPPO	8-To be organised and funded by NPPO 9-To be done by NPPO at regional level
	Response	Official Notification Delimiting surveys	10-To be done as early as possible on IPPC website and at national level by NPPO 11-To organize at local level
Legal framework	PRA	Share PRA template, have a PRA at regional level at least	12-Realize at national level each PRA for each global emerging pest Use the regional PRA if not available at national level
Human and financial resources	Financial preparedness	Immediate Available funds	13-Organize funds* for emergency
	Human preparedness	National task force for emergency	14-Organise a task force** for any emerging plant with a list of identified experts
	National lists of experts	national technical and scientific expertise*	15-List and contacts of experts at national level has to be implemented in relation/complementary with regional experts

*Funds: the financial framework is described in Recommendation 11&12.

** The national task force has to be linked with regional task force.

9.3 Organisation, Logistics and Expertise

The focus group recommends that all (13) achievements described in Table X (with the exception of tasks 10 and 11 concerning Response) require organisation and logistical preparation, prior to the alert. This preparation includes, in certain cases, the organisation of specific trainings.

The scientific and technical national expertise can be summarized in a national experts' database gathering skills and contact information of each expert. Such system has been implemented by Argentina through its SINAVIMO website (Sistema nacional de vigilancia y monitoreo de plagas) which involved 800 experts. The engagement of the national expertise can be either voluntary or a paid position. The focus group recommends engaging national expertise on the basis of motivation and volunteering. This engagement could be recognized through the provision of a certificate.

9.3.1 International expertise

If national expertise is unavailable or inaccessible, international expertise is needed to assist a country during an outbreak. Depending on the categorization of the pest, various scientific and technical skills are needed by NPPO. In the case of quarantine pests, specialists in exclusion are needed, whereas in the case of emerging pests within the country, some specialists in biosafety are needed. In the case of endemic pests, specialists in integrated pest management are required. Three main processes are identified to engage rapidly expertise.

9.3.2 International Database of Experts and the role of the IPPC Secretariat

Engaging with and having access to expertise and resources must be a high priority. For this, an option is to create an international database of experts. This database should be part of the POARS webpage.

Calls for experts would be issued (on categories of expertise or on pests). NPPOs and RPPOs shall actively contribute to the database by providing names and contacts of relevant experts. Resources will be required to compile and keep the database up-to-date at all times. Developing and maintaining the database might be a specific role of the POARS Steering Committee.

The information on the database of experts should be organized based on the expertise of each individual and the relevant components of the global system. Such categories could include PRA, organization and strategic planning, deployment of emergency response campaigns, surveillance and response tools, quarantine pests, location etc. The database should also help identify experts for specific pest groups.

Formal expert databases can be challenging and resource intensive to maintain. However, some do become obsolete. Databases of reference institutes (Reference Labs) have been useful because even if the expert changes, the incoming expert usually has similar expertise.

9.3.3 Implementation of specific commandos

Another process to engage international expertise would be to implement international expert or small groups with complementary skills of a specific quarantine or emerging pest. Such a group can be called "commando". Any country can require the intervention of such a commando according its needs (prevention, outbreak, response or management). The aim of such commando is to support countries in exclusion, prevention, containment and phytosanitary management against specific quarantine or emerging pests. Seven functions have been identified : (i) Accompany declaration of regional phytosanitary alert by RPPO, (ii) Provide advice in the official declarations, (iii) Update contingency plans, (iv) Support and evaluate the development of national and regional skills for prevention, (v) Harmonization of phytosanitary measurement, (vi) Encourage and support research and (vii) Evaluate

the capacities of the countries and NPPOs in terms of diagnosis, surveillance, prevention and management of outbreaks of specific pest and recommend the necessary improvements.

Each commando is comprised of 5 to 10 volunteer experts identified for the scientific and technical skills which have to be complementary within the group. Skills in plant protection, pest risks analysis, vigilance, contingency, integrated management, quarantine, on crops and on one specific pest have to be gathered in the commando. OIRSA has currently set up approximately 10 specific commandos, focusing on fruit fly, langosta, Fusarium TR4 of bananas, among others. With the experts belonging to various institutions, an agreement between institution and OIRSA is signed to allow the engagement and activities of each expert. The activities of each commando are coordinated by OIRSA.

Concerning commandos for quarantine pest, the expertise in pest diagnosis under field conditions is very important. A country can require the intervention of the commando in one or several topics such as exclusion, containment, etc. The deadline for interventions is approximately 24h and countries have to cover travel and subsistence expenses of experts.

9.3.4 Distant diagnosis expertise

Some countries like the USA have implemented a network of national experts providing rapid diagnosis through the observation of a digital picture. The system requires that a country acquire the appropriate laboratory equipment (binocular, numeric camera) and that technical staff are previously trained. This system is implemented within USA and within the Caribbean region allowing a 24h diagnosis. Nevertheless, the system assumes that samples are appropriate and requires an annual payment to accede to this experts' network.

The FG recommends setting up both globally and internationally, an expert data base and pest specific international commando. Both processes could be coordinated by IPPC. Few specific commandos could be implemented for major global quarantine pests such as Fusarium TR4 of bananas, defined annually by IPPC. Due to a diversity of language and needs, and following the availability of experts, such specific commandos could be set up at the level of RPPO (with regional experts) and be duplicated (with different experts) in various continents.

9.4 Expertise funding

There are various options to fund national and international expertise in relation with categorization of the outbreak organism. These include:

- Emergency funds provided and managed by NPPO; for exotic pest (quarantine)
- Emergency funds provided by the RPPO
- Emergency/insurance funds managed by growers concerned by crops newly infected
- Blended funds from the three above sources

Funds would be used to cover expenses of experts (travel, diagnosis costs) but expertise would not be paid.

The funding of expertise will be included in the action plan of POARS described in Recommendations for Tasks 11&12.

10 Recommendations for Task 10: Generic tools in the different areas of phytosanitary activity comprising POARS

10.1 Overview

Phytosanitary activities that make up POARS components are grouped into pre-detection/prevention and the post-detection/response categories. Pre-detection/ prevention components include horizon scanning; risk analysis; regulation inspection; prevention and preparedness; surveillance diagnostics and risk communication. Post-detection/response on the other hand, includes diagnostics; notification; response management; surveillance; eradication/containment and communication.

There are various tools available to support the activities within each component (see Appendix to Task 7). Some of these tools are readily available to NPPOs and others through the IPPC web site as contributed resources or as IPPC tools. These include standards, guidelines, and manuals, among others. However, they are not exhaustive and additional tools need to be further developed. Various tools are also available through other sources (third-party generated tools) and in some cases access and use are restricted or available through financial subscription.

Certain POARS tools will assist NPPOs to develop a comprehensive alert and response system for their country. In particular, e-RSPM, ISPM, species-target surveillance and diagnostics guidelines and manuals, e-learning training materials and access to a pool of expertise are important tools. Additionally, innovative technologies have been identified as providing new opportunities in the various POARS activities. These include capturing surveillance data (automatic insect traps, biosensors etc.), mapping pest distribution data, predicting future pest distribution with models and software, communicating pest alerts to growers and stakeholders within the country, and facilitating NPPOs to meet their reporting obligations.

The FG studied and identified the various available generic tools either within IPPC or with other parties (see Recommendations 6 and 7) and mapped how such tools can contribute to the POARS activities. Based on the study, the focus group summarizes each component and the available tools, and identifies the gaps that need to be addressed. Recommendations on the processes for developing and maintaining the tools of the toolbox and to ensure accessibility by NPPOs, RPPOs and others, are provided in Recommendation 7. This summary focuses on recommendations regarding generic tools in the different areas of phytosanitary activity comprising the POARS.

10.2 POARS Components

10.2.1 Horizon Scanning

Horizon scanning is a widely used method in futures studies in various fields, sometimes regarded as a part of foresight. It is the early detection and assessment of emerging threats or risks, and in the context of the POARS, an important activity. The available tools, sometimes referred to as “horizon scanning” tools, have different aims, corresponding to the various situations and activities listed under Step 1 Initiation in ISPM11. Some are concerned more with identifying a list of potential pest risks, while others collate and report new information that might be useful in monitoring possible changes to the potential risks, and thus drive an alert system. Some NPPOs and regions already use a risk register to continuously document/capture horizon scanning activities. There are many different approaches to developing a list of potential pest risks. CABI’s horizon scanning tool extracts potential pest risks from a global pest distribution database based on geography and other parameters and is a useful first step in creating a list of priorities.

EFSA’s horizon scanning activities cover scanning of media and literature reports for relevant information mainly on pests designated as of phytosanitary concern to Europe, with the outcome

published monthly. Pests for which information is identified that are not-regulated in the EU are further analysed by a dedicated ‘ranking’ tool. The EPPO reporting service, published monthly, and the EPPO alert list aim at providing information on pest presence and early warning. Various approaches, such as Canada’s weed categorization template, provide tools for evaluating one or more species from a list of potential quarantine pests. Other tools identified in the area of plant health horizon scanning include Medisys and PestLens. Similar approaches are used in human health (WHO EIOS) and in animal health (OIE/FAO). In all cases the aim is to provide information on how risk may be developing or changing.

Recommendations:

- a. A document on existing horizon scanning and pest prioritisation tools should be developed, including a comprehensive, annotated catalogue of available tools and methods, highlighting their pros and cons. Costed options should be made to recommend the systems POARS should put in place.
- b. Various other services scan multiple sources (especially media and scientific publications) and publish reports, some focussing mainly on prioritized pests (e.g., EFSA). Others, including “new reports” although not always official, offer information on changes in pest status etc. (e.g., PestLens). These may all be useful, but a service/tool that could provide customized media/literature scanning would be of value to many NPPOs.
- c. A detailed proposal/specification and budget (likely to be high) should be developed for a service based on elements similar to EFSA’s plant health newsletters, PestLens and others, but in which NPPOs could specify their species of phytosanitary concern to be included in the scanning processes. It may be very useful for countries to receive alerts of new eminent pests via their respective contact points. These pest alerts should be communicated automatically as depicted in a horizon scanning tool. However, as each country has its own quarantine pest list, these pest alerts should be keeping track of those pests which are spreading at an alarming rate, changing to new hosts frequently or emerging but causing huge amounts of damage. Historic examples of such pests could be the Oriental fruit fly (*Bactrocera dorsalis*) when it entered Africa and *Tuta absoluta* when it entered Europe and Africa, and more recently, the Fall Armyworm (*Spodoptera frugiperda*) and Fusarium wilt Foc Tr4 (*Fusarium oxysporum f.sp. cubense* tropical race 4).

10.2.2 Risk Analysis

Risk Analysis is an important process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it. Pest risk analysis is a vital tool to determine the magnitude of the associated threat and identify the appropriate phytosanitary measures required to protect plant resources against new or emerging pests and regulated pests of plants or plant products. There are three existing ISPM on PRA to guide NPPOs. To help countries better understand and implement these standards, IPPC developed a training course and training materials (including presentations), explaining PRA concepts. The tools include practices and group exercises to demonstrate those concepts. Various other tools are available to assist PRA activities, such as CAPRA (developed by and for EPPO), and the CABI PRA tool (<https://www.ippc.int/fr/core-activities/capacity-development/guides-and-training-materials/contributed-resource-detail/pest-risk-analysis-tool/>). The latter is available through subscription but has been provided free to 100 NPPOs. IPPC, COLEACP and CABI are also developing e-learning materials on PRA. While technical capacity for PRA needs to be supported through tools for training and implementation, one reason why PRA is still not undertaken is that NPPOs are not structured and resourced appropriately. This is addressed in the IPPC guideline on Operation of a National Plant Protection Organization.

Recommendations:

- a. An easy access link to the existing IPPC resources and other tools such as CABI should be made available
- b. IPPC should negotiate for third-party generated PRA tools to be freely accessible by NPPOs
- c. A pest specific focus group of emerging pests to be established. It would provide support to NPPOs that need urgently to perform a PRA for an emerging pests of a global concern

10.2.3 Phytosanitary Regulation

The plant quarantine regulation provides various tools that assist an NPPO in preventing the possible introduction of harmful pests. An absence of updated phytosanitary regulations or measures will significantly handicap an NPPO in the effective delivery of NPPO mandates as per the IPPC. The majority of the NPPO have the regulation adopted in the last century. The IPPC has the Phytosanitary Capacity Evaluation tool (PCE) that allows the NPPO to identify the critical gaps and deviation from the SPS and IPPC standards; however, substantial financial resources are needed to complete the PCE activity. The various ISPM guides what shall be reflected in the plant quarantine regulation. Part of the institutional challenges countries may face is the legal mandate to respond to new pest outbreaks. Old legislations are not necessarily aligned with newer ISPM and the implementation of phytosanitary measures such as destruction of crops in order to eradicate a pest, may not be possible as it is legally challenged. Therefore, it would be useful for countries to follow a guide on how to develop legislation or phytosanitary regulations or measures within existing legislation to eradicate or contain new pest outbreaks. Response plans can also be used as a guide to develop phytosanitary regulations such as the South African Australian Emergency Plant Pest Response Plans.

Recommendation:

- a. A document “Guidance on the development of implementing regulation” should be developed. It would analyse, in depth, the elements that should be taken into consideration to further develop a law on plant health. It would focus on explaining the technical elements and could also include guidance for countries to adjust these technical elements to their existing primary legislation. The framework would offer concrete recommendations to ensure consistency across legal instruments, encourage stakeholders’ participation in the development of the regulation, facilitate implementation and ensure alignment with national legal systems and traditions.
- b. A generic guideline on the possible regulatory options for new or emerging pests of global concern should be developed.

10.2.4 Inspection

IPPC has existing ISPM 23 - Guidelines for inspection for the use by the NPPO. Secondly, the IPPC also has e-learning material available for inspection and diagnostics. The additional third-party shared resources are also available on the IPPC website for NPPO’s use.

Recommendations:

- A. A practical manual should be developed for various commodity inspections, including freight containers and conveyance targeted for emerging pests of global concern.
- B. An accessible platform should be available with information on commodity or pathway inspection infested with emerging pests for targeted inspection and risk mitigation.

10.2.5 Prevention and Preparedness (including simulation exercises for pest outbreaks)

Although national documents exist, a harmonized generic outline of what NPPOs and RPPOs in collaboration with relevant stakeholders need to do to identify, eradicate, contain or manage a pest incursion or outbreak is not yet available. With this purpose in mind, a guide on contingency planning should be developed.

Contingency planning is key to responding to pest outbreaks. Timely response to quarantine pest outbreaks might increase the likelihood of containment or eradication. Simulation exercises and simulacrum would allow NPPOs and all stakeholders to be prepared and organized to respond to emergencies and assess how well the contingency plans and processes can be implemented.

Some simulation exercises have been done in Central America by FAO and OIRSA for *Fusarium TR4*, and a protocol to perform simulation exercises and simulacrums will be released soon. USDA-APHIS has the Emergency Response Manual. Australia counts with the Australian Emergency Plant Pest Response Plan (PLANT PLAN), which is a generical technical response plan. PLANT PLAN provides national guidelines for response procedures, an outline of the phases of an incursion, and the key roles and responsibilities of industry and government during each of these phases.

Recommendations:

- a. A guide on prevention and preparedness should be developed and be made widely available in UN official languages and as an e-learning course.
- b. Species-specific prevention and preparedness plans could be drafted for emerging pests of global concern or shared as contributed resources. A series of IPPC publications could be developed on the “Prevention, preparedness and response guidelines for *Spodoptera frugiperda*” model.
- c. Prepare a generic global protocols and guidelines to perform simulation exercises and simulacrums, highlighting the usefulness of ISPMs and other IPPC resources for this purpose.
- d. Tools such as apps, forms, and short explanatory videos, among other, should be developed to facilitate and assess the implementation of protocols and guidelines for simulation exercises and simulacrums.

10.2.6 Surveillance

Surveillance is one of the key operations of the NPPO to determine the status and distribution of pests. IPPC has published the “Plant Pest Surveillance A guide to understanding the principal requirements of surveillance programs for national plant protection organizations.” The other IPPC resources, such as ISPM 6 and 8 and other ISPM related to PFA, provide further guidance to NPPOs on pest surveillance. Secondly, various third-party surveillance materials (e.g., EFSA, EPPO) are also available for further guidance. The capturing of surveillance data with real-time access is lacking in many countries, which significantly impacts the NROs of NPPOs. Tools such as Pest Tracker and Crop watch Africa and Biosecurity Africa already provide platforms where survey data is captured through a cell phone application system. This makes it possible for the end users to have real time survey data available through a website link which include, distribution maps, heatmaps, reports, graphs, photos etc.

Recommendations:

- a. Various electronic platforms should be made available to capture the surveillance data or develop a generic platform that NPPOs could adopt. Such platforms could be used with different accessibility settings and information dissemination settings and can also be utilized to generate pest alerts and inform a horizon scanning tool. Many of the private companies would be able to white label existing software at a far less cost than to program new software.

The survey data is captured through a cell phone application system which makes it possible for the end users to have real time survey data available through a website link which includes, distribution maps, heatmaps, reports, graphs, photos etc. Diagnostic results are also fed to the database which then serves as verification of field observations.

- b. A “Global Pest Map” should be established to map the distribution of an emerging pest. Such a map could be directly linked to the surveillance platform.
- c. A global pest matrix or database containing Emerging Pests (EPs) and corresponding rank (high, medium, low priority) as well as available general and specific tools for EPs surveillance and response, should be developed and incorporated into the global system (POARS) web page. This global pest matrix will have the function of a database as it will be continuously populated with data.
- d. The database should provide access to the information concerning the emergency response tools and SOPs through links to the specific documents. The same database will indicate the gaps in terms of tools and SOPs and may be used for policy recommendations on where to direct research and development resources. Under Recommendation 7, a matrix that presents general and specific tools has been developed. The matrix has been populated with information on general tools and also with some tools for specific quarantine pests).
- e. The procedure that will be used to assess and priorities EPs, e.g., decision tree/matrix/dedicated tool for criteria and prioritization, etc., and the pest database should be directly linked. The procedure that will be used to assess EPs and the pest database should be part of a single system where the EP assessment tool will be feeding the EP database. Developing and maintaining the database might be a specific role of an POARS subgroup. Apart from this procedure to assess emerging pests and identify tools, it is expected that information on emerging pests and tools is also provided directly by NPPOs and RPPOs from horizon scanning and PRAs, and even by entities such as EFSA which are actively engaged in preparing PRA.

10.2.7 Diagnostics

IPPC has developed various diagnostic protocols for regulated pests under ISPMs and continues to develop additional diagnostic protocols. EPPO has developed independent diagnostic protocols which other NPPOs currently use. Similarly, the American Phytopathological Society has developed a crop compendium that assists in disease diagnostics. However, various available tools are restrictive or can only be accessed through paid service. In many developing countries, NPPOs are not able to access such services and thus have limited diagnostic capacity. To achieve a quick turnaround response for diagnostics, there is more focus on molecular diagnostics than morphological diagnostics. Molecular diagnostics are expensive and not readily adopted by developing country NPPOs. There is dire need for countries to have access to credible diagnostic laboratories as few countries can identify all the major pests in their respective countries or those identified as quarantine pests. There is a need for a network of diagnostic laboratories which can be accessed by member countries and of which the results would be accepted by other member countries.

Recommendations:

- A. The preferred route for the diagnostic standard of emerging pests should be developed and made available in a timely manner.
- B. IPPC/IC should negotiate for third-party generated diagnostic resources to be freely accessible by NPPOs.
- C. A guideline on establishing regional diagnostics network should be developed that would assist RPPOs in establishing the regional diagnostic network for NPPOs.

10.2.8 Risk Communication

Pre-detection pest risk communication aims at raising awareness about the pest. Communication can be generated by NPPOs, informing decision-makers or target partners and stakeholders to prepare for this potential threat and thus allowing for early detection and response. Post-detection communication also aims at informing about risks related to pests. Messages may be articulated differently given that the pest has already been detected. However, the goals are the same: informing decision-makers, stakeholders and partners to respond quickly, limit impacts, and raising awareness for early detection of any new infested sites. Much of the communication is generic and can be useful for any NPPO for any pest.

Different documents relating to pest risk communication already exist, including an IPPC Guide to Pest Risk Communication, which provides useful information that any NPPO can use.

Recommendations:

- A. A link to the IPPC Guide to Pest Risk Communications should be made available for easy reference by NPPOs. Links to similar tools for pest risk communications, such as the CABI's Framework for Strategic Communication during Pest Outbreak), could also be added. This guide could be translated into Spanish, Arabic, and Russian for further diffusion. The IPPC Guide to Pest Risk Communication could be made available as an e-learning course.
- B. The examples of outreach material should be made available to NPPOs and RPPOs to help raise awareness about pre- and post-detection of various plant pests. Templates for leaflets, posters news releases, media lines, and industry notices could also be developed and shared on the POARS. TR4 could be taken as an example.

10.2.9 Notification

There are various existing IPPC ISPMs available that outline the provisions and guidelines for providing notification regarding pests. These are the ISPM 13 - Guidelines for the notification of non-compliance and emergency action and ISPM 17 Pest reporting. The IPPC also has the NRO platform for the contracting parties to provide continuous updates on the pest status of their country. The NRO guide and eLearning on NRO provide further guidance to the CPs on their obligations about pest status. Currently, the IPPC is developing additional training and guidance material such as the guide on e-Commerce for plants, plant products, and other regulated articles; surveillance and reporting obligations; e-learning course, and Pest Status Guide for CPs related to the pest reporting and notification through IPPC.

Electronic survey tools create platforms with different accessibility settings and information dissemination settings. These can also be utilized to generate pest reports and notify on the IPP once pest verification has been completed. Analysis on current notification processes highlighted the following gaps:

- CPs fail to provide pest notification through NRO promptly or do not provide the information at all. This creates an information gap and weakens the pest alert system.
- Pest information is available through a non-official platform such as academia/ private and public research institute but not yet confirmed by CPs to IPPC.
- There is a lack of an integrated platform managed by IPPC showing the occurrence of global or regional pest of concern.

Recommendations

- a. IPPC/IC should strengthen the policies and procedures to strengthen the NROs by CPs.

- b. A digital online platform and mobile application should be developed that issues live notifications on pest status on emerging pests of global concern. Such early warning systems can also be replicated at regional level by RPPOs for emerging pests of regional concern.
- c. A mechanism should be established to capture the pest outbreak information from a non-official source such as academia/ private and public research institute and have the mechanism for NPPOs to validate such information before considering it and releasing it as official notification. Electronic pest survey platforms with different accessibility settings and information dissemination settings to be integrated with a system to generate notifications automatically. NPPOs will still be able to set the notification settings in terms of the diagnostic verification or other information needed to release the notification.

10.2.10 Response Management

Response Management is an essential component to address pest outbreaks via eradication and containment. NPPOs must have defined, established and documented procedures to address a pest outbreak. A timely response action will ensure and increase the chance of eradication and lowers the probability of establishment. A response action requires multiple resources and technical and policy decisions at the NPPO level, including government. Therefore, pre-established procedures will effectively guide the NPPO in the activation and implementation of the response action. Different emergency response plans, documents and manuals are available with NPPOs. Some of these documents are precise to a particular country, while some are generic and could be tailor-made to suit other NPPOs requirements. The majority of these response plans have been tested by NPPOs and should assure other countries that they are useful tools in a similar scenario. Developing individual NPPOs response management plans require considerable human and financial resources; however, all response plans address the same issue – outbreak/incursion of pests. The availability of a generic Emergency Response Plan (ERP) will allow NPPOs to adopt those plans with alterations to reflect the operation structure of the NPPO. These will save considerable resources, and support NPPOs in being proactive against pest incursion.

Recommendations

- a. IPPC/IC should support RPPOs to develop a generic Emergency Response Plan for an NPPO, with reference to existing response plans studied by the POARS.
- b. An assessment guideline should be developed for decision making on best feasible response management.
- c. The current development of the IPPC Guide on prevention and preparedness planning will complement a generic response plan.

10.2.11 Eradication or Containment

Post detection of a pest, surveillance is important to determine the distribution of the pest of concern, and implement eradication/containment actions to prevent its spread. During this process, the documentation of the implemented actions is important and the declaration by the NPPO of the eradication of the pest.

The most relevant tool for pest eradication is the Guidelines for pest eradication programs (<http://www.fao.org/3/x2981e/x2981e.pdf>)

Recommendation

- a. The use of Gerda (<http://b3.net.nz/gerda/>) could be promoted since it offers a summary of eradication programs from around the world. Another possibility would be the development of a system similar to GERDA by the CIPF. This tool could facilitate the exchange of experiences in pest eradication by different countries.

11 Recommendations for Tasks 11 & 12 – POARS Work plan

The POARS work plan presented in the Strategic Framework Development Agenda implementation for 2020-2024 document noted by CPM in 2019 remains valid. Table 1 below lists these activities and their status.

Table 2: POARS Activities and status as of January 2022

Activities and tasks	Status of the activity
1. Analysis and report – global state of emerging pest risk scanning and reporting, impediments to reporting	See related study.
2. Definition of organizational structure and user requirements needing to be in place for an enhanced scanning and reporting system	See the CPM FG POARS proposals.
3. Development and global adoption of enabling policies to encourage and optimise reporting including IPPC mandate and operating structures	See the CPM FG POARS recommendations to the IC Subgroup on NROs. CPM FG POARS recommends setting Epidemic Intelligence from Open Sources (EIOS)
4. Establishment of a network of phytosanitary emergency response expertise/tools and making it available to all NPPOs via a global platform	See the CPM FG POARS proposals.
5. Development, adoption and application of processes for rapidly engaging expertise and response resources	See the CPM FG POARS proposals.
6. Establishment of a POARS toolbox	See the CPM FG POARS recommendations on tools to be developed as well as on the governance to be set to develop these tools.
7. Facilitation of adoption of the POARS globally and advocacy with potential fund providers	Discussions are being held to mutualize activities with the Emergency Management Centre Animal Health Unit within FAO.

11.1 Budget to conduct the POARS activities within the IPPC Secretariat

During CPM 14 (2019), the CPM “called on the IPPC Secretariat to establish an emergency trust fund to support addressing issues related to emerging pests and emergency issues. The CPs further encouraged FAO and the IPPC Secretariat to have a holistic rather than a country-by-country approach to deal with emerging pest issues”⁷. The IPPC Secretariat explored this point and considered that because the current Multi Donor Trust Fund can be used for this purpose, there was no need to create a new trust fund. CPs and other resource partners are able to contribute to priorities associated with emerging pests and emergency issues in the Multi-Donor Trust Fund.

As proposed, POARS would be a new system, inspired by other similar systems such as the one for animal health, but adapted to the peculiarities of plant health. In its initial phase, its structure needs to be based on a small nucleus of fully dedicated staff.

To have a continuous operating capacity and to ensure the sustainability of this system, considerations should be given to allocating regular budget funds towards this work. In addition, additional budget funds could be mobilized.

To support the POARS and the initial work of a POARS Steering Group, the following human resources would be needed (estimates in USD):

⁷ FAO, IPPC (2019) Report of the Fourteenth Session of the Commission on Phytosanitary Measures. 295 pages. https://assets.ippc.int/static/media/files/publication/en/2019/07/CPM-14_Report_withSPMs-2019-07-31.pdf

- One manager (P4 level, \$200k per year)
- One dedicated IT developer (P2 level, \$130k per year)
- Part time administrative person (G3 level, \$40k per year)
- Two scientific officers (P2 level, \$140k per year x 2 = 280k per year)
- One human resource for relations with the regions and the RPPOs, the One Health nexus, WHO and other relevant organizations (P3 level, \$160k per year)
- A part time communication expert (Consultant, \$40k per year)

A further \$100k per year should be made available for the procurement of external services such as translation, IT support and experts' meetings. The budget for the staff, including equipment, can be estimated per year at \$950k.

As a minimum, to start the activities and manage the POARS Steering Group for the first three years, the following staff would be necessary:

- One part time manager (P4 level, \$100k per year)
- One part-time dedicated IT developer (P2 level, \$65k per year)
- Quarter time administrative officer (G3 level, \$20k per year)
- One scientific officer (P2 level, \$140k per year)

As indicated above, at a minimum, a further \$100k per year should be made available for the procurement of external services such as translation, IT support and experts' meetings, to occur possibly face-to-face.

The IPPC Secretariat would manage the daily activities for the delivery of the POARS work plan.

11.2 Managing field emergency interventions

A well-structured global pest alert and response system should provide guidance and information to CPs on available mechanisms for timely response to emerging pest incursions and outbreaks. This would contribute to preventing potential devastating effects to food production and commercialization.

Emergency interventions for a pest can be of limited duration (few months) or can extend to a few years when necessary. The necessary budget for these types of field interventions may vary depending on the magnitude of the outbreak from a few hundred thousand to several million US dollars. Tools to assist in estimating costs of such an intervention are available for some pests including fruit fly quarantine pests.

The IPPC Secretariat would not be directly involved in on-the-ground emergency interventions. In this regard, the FAO Emergency Management Centre (EMC) fills the gap for emerging pests and diseases of concern to animal health. The EMC has an organizational structure that includes coordinators at regional level. It is well staffed and adequate financial resources from extra budgetary contributions allow EMC to support Member States in operational matters such as supporting national diagnostic laboratories and field interventions. The EMC also has a so-called Incidence Coordination Group (ICG). This structure is similar to a Steering Committee with one of its main roles being to define the governance of the participating entities and to engage stakeholders from public and private organizations. It is recommended that a similar structure be established for Plant Health within EMC, possibly under the One-Health-Umbrella initiative.

References

- Adopted Standards (ISPMs) <https://www.ippc.int/en/core-activities/standards-setting/ispms/>
- Crop Watch Africa <https://www.cropwatch.africa/>
- EPPO campaign “Don’t Risk it” https://www.eppo.int/RESOURCES/eppo_publications/don_t_risk_it
- FAO/IAEA (2007) Cost-Benefit Analysis Model: A tool for fruit fly area-wide management. Procedure manual. 21 p. https://inis.iaea.org/collection/NCLCollectionStore/_Public/38/105/38105599.pdf?r=1
- FAO, IPPC (2019) Report of the Fourteenth Session of the Commission on Phytosanitary Measures. 295 pages. https://assets.ippc.int/static/media/files/publication/en/2019/07/CPM-14_Report_withISPMs-2019-07-31.pdf
- FAO, IPPC (2017) ISPM 9 Guidelines for Pest Eradication Programmes. <https://www.fao.org/3/x2981e/x2981e.pdf>
- Global Action for Fall Armyworm Control <https://www.fao.org/fall-armyworm/en/>
- International Year of Plant Health 2020 material <http://www.fao.org/plant-health-2020/communication-toolkit/en/>
- InvaCost, a public database of the economic costs of biological invasions worldwide available at <https://www.nature.com/articles/s41597-020-00586-z>
- IPP Component page on eradication <https://www.ippc.int/fr/core-activities/capacity-development/phytosanitary-system/eradication/>
- IPP Component page on Surveillance <https://www.ippc.int/fr/core-activities/capacity-development/phytosanitary-system/surveillance/>
- IPP Publications: <https://www.ippc.int/en/publications/>
- IPPC (2019) Guide for Establishing and Maintaining Pest Free Areas. Published by FAO on behalf of the Secretariat of the International Plant Protection Convention (IPPC). <http://www.fao.org/3/ca5844en/CA5844EN.pdf>
- IPSA video on *Fusarium oxysporum* f. sp. *cubense* Tropical Race 4 (TR4) simulation in Nicaragua in August 2019: <https://www.ipsa.gob.ni/NOTICIAS/itemid/157/SIMULACRO-IPSA-ANTE-UN-POSIBLE-BROTE-DE-LA-MARCHITEZ-POR-FUSARIUM>
- Organismo Internacional Regional de Sanidad Agropecuaria (OIRSA) website <https://www.oirsa.org/>
- Pest Tracker (CAPS) <https://pest.ceris.purdue.edu/pests.php>
- Plant Health Australia’s Emergency Plant Pest Response Deed (EPPRD) <https://www.planthealthaustralia.com.au/biosecurity/emergency-plant-pest-response-deed/>
- South African Emergency Plant Pest Response Plan <https://www.nda.agric.za/doaDev/sideMenu/plantHealth/docs/South%20African%20Emergency%20Plan%20Pest%20Response%20Plan%202013.pdf>
- Tenth session of the Strategic Planning Group meeting, October 2021: https://assets.ippc.int/static/media/files/publication/en/2021/12/FINAL_SPG_Oct_Report_2021-12-07.pdf
- US inter-governmental Educational Programme “Don’t Pack a Pest” <https://www.dontpackapest.com/>

Appendix 1. Tables listing components identified in different systems from Task 1

Table 1. Components to be utilised to form an alert for quarantine pests.

Component	Plant health	Animal health	Human health or food safety
Ease of national reporting	Facilitation of pest reporting (IPPC National Regional Obligations, OIRSA, COSAVE, CABI, EPPO, EUROPHYT, NAPPO, National Plant Diagnostic Network (NPDN)-APHIS, PestLens, RPPOs)	Facilitation of disease and zoonosis reporting (OIE, OIRSA), World Animal Health Information System (WAHIS)	
Setting criteria and lists	Establishment of criteria and lists to consider a pest as an emerging threat (criteria for a pest to be in an alert list, PRA and conclusion) (EPPO) ISPM 11 (<i>Pest risk analysis for quarantine pests</i>) (IPPC Secretariat), pest risk analysis (IICA), guidance on quantitative pest risk assessment (EFSA) EFSA media and literature monitoring, EPPO alert lists, EPPO reporting service	Receipt of information on confirmed outbreaks and emerging diseases, and analysis of it to decide on a possible necessary action in line with OIE standards (OIE)	Investigation and characterization of events and assessment of risks of emerging epidemics (GOARN)
Monitoring	Global, regional and national pest monitoring (EMPRES, CABI, OIRSA, COSAVE, EPPO, EFSA horizon scanning, NPDN-AHIS PPQ CAPS)	Monitoring of rumours (GLEWS) and confirmed outbreaks and sharing of information that has been validated (OIE) Establishment of networks for specific diseases (e.g. OFFLU for influenzas)	Monitoring and sharing of information (INFOSAN, GOARN)
Modelling and forecasting	Modelling and forecasting (CABI, OIRSA, EMPRES, but also NPPOs, USDA, EFSA, satellite information for locust forecasting (DLIS-FAO), national and international meteorological forecasting (NASA, etc.))	Global Early Warning and Response System for Major Animal Diseases, including zoonoses (GLEWS – OIE, FAO, WHO)	
Sharing information	Free availability of targeted and analysed information sent directly to target audience, with clear indication of risk and recommendations for action, through emails, newsletters (EFSA, EPPO), a website (EFSA, EPPO) or telegram (CABI) Establishment of tools to share this information (IPPC Strategic Framework)	OIE-WAHIS OIE General Session OIE Scientific and Technical Review_OIE Bulletin	Disease outbreak news (GOARN)
Displaying maps	Visualization in the form of maps of distribution records (EPPO, CABI)	OIE-WAHIS disease outbreak and disease distribution maps (OIE)	
Storing information	Storage of verified information in a suitable and accessible database (EPPO, USDA CAPS, NPDN; database on epidemic intelligence at French and European levels (EFSA newsletters))	OIE-WAHIS; French platform ESA	Database on epidemic intelligence, verification status, laboratory investigations (GOARN)
Partnering	The CBD – Invasive Alien Species activity partners with the GEF for funding	Building of networks for surveillance and research (OIE) (e.g. OFFLU, RVF).	

		Tripartite+ mechanisms for cooperation between OIE, FAO, WHO and UNEP	
Capacity development	STDF, USAID, IICA, CIRAD, FAO, World Bank, South-South Cooperation (SSC), EU-funded programmes	CIRAD, IICA, FAO, OIE PVS programme	Delivery of training (GOARN)

Notes: **ISPM 11.** *Pest risk analysis for quarantine pests.* Rome, IPPC Secretariat, FAO. www.ippc.int/en/publications/639

CBD – GEF, Convention on Biological Diversity – Global Environment Facility

CIRAD, Centre de coopération internationale en recherche agronomique pour le développement

12 COSAVE, Comité Regional de Sanidad Vegetal del Cono Sur

EUPHRESO, network of organisations that fund research projects and coordinate national research in the phytosanitary area

13 EUROPHYT, European Union Notification System for Plant Health Interceptions

GF-TADS, Global Framework for the Progressive Control of Transboundary Animal Diseases

IICA, Inter-American Institute for Cooperation in Agriculture

NASA, National Aeronautics and Space Administration

PestLens, APHIS-PPQ's phytosanitary early-warning system

OFFLU, World Organisation for Animal Health (OIE)/Food and Agriculture Organization of the United Nations (FAO) global network of expertise on animal influenza

ProMED-Mail, International Society for Infectious Diseases

STAR-IDAZ, International Research Consortium on Animal Health

STDF, Standard and Trade Development Facility

USAID, United States Agency for International Development

Table 2. Components to be utilised in response to a pest outbreak

Components	Plant health	Animal health	Human health or food safety
Building a network of experts able to intervene	Creation of a pool of experts on the surveillance and eradication of specific invasive pests at national, regional and global levels (INFOSAN, OIRSA) Provision of mechanisms to allow sharing of documents, experience and expertise among this network of experts on specific pests Assignment of IPPC recognized reference laboratories with regional capacity to assess the epidemiological situation in a country and define the actions required (e.g. in the case of invasive fruit fly pests, the Moscamed Programme of the governments of Guatemala, Mexico and the United States of America has provided expert advice and sterile flies to eradicate outbreaks).	Assignment of reference laboratories and collaborating centres (OIE Reference Centres provide support to Member Countries for disease detection and control (OIE Reference Laboratories) and for horizontal topics such as epidemiology and food safety (OIE Collaborating Centres)) Disease specific networks (sometimes joint OIE and FAO) (e.g. OFFLU for animal influenzas) FAO – Emergency Management Centre-Animal Health provides experts for response missions (sometimes jointly with OIE and or WHO) New World Screwworm Reference Laboratory COPG Panama	Mobilization and deployment of experts to the field (GOARN)
Building a coordination mechanism across the network	IPPC Umbrella Programme/IPPC Global Pest Alert and Emergency Response System, EMPRES, RPPOs	EMPRES, Global Early Warning and Response System for Major Animal Diseases, including Zoonoses (GLEWS – OIE, FAO, WHO) GF-TADS – OIE/FAO Global Framework for Control of Transboundary Animal Diseases	Rapid identification, verification and communication of threats, ensuring a coordinated mechanism for outbreak alert and response (GOARN) Coordination of partners
Keeping experts up to date	Provision of virtual e-learning courses, including on simulation (e.g. INFOSAN, OIRSA) and fruit fly surveillance (IAEA), to keep the experts of the network up to date	OIE <i>Scientific and Technical Review</i>, Bulletin, global conferences, ad hoc group meetings, specialist commissions, training, national focal points for specific technical areas (wildlife, veterinary products, disease reporting, welfare, laboratories, aquatics)	Provision of virtual e-learning courses, including on simulation, to keep the experts of the network up to date (e.g. GOARN, INFOSAN)

Sharing information	IPPC Umbrella Programme/IPPC Global Pest Alert and Emergency Response System Sharing of available and updated information on the pests (contingency response plans, delimitation methods, diagnostic protocols, containment protocols, lists of lures, attractants and control agents, control options, phytosanitary treatments, etc.) (OIRSA) Sharing of information through database and email notification (ProMED, PestLens, EPPO, EFSA, Global eradication and response database (GERDA))	Sharing information through database (OIE – WAHIS, ProMED-mail)	
Securing funding and material	Securing of funding and material at the national and regional level for rapid intervention (to cover flight tickets, protective gear, phytosanitary products or other material) (OIRSA) STDF, World Bank, BID, USAID, EU, CBD – GEF are examples of institutions securing funding.		
Capacity development	Frequent capacity development through simulations (OIRSA) FAO and IAEA technical cooperation projects, STDF, USAID, IICA, UE	Performance of Veterinary Services Pathway Simulation exercises	Frequent capacity development through simulations, training (INFOSAN, GOARN)
Wider technical assistance	FAO and IAEA technical cooperation projects Provision of phytosanitary technical assistance, in particular for surveillance (INFOSAN, OIRSA)	Strengthening of reference laboratories and collaborating centres (OIE) Laboratory twinning Provision of guidance materials and advice	
Early response	Establishment of early response capacity at national, regional and intercontinental levels for targeted disease control, based on prompt and authoritative disease investigation and diagnosis, in order to limit the spread of outbreaks of regional priority diseases (OIE)		
Increasing public awareness	Public information and education programmes to overcome professional and public resistance to pest-eradication interventions and to educate the public at large in order to contribute to early detection by the reporting of invasive pest incursions and in order to reduce the risk of unintentional release of non-native invasive species (e.g. United States of America intergovernmental educational programme “Don’t Pack a Pest”)	Communications campaigns, global strategies, regular stakeholder consultations and meetings.	

	(www.dontpackapest.co/), FAO and IAEA Technical Cooperation projects, RPPOs, NPPOs, CBD		
Research and development	Establishment of priorities for novel technologies to enhance diagnostic capabilities, tools for early detection, and tools for sustainable and environmentally friendly pest prevention, suppression and eradication Investment in collecting baseline information on the biology, detection, risk, and management of invasive pests (FAO consultant meetings and NPPO research capabilities). EUPHRESKO, EU-funded research programmes, USDA National Institute of Food and Agriculture, USAID are coordinating research efforts.	STAR-IDAZ – international research consortium for animal health Research agendas (e.g. OFFLU research agenda)	
Legal framework	Quick identification and availability of surveillance and control tools to enable a rapid response, using special authorization if required.	OIE standards	WHO's IHR

Appendix 2: Terms of Reference for the Steering Group of the Global Pest Outbreak Alert and Response System

1. Background

During CPM-14 (2019), Member States strongly supported the establishment of a Global Pest Outbreak Alert and Response Systems (POARS), as no such systems exist within the IPPC Community. CPM-14 (2019) requested that the Bureau draft an action plan for an IPPC pest emergency system and submit it to CPM-15 (2020) with input from the SPG. The IPPC Secretariat developed this action plan and aligned it with IPPC Strategic Framework development agenda item on “Strengthening Pest Outbreak Alert and Response System”. The concepts of “emerging pests” and “emergency situations” were embedded in this action plan and the scope was limited to quarantine or potential quarantine pests.

A Focus Group on POARS provided its recommendations in 2022, advocating for the creation of a new CPM Subsidiary body, the POARS Committee. The SPG expressed concerns about the long-term impact and funding implications and challenges of establishing a new CPM Subsidiary body and the need to consider the potential costs, benefits and the return on investment. To explore these elements in depth, the FG suggested, that a POARS Steering Group (SG) could be established as an interim measure, following the model of the ePhyto Steering Group.

2. Purpose

The POARS SG will provide coordination, guidance and advice on IPPC actions to develop and implement a Global Pest Outbreak Alert and Response System, avoiding duplication and building synergies with other systems.

3. Duration and Review

POARS SG will be initially established for three years and will make recommendations for its future to CPM each year.

4. Composition of the Steering Group

The Steering Group is skills- and knowledge-based, composed of the following nine members:

- At least one expert from a RPPO
- At least two experts from NPPOs
- At least one donor representative
- At least one international or regional research institution representative
- At least one representative from an international organization dealing with outbreaks and responses
- One representative from each of the IC and SC

The IPPC Secretariat supports equity, diversity and inclusiveness, and encourages all interested experts to submit their candidature to participate in the POARS SG. The members of this SG will be selected based on their technical and practical expertise in the subject matter. Geographical representation from both developing and developed countries will also be considered to ensure that the outputs are globally relevant, applicable and reflect best practices from all over the world.

The following criteria should be used for selecting SG members:

- Actively engaged in existing global and/or regional pest alert and response frameworks
- Experience in designing and managing pest alert and response systems
- Proven experience in promoting and articulating public-private partnerships

- Full understanding of international phytosanitary standards and legislation

The Chair will be selected by the membership and will remain chair for the duration of the SG. The IPPC Secretariat will provide support, coordinate and facilitate the functions of the SG.

5. Reporting

The IPPC Secretariat on behalf of the SG reports to the CPM Bureau.

6. Functions

The functions of the POARS Steering Group will be to:

- Define clearly the relative roles of the POARS Steering Group in relation to IC, to ensure synergy rather than overlap
- Analyse the pros and cons of setting a POARS Steering Committee and the return on investment among its other functions
- Ensure coherent implementation of POARS
- Establish directives looking into the future
- Make recommendations for the necessary POARS resources (staff and financial)
- Provide access to existing and new pest alert and response systems
- Promote and articulate the establishment of a network of international organizations and experts actively involved in Pest Alert and Emergency Response
- Promote and articulate a network for information exchange and resource mobilization in the event of an imminent threat, incursion or outbreak to facilitate advocacy initiatives with potential donors
- Set-up working groups to address specific tasks, including establishing emerging pest criteria and a clear procedure to assess and rank emerging pests, as recommended by the Focus Group
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7. Funding and organization of meetings

Funding for Steering Group members participation in regular or extraordinary meetings will be provided by the respective members' organizations or through the fund established specifically to support POARS.

The SG, through the CPM Bureau will provide a report to the CPM. The SG will meet virtually on an *ad hoc* basis as required and if possible, will meet at the IPPC Secretariat headquarters in Rome or in another mutually agreed upon venue.

IPPC

The International Plant Protection Convention (IPPC) is an international plant health agreement that aims to protect global plant resources and facilitate safe trade.

The IPPC vision is that all countries have the capacity to implement harmonized measures to prevent pest introductions and spread, and minimize the impacts of pests on food security, trade, economic growth, and the environment.

Organization

There are over 180 IPPC contracting parties.

Each contracting party has a national plant protection organization (NPPO) and an official IPPC contact point.

10 regional plant protection organizations (RPPOs) have been established to coordinate NPPOs in various regions of the world.

The IPPC Secretariat liaises with relevant international organizations to help build regional and national capacities.

The IPPC Secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO).

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