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Global emerging issues

A report of findings from the
2016 IPPC regional workshops questionnaire



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As part of the FAO foresight initiative, the Implementation Review and Support System (IRSS) prepared the questionnaire – Emerging Issues in Plant Health, that was sent to all contracting parties participating in the 2016 IPPC Regional Workshops. The questionnaire was also sent to all regional plant protection organizations (RPPOs). The questionnaire asked participating contracting parties and RPPOs to list the five most important emerging issues related to plant health in the next two to five years and provide short explanations for each issue. The information gained from the questionnaire responses will help the IPPC Secretariat, RPPOs and the Commission on Phytosanitary Measures (CPM) to understand national and regional emerging issues and trends between geographic areas.

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Acronyms

CPM	Commission on Phytosanitary Measures (of the IPPC)
FAO	Food and Agriculture Organization (of the United Nations)
IPPC	International Plant Protection Convention
IRSS	Implementation Review and Support System (IRSS)
NAPPO	North American Plant Protection Organization
RPPO	regional plant protection organization
TC-RPPO	Technical Consultation among Regional Plant Protection Organizations

Background

Since 2015 the International Plant Protection Convention (IPPC) Secretariat has participated in the Food and Agriculture Organization (FAO) Foresight group to work towards developing methodologies to identify emerging issues and their impacts, and explore potential strategies to mitigate risk, thus enhancing organizational foresight. The FAO Foresight group is composed of staff from the technical sectors of food safety, fisheries, animal health, plant health and the environment.

As part of the FAO foresight initiative, the Implementation Review and Support System (IRSS) prepared the questionnaire – *Emerging Issues in Plant Health* (Annex 1) that was sent to all contracting parties participating in the 2016 IPPC Regional Workshops. The questionnaire was also sent to all regional plant protection organizations (RPPOs). The questionnaire asked participating contracting parties and RPPOs to list the five most important emerging issues related to plant health in the next two to five years and provide short explanations for each issue.

Responses were received from 90 contracting parties out of 114 participating in workshops, a response rate of 78.9 percent. Additional responses were received from the nine regional plant protection organizations (RPPOs), however only seven of

these were from a regional perspective (opposed to cumulative national responses), a response rate of 77.8 percent.

The analysis of questionnaire responses was undertaken by the IPPC Secretariat to identify emerging issue trends within and between regions. The findings of this questionnaire are therefore presented globally and regionally.

The five most common emerging issues across all participating contracting parties and regions were in relation to:

- ◆ Introduction of new pests
- ◆ Climate change
- ◆ Phytosanitary capacity of pest surveillance
- ◆ Phytosanitary capacity of inspection and pest reporting systems
- ◆ Overuse of chemicals for pest risk management

This information gained from the questionnaire responses will help the IPPC Secretariat, RPPOs and the Commission on Phytosanitary Measures (CPM) understand national and regional emerging issues and trends between geographic areas. Feedback sessions are planned for the 2017 IPPC Regional Workshops to provide participating contracting parties with regional findings and conclusions.



Findings

Emerging issues themes

Findings from the *Emerging Issues in Plant Health* questionnaire are presented as global and regional summaries based on participating contracting party responses and also from the perspective of RPPOs, through their responses on behalf of regions. The emerging issues identified from analysis of the questionnaires are presented in themes under the following categories. Detailed findings of the questionnaire responses can be found in Annex 2.

- ◆ Environment
- ◆ Plant pests: diseases
- ◆ Plant pests: other
- ◆ Collaboration
- ◆ Policy
- ◆ Resource limitations
- ◆ Phytosanitary capacity
- ◆ Trade issues

Environment

The emerging issues relating to the environment that have been specified by participating contracting parties and RPPOs range from situations that can be managed to those that cannot. The occurrence of climate change and risk of natural disasters cannot be controlled, compared the overuse of chemicals for pest risk management, pollution to the environment and poor soil conditions through mismanagement.

Plant pests: diseases

Plant diseases that have been specified by participating contracting parties and RPPOs are vary widely. They include rots of roots, stems, fruit and pods, cankers, blights, fungal infections, phytoplasmas, viruses and various soil diseases.

Plant pests: other

Other plant pests listed by participating contracting parties and RPPOs as emerging risks include insects, arachnids, molluscs and nematodes. Insects are specified as the most common plant pests of concern including beetles and weevils, fruit flies, several moth species (larvae and adults) and others. In addition to species of mites, snails and nematodes.

Collaboration

The need for collaboration is an area contracting parties and RPPOs have indicated there is need for improvement. This includes collaboration at the national, regional and global levels. Specifically, there is a need to strengthen legislative and regulatory frameworks of contracting parties to promote collaboration between national stakeholders. Regional collaboration is considered necessary for better cooperation with neighbouring countries and global collaboration between RPPOs and with the IPPC.

Policy

The policy aspects that contracting parties and RPPOs have specified as necessary to address include national phytosanitary strategies and legislation, resilience to the national political situations, responses to national phytosanitary emergencies and risk management of sea containers.

Resource limitations

Resource limitations are a common theme specified by contracting parties and RPPOs as risks to the sustainability of their phytosanitary systems. These include access to financial resources, having appropriately trained staff and the ability to retain them, facilities where phytosanitary activities can be undertaken, such as inspections, and sufficient infrastructure.

Phytosanitary capacity

The need to have an appropriate level of national phytosanitary capacity has been specified by contracting parties and RPPOs as very important. The areas identified where there is a need to develop capacity includes pest surveillance, inspection, pest reporting, plant pest diagnostics, phytosanitary treatments, new agricultural practices, pest risk analysis, use of new technologies such as the ePhyto system and the ability to raise national phytosanitary awareness.

Trade issues

The trade issues that are considered by contracting parties and RPPOs to be of importance include establishment and implementation of economic partnerships and agreements, market access, risks associated with e-commerce in plants and plant products, illegal plant trade and risk associated with increasing tourist numbers.

Global emerging issues

At the global level (all participating contracting parties and RPPO respondents), the most important emerging issue specified by participating contracting parties and RPPOs is the need for strengthened phytosanitary capacity. This is followed by issues associated with emerging pests in general, the environment, plant pests: diseases, plant pests: other and resource limitations. The emerging issues considered the lowest priority include trade issues, collaboration and policy (Table 1).

Table 1: Prioritization of emerging issues in plant health (global)

Emerging issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	144	22.6%
Emerging pests (general)	95	14.9%
Environment	88	13.8%
Plant pests: diseases	85	13.3%
Plant pests: other	79	12.4%
Resource limitations	58	9.1%
Trade issues	35	5.5%
Collaboration	34	5.3%
Policy	20	3.1%

Africa

Twenty four contracting parties participated in this questionnaire from the African region. The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by emerging issues associated with the environment, emerging pests in general, plant pests: other, resource limitations and plant pests: diseases. The emerging issues considered the lowest priority include collaboration, trade issues and policy (Table 2).

Table 2: Prioritization of emerging issues in plant health (Africa)

Emerging issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	21	17.4%
Environment	18	14.9%
Emerging pests (general)	17	14.1%
Plant pests: other	16	13.2%
Resource limitations	16	13.2%
Plant pests: diseases	15	12.4%
Collaboration	8	6.6%
Trade issues	5	4.1%
Policy	5	4.1%

The main phytosanitary capacity needs of Africa are use of new agricultural practices, inspection, pest reporting, diagnostics and the ability to raise national phytosanitary awareness. Environmental concerns include climate change and overuse of chemicals for pest risk management. The main concern of emerging pests in general for Africa is the introduction of new pests. Plant diseases of concern include Maize lethal necrosis disease, bunch root

diseases and *Fusarium oxysporum* f. sp. *cubense* Race 4 (Panama disease) and other plant pests include fruit flies and *Tuta absoluta* (tomato leafminer). There are general lack of resources, trade issues are centered on market access and there is room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks and associated policies. Policies associated with sea containers were also seen as necessary to avoid associated risks.

Asia

Seventeen contracting parties participated in this questionnaire from the Asian region. The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by emerging pests in general, plant pests: other and the environment. The emerging issues considered the lowest priority include plant pests: diseases, resource limitations, trade issues, collaboration and policy (Table 3).

Table 3: Prioritization of emerging issues in plant health (Asia)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	29	29%
Emerging pests (general)	17	17%
Plant pests: other	15	15%
Environment	11	11%
Plant pests: diseases	9	9%
Resource limitations	7	7%
Trade issues	6	6%
Collaboration	4	4%
Policy	2	2%

The main phytosanitary capacity needs of Asia are pest surveillance, inspection, pest reporting, diagnostics and use of phytosanitary treatments. The main concern of emerging pests in general for Asia is the introduction of new pests. The plant disease of concern to Asia is *Xylella fastidiosa* (Pierce's disease) and other plant pests include *Nilaparvata lugens* (brown planthopper), Golden snail and *Trogoderma granarium* (Khapra beetle). Environmental concerns include overuse of chemicals for pest risk management and climate change. Resource limitations include access to facilities, sufficient infrastructure and financial resources. Trade issues are centered on market access and there is room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks. Policies associated with sea containers were also seen as necessary to avoid associated risks.

Caribbean

Eight contracting parties participated in this questionnaire from the Caribbean region. The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by resource limitations, emerging pests in general and plant pests: diseases. The emerging issues considered the lowest priority include policy, the environment, plant pests: other, trade issues and collaboration (Table 4).

Table 4: Prioritization of emerging issues in plant health (Caribbean)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	17	27.9%
Resource limitations	11	18.1%
Emerging pests (general)	8	13.1%
Plant pests: diseases	6	9.8%
Policy	5	8.2%
Environment	5	8.2%
Plant pests: other	3	4.9%
Trade issues	3	4.9%
Collaboration	3	4.9%

The main phytosanitary capacity needs of the Caribbean are inspection, pest reporting, and pest surveillance. Resource limitations of importance include having appropriately trained staff and the ability to retain them and sufficient infrastructure. The main concern of emerging pests in general for the Caribbean is the introduction of new pests. Plant diseases of concern to the Caribbean include *Candidatus Liberibacter spp.* (Citrus greening) and Lethal yellowing of palm/coconut, however other plant pests aren't specified as a major concern. Policy issues are listed as weaknesses associated with national legislative and regulatory frameworks. There is an environmental concern for climate change, room for improvement in regional collaboration and no particular trade issues.

Europe

Five contracting parties participated in this questionnaire from the Central Asian and Eastern European region. The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by resource limitations, emerging pests in general, the environment, policy, plant pests: other and collaboration. The emerging issues considered the lowest priority include trade issues and plant pests: diseases (Table 5).

Table 5: Prioritization of emerging issues in plant health (Europe)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	8	25%
Resource limitations	5	15.6%
Emerging pests (general)	3	9.4%
Environment	3	9.4%
Policy	3	9.4%
Plant pests: other	3	9.4%
Collaboration	3	9.4%
Trade issues	2	6.2%
Plant pests: diseases	2	6.2%

The main phytosanitary capacity needs of Central Asia and Eastern Europe are pest surveillance, inspection, pest reporting and pest risk analysis. Resource limitations of importance include having appropriately trained staff and the ability to retain them and sufficient infrastructure. The main con-

cern of emerging pests in general for Central Asia and Eastern Europe is the introduction of new pests. Environmental concerns include overuse of chemicals for pest risk management and climate change. No specific plant diseases or other plant pests are of major concern. There is room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks and no particular trade issues.

Latin America

Fifteen contracting parties participated in this questionnaire from the Latin American region. The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by emerging pests in general, plant pests: diseases and plant pests: other. The emerging issues considered the lowest priority include the environment, trade issues, collaboration, resource limitations and policy (Table 6).

Table 6: Prioritization of emerging issues in plant health (Latin America)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	29	26.7%
Emerging pests (general)	16	14.7%
Plant pests: diseases	15	13.8%
Plant pests: other	14	12.8%
Environment	8	7.3%
Trade issues	8	7.3%
Collaboration	8	7.3%
Resource limitations	7	6.4%
Policy	4	3.7%

The main phytosanitary capacity needs of Latin America are pest surveillance, use of phytosanitary treatments, inspection, pest reporting and diagnostics. The main concern of emerging pests in general for Latin America is the introduction of new pests. Plant diseases of concern include *Candidatus Liberibacter* spp. (Citrus greening), *Fusarium oxysporum* f. sp. *cubense* Race 4 (Panama disease) and *Xylella fastidiosa* (Pierce's disease) and other plant pests include fruit flies, *Lobesia botrana* (European grapevine moth) and *Trogoderma granarium* (Khapra beetle). Environmental concerns include climate change and overuse of chemicals for pest risk management. Trade issues are centered on market access. There is room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks associated policies. Resource limitations of importance include having appropriately trained staff and the ability to retain them and sufficient financial resources.

Near East

Seven contracting parties participated in this questionnaire from the Near East region. The most important emerging issue specified by participating contracting parties are emerging pests in general and plant pests: diseases. This is followed by the need for strengthened phytosanitary capacity, plant pests: other and the environment. The emerging issues considered the lowest priority include resource limitations, trade issues and collaboration (Table 7).

Table 7: Prioritization of emerging issues in plant health (Near East)

Emerging Issues	Response rate (count)	Response rate (percent)
Plant pests: diseases	9	20%
Emerging pests (general)	9	20%
Phytosanitary capacity	8	17.8%
Plant pests: other	8	17.8%
Environment	6	13.3%
Resource limitations	2	4.4%
Trade issues	2	4.4%
Collaboration	1	2.3%
Policy	0	0%

The main concern of emerging pests in general for the Near East are the introduction of new pests, increasing resistance to pesticides and emergence of new pest biotypes. The plant disease of major concern is *Xylella fastidiosa* (Pierce's disease) and other plant pests of concern are fruit flies. The main phytosanitary capacity needs of the Near East are pest surveillance and the ability to raise national phytosanitary awareness. Environmental concerns include climate change and overuse of chemicals for pest risk management. Resource limitations, trade issues and collaboration are not considered to be of high importance to the Near East and no issues relating to policy were raised.

North America

Three contracting parties participated in this questionnaire from the North American region. Although there is no IPPC Regional Workshop for this region responses were collected by the RPPO – the North American Plant Protection Organization (NAPPO). The most important emerging issue specified by participating contracting parties is the need for strengthened phytosanitary capacity. This is followed by plant pests: other, emerging pests in general and trade issues. The emerging issues considered the lowest priority include the environment, plant pests: diseases and collaboration (Table 8).

Table 8: Prioritization of emerging issues in plant health (North America)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	7	28%
Plant pests: other	5	20%
Emerging pests (general)	4	16%
Trade issues	3	12%
Environment	2	8%
Plant pests: diseases	2	8%
Collaboration	2	8%
Resource limitations	0	0%
Policy	0	0%

The main phytosanitary capacity need of North America is regarding the use of new agricultural practices. The main concern of emerging pests in general for North America is the introduction of new pests. There is some concern for the plant diseases *Fusarium oxysporum* f. sp. *cupense* Race 4 (Panama disease) and *Xanthomonas campestris* pv. *citri*, *X. axonopodis* (Citrus canker) and other plant pests

Epiphyas postvittana (light brown apple moth), *Grapholita molesta* (Oriental fruit moth), *Lobesia botrana* (European grapevine moth), *Lymantria dispar* (Gypsy moth) and *Xyleborus glabratus* (ambrosia beetle). Trade issues are centered on market access. There is an environmental concern for climate change and room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks and working regionally.

South West Pacific

Eleven contracting parties participated in this questionnaire from the South West Pacific region. The most important emerging issues specified by participating contracting parties are plant pests: diseases, the need for strengthened phytosanitary capacity and emerging pests in general. This is followed by the environment, plant pests: other and resource limitations. The emerging issues considered the lowest priority include trade issues and collaboration (Table 7).

Table 8: Prioritization of emerging issues in plant health (South West Pacific)

Emerging Issues	Response rate (count)	Response rate (percent)
Plant pests: diseases	18	24.7%
Phytosanitary capacity	14	19.2%
Emerging pests (general)	14	19.2%
Environment	7	9.6%
Plant pests: other	7	9.6%
Resource limitations	6	8.2%
Trade issues	5	6.8%
Collaboration	2	2.7%
Policy	0	0%

The main concern for the South West Pacific are the plant diseases *Colletotrichum gloeosporioides* (Anthracnose fungus), *Cercospora coffeicola* (Brown eye leaf spot), *Phytophthora palmivora* (Fruit rot) and *Xanthomonas campestris* pv. *citri*, *X. axonopodis* (Citrus canker) and the other plant pest *Oryctes rhinoceros* (Coconut Rhinoceros Beetle). The main phytosanitary capacity needs of the South West Pacific are pest surveillance, use of phytosanitary treatments and the ability to raise national phytosanitary awareness. The concern for emerging pests in general are the introduction of new pests and emergence of new pest biotypes. Environmental concerns include climate change and poor soil conditions through natural causes or mismanagement. Resource limitations include having sufficient infrastructure and financial resources. Trade issues include market access and illegal plant trade and room for improvement in strengthening collaboration among national stakeholders relating to legislative and regulatory frameworks and working regionally.

Regional Plant Protection Organizations

Seven RPPOs participated in this questionnaire. The results from RPPOs were collected before and after the annual Technical Consultation among Regional Plant Protection Organizations (TC-RPPO) meeting. The most important emerging issue specified by participating RPPOs is the need for strengthened phytosanitary capacity, plant pests: diseases, plant pests: other and emerging pests in general. This is followed by resource limitations and collaboration. The emerging issues considered the lowest priority include trade issues, environment and policy (Table 9).

Table 9: Prioritization of emerging issues in plant health (RPPOs)

Emerging Issues	Response rate (count)	Response rate (percent)
Phytosanitary capacity	11	24.4%
Plant diseases	9	20.0%
Plant pests	8	17.8%
Emerging pests (general)	7	15.6%
Resource limitations	4	8.9%
Collaboration	3	6.7%
Trade issues	1	2.2%
Environment	1	2.2%
Policy	1	2.2%

The main phytosanitary capacity needs identified by RPPOs are inspection, pest reporting and pest surveillance. The main plant diseases of concern include *Candidatus Liberibacter* spp. (Citrus greening) and *Fusarium oxysporum* f. sp. *cubense* Race 4 (Panama disease) and the plant pests are fruit flies. The main concern of emerging pests in general is the introduction of new pests. Resource limitations of importance include having appropriately trained staff and the ability to retain them, access to facilities and financial resources. Collaboration at the regional level is considered very important, as well as on an international level. The only trade concern is for implementation of economic partnership agreements and policy issues relating to the existence of weak national policies. There is an environmental concern for climate change.



Conclusions

The majority of regions specify the need for phytosanitary capacity as the primary emerging issue of concern. This is identified by six of the eight geographical areas undertaking the questionnaire, in addition to the most significant issue identified by RPPOs and on a global level. The areas where phytosanitary capacity is most necessary are pest surveillance, inspection, pest reporting, diagnostics, use of phytosanitary treatments and the ability to raise national phytosanitary awareness.

The emerging issue themes relating to emerging pests in general, the environment, plant pests: diseases and plant pests: other vary in level of importance to responding contracting parties (and their regions) and RPPOs. Emerging pest issues in general are mainly in regard to risks associated with the introduction of new pests. Environmental issues are concerning climate change and the overuse of chemicals for pest risk management. The emerging issues of plant diseases and other plant pests posing risks vary greatly across regions, with *Candidatus Liberibacter* spp. (Citrus greening) and *Fusarium oxysporum* f. sp. *ubense* Race 4 (Panama disease) and fruit flies of most concern, respectively.

Resource limitations are of high concern to two regions and of medium and low to others. When the availability of resources are considered to be a risk they are primarily relating to having appropriately trained staff and the ability to retain them, sufficient financial resources and access to facilities.

Emerging risks associated with trade, collaboration and policy are generally considered by most participating contracting parties (and their regions) and RPPOs as the lowest priority. When trade is considered an emerging risk it is mainly due to market access. While collaboration and policy emerging risks are relating to strengthening collaboration among national stakeholders with regard to legislative and regulatory frameworks and associated policies. Collaboration at a regional level is also considered a necessity.

The information gathered from the questionnaires has provided the IPPC Secretariat, RPPOs and the CPM with an understanding of the emerging risks that are of importance at the national, regional and global levels. It is hoped this information will be used by contracting parties at a regional level (such as at annual IPPC Regional Workshops) and RPPOs when they discuss plant health priorities so they can target areas where there is the greatest need for resources and effort to achieve the greatest impact.

Annex 1

IPPC Emerging issues in plant health questionnaire

Many factors inside and outside of phytosanitary system(s) directly and/or indirectly drive the emergence of plant health issues. Below is a short questionnaire to be completed and submitted to your regional representative before attendance at the upcoming IPPC Regional Workshop. In responding to question #1 please consider causes and the broad drivers that can impact on plant health issues as provided below.

1. Please identify what you believe to be the five most important emerging issues¹ related to plant health in the next two to five years in your country.

- ◆ Issue one
- ◆ Issue two
- ◆ Issue three
- ◆ Issue four
- ◆ Issue five

2. For each issue please provide a short explanation² (1 or 2 paragraphs)

- ◆ Issue one explanation
- ◆ Issue two explanation
- ◆ Issue three explanation
- ◆ Issue four explanation
- ◆ Issue five explanation

In the field of plant health emerging issues/risks might be caused by:

- ◆ a newly identified plant pest for which a significant probability of introduction and/or spread may occur;
- ◆ an unexpected, new or increased significant probability of introduction and/or spread of an already known plant pest (e.g. a new or a modified pathway of introduction, a change in agriculture or forestry practice, a change in pest/disease management or the cultivation of a new crop);
- ◆ a new or an increased susceptibility of host plants to a known plant pest or to an agent with altered virulence (including insensitivity to previously applied measures).

Drivers of emerging plant health issues at different scales:

- ◆ **Changes in plants, pests and their interactions** – are one of the major threats for plant health and biodiversity. Challenges are to understand what makes for a successful invader, find ways to predict which species are more likely to become plant pests and identify traits at species level (traits related to spread, reproduction, and host range) correlated with invasiveness, which could be used in a predictive approach.

1/ In this context emerging issues are those that are new, unexpected, or can cause change in the status quo. With the word "issues" is meant as risks/challenges that might have an impact on plant health.

2/ In providing a short explanation of 1 -2 paragraphs please briefly explain: 1) why you selected that issue (i.e. on what basis – information/data, knowledge or assumption – you made that choice) and 2) the expected impacts of the issue (whether the impact would be sector-specific, affect only some sub-populations or countries/regions, in relation to plant health or trade etc.)

- ◆ **Agriculture and forestry practices** – spread of plants and associated pests to new growing zones (exotic trees tree species in new zones, forests and urban areas), protected and/or open field cultivation effected by pests not previously known to have significant effect, adoption of grafting techniques, increased areas devoted to ornamental or minor crops, expansion of protected cultivation and associated pests, banning of some plant protection products and control methods (especially reduction in availability of soil disinfectants), human manipulation of domesticated plants, reducing genetic diversity and using resistant genotypes, contributing to the emergence of different diseases.
- ◆ **International trade of plants and plant products and movement of people** – a shift from local self-sufficiency towards a global commodity markets has resulted in increased diversity and volume of plants and plant products in international trade. Increased trade has contributed to the expansion of the geographical ranges of pests and movement to new ecological niches. Commodities imported from new exporting countries and/or new commodities imported from an established trading partner can be new sources of pest spread. Risk of introduction of pests with trade vessels, increased passenger movement and associated logistical and resourcing changes and modes of transport expanding the potential pathways of entry for pests of concern and internet trade.
- ◆ **Market access** – Exporting countries are challenged by the need for additional resources (human resources, infrastructure, monitoring and eradication programs, pest risk analysis (PRA), pest free areas (PFA) and areas of low pest prevalence (ALPP)) for meeting stringent import requirements and for establishing and maintaining phytosanitary systems and programmes. Shifts of operations for import clearance of commodities at points of entry and export certification practices can become resource intensive and affect appropriate delivery of functions.
- ◆ **Plant protection chemicals** – the range of registered agricultural chemicals available for the control of pests is subject to a continuous change. In many cases, specific chemicals (e.g. disinfestation products including fumigants e.g. methyl bromide) become unavailable. In some cases, alternative crop protection chemicals or control methods are either not available, are significantly more costly or require substantial new investment in development and infrastructure to achieve the desired outcome.
- ◆ **Food consumption patterns** – the demand for plants and plant products effecting trade, production and farm practices and land use can change.
- ◆ **Land use and landscape management** – protection of patrimony (for environmentally protected areas) and aesthetic value of properties in the public (e.g. parks) as well as for private use (residential, commercial spaces. Agro and environmental tourism, agro forestry and silviculture can also cause changes to plant health and biodiversity.

- ◆ **Climate change** – can have direct and indirect effects on plant health. Direct effects include pest spread and shorter lifecycles. As climate change is an extremely complex driver it might interact with other factors (e.g. cultivation practice, globalization of trade, land use changes, habitat destruction) and indirectly affect distribution, abundance and impact of pests. There is uncertainty in both climate change predictions and plant pest behavior.
- ◆ **Awareness and stakeholders involvement** – awareness on plant health issues at governmental and public level, awareness on the need for a national integrated phytosanitary system and for developing a national policy to facilitate safe trade, involvement of producers and communities (e.g. citizen science) in pest detection and avoiding pest incursions, sharing with industry the costs and responsibility for plant health.
- ◆ **Research and development coordination, collaboration and capacity building** – collaboration on regional and international level for implementation of the IPPC and its tools, defining implementation challenges, projects for implementation, including the IPPC surveillance pilot project, pest diagnosis expertise sharing, development of new technologies for pest detection/diagnosis and surveillance, making available of new technologies to a wide range of stakeholders.
- ◆ **Conflicting priorities for resources and funding** – occur at the national level as the result of shortage of resources available to governments, as well as priorities given to food safety and veterinary fields at agencies/authorities level.

Annex 2

Detailed results of the emerging issues in plant health questionnaire

Emerging issues	Contracting party responses (count)									
	Africa	Asia	Caribbean	Europe	Latin America	Near East	North America	South West Pacific	RPPOs	Total
Environment										
Climate change	9	4	2	1	6	3	2	5	1	33
Natural disaster	1	0	1	0	0	0	0	0	0	2
Environmental pollution	1	0	1	0	0	1	0	0	0	3
Poor soil conditions	0	0	0	0	0	0	0	2	0	2
Overuse of chemicals in pest risk management	7	7	1	2	2	2	0	0	0	21
Emerging pests (general)										
Emerging diseases in general	3	1	2	0	2	1	0	1	1	11
Increasing resistance to pesticides	1	2	0	0	1	2	0	1	0	7
Introduction of new pests	11	9	5	2	10	4	3	7	4	55
Emergence of new pest biotypes	0	2	0	0	2	2	1	5	1	13
Weeds as plant pests	2	3	1	1	1	0	0	0	1	9
Plant diseases										
Bunch root diseases	3	0	0	0	0	0	0	1	0	4
<i>Candidatus Liberibacter spp.</i> (Citrus greening)	1	1	2	0	4	1	0	0	4	13
<i>Capnodium citri</i> (sooty mould)	0	0	0	0	0	0	0	2	0	2
Cassava mosaic virus	0	1	0	0	0	0	0	0	1	2
<i>Cercospora coffeicola</i> (Brown eye leaf spot)	0	0	0	0	0	0	0	2	0	2
<i>Colletotrichum gloeosporioides</i> (Anthracnose fungus)	0	0	0	0	0	0	0	3	0	3
<i>Cylindrocladium buxicola</i> (boxweed blight)	0	0	0	1	0	0	0	0	0	1
<i>Erwinia amylovora</i> (fire blight)	0	0	0	1	0	0	0	0	0	1
<i>Fusarium oxysporum f.sp. albedinis</i> (Bayoud disease of date palm)	0	0	0	0	0	1	0	1	0	2

Emerging issues	Contracting party responses (count)										
	Africa	Asia	Caribbean	Europe	Latin America	Near East	North America	South West Pacific	RPPOs	Total	
<i>Fusarium oxysporum f. sp. cubense</i> Race 4 (Panama disease)	3	0	0	0	4	0	1	1	2	11	
Lethal yellowing of palm/coconut (Bogia Coconut Syndrome (BCS))	0	1	2	0	0	0	0	1	0	4	
Maize Lethal Necrosis disease	4	0	0	0	0	0	0	0	0	4	
<i>Moniliophthora roreri</i> (Frosty pod rot)	0	0	1	0	0	0	0	0	0	1	
<i>Mycosphaerella spp.</i> (Black or yellow Sigatoka)	1	0	0	0	1	0	0	1	0	3	
Oryctes of date palm trees	0	0	0	0	0	1	0	0	0	1	
Papaya meleira virus	0	0	0	0	1	0	0	0	1	2	
<i>Phytophthora palmivora</i> (Fruit rot)	0	1	0	0	0	0	0	2	0	3	
Banana wilt associated phytoplasma	0	0	0	0	0	0	0	1	0	1	
<i>Ralstonia solanacearum</i> Race 2 (Moko disease)	0	0	1	0	1	1	0	0	0	3	
<i>Solanaceae</i> bacterial blight	1	0	0	0	0	0	0	0	0	1	
Soil borne fungal diseases	1	1	0	0	1	0	0	0	0	3	
Cacao swollen shoot virus disease	1	0	0	0	0	0	0	0	0	1	
Taro corm rot	0	0	0	0	0	0	0	1	0	1	
Tospoviruses	0	1	0	0	0	0	0	0	0	1	
<i>Verticillium wilt</i> on olive trees	0	0	0	0	0	1	0	0	0	1	
<i>Xanthomonas campestris</i> pv. citri, <i>X. axonopodis</i> (Citrus canker)	0	1	0	0	1	0	1	2	0	5	
<i>Xylella fastidiosa</i> (Pierce's disease)	0	2	0	0	2	4	0	0	1	9	
Other plant pests											
<i>Achaea catocaloides</i> (forest dwelling moth)	1	0	0	0	0	0	0	0	0	1	
Armyworm	0	1	0	0	0	0	0	0	0	1	
Bamboo grasshopper	0	1	0	0	0	0	0	0	0	1	
Cassava pink mealybug	0	1	0	0	0	0	0	0	1	2	
<i>Cydalima perspectalis</i> (box tree moth)	0	0	0	1	0	0	0	0	0	1	

Emerging issues	Contracting party responses (count)										
	Africa	Asia	Caribbean	Europe	Latin America	Near East	North America	South West Pacific	RPPOs	Total	
<i>Epiphyas postvittana</i> (light brown apple moth)	0	0	0	0	0	0	1	0	0	1	
<i>Euscepes postfasciatus</i> (West Indian sweet potato weevil)	0	0	0	0	0	0	0	1	0	1	
Foliating caterpillar	2	0	0	0	0	0	0	0	0	2	
Fruit flies	9	1	1	0	4	3	0	1	3	22	
Golden snail	0	3	0	0	0	0	0	0	1	4	
<i>Grapholita molesta</i> (Oriental fruit moth)	0	0	0	0	0	0	1	0	0	1	
<i>Globodera pallida</i> , <i>G. rostchenises</i> (potato nematodes)	0	1	1	0	0	1	0	0	0	3	
<i>Hyphantria cunea</i> (Fall webworm)	0	0	0	1	0	0	0	0	0	1	
Leptocybe wasps	0	0	0	0	1	0	0	0	0	1	
Little Fire Ant	0	0	0	0	0	0	0	1	0	1	
<i>Lobesia botrana</i> (European grapevine moth)	0	0	0	0	3	0	1	0	0	4	
<i>Lymantria dispar</i> (Gypsy moth)	0	0	0	0	1	0	1	0	1	3	
Other nematodes in potatoes	0	0	0	0	0	1	0	0	0	1	
<i>Nilaparvata lugens</i> (brown planthopper)	0	3	0	0	0	0	0	0	0	3	
<i>Oryctes rhinoceros</i> (Coconut Rhinoceros Beetle)	0	0	0	0	0	0	0	2	0	2	
<i>Opisina arenosella</i> (coconut black-headed caterpillar)	0	1	0	0	0	0	0	0	0	1	
<i>Opogona sacchari</i> (banana moth)	0	0	0	0	1	0	0	0	0	1	
<i>Rhynchophorus ferrugineus</i> (Red palm weevil)	0	0	1	0	0	2	0	0	1	4	
<i>Argidae</i> and <i>Shizocera spp.</i> (sawflies)	0	1	0	0	0	0	0	0	0	1	
<i>Tetranychus sp.</i> (Red spider mite)	0	0	0	0	0	0	0	1	0	1	
<i>Toxoptera citricida</i> (black citrus aphid)	0	0	0	0	0	1	0	0	1	2	
<i>Trogoderma granarium</i> (Khapra beetle)	0	2	0	0	2	0	0	0	0	4	

Emerging issues	Contracting party responses (count)									
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<i>Tuta absoluta</i> (tomato leafminer)	4	0	0	0	1	0	0	0	0	5
<i>Xyleborus glabratus</i> (ambrosia beetle)	0	0	0	1	1	0	1	0	0	3
White fly	0	0	0	0	0	0	0	1	0	1
Collaboration										
Strengthen the legislative and regulatory framework at national level (collaboration of different regulation bodies, government agencies and institutes)	5	2	1	2	6	0	1	1	0	18
Regional level (neighboring countries or others in region)	2	1	2	1	2	1	1	1	2	13
Global level (between regions, RPPOs and IPPC)	1	1	0	0	0	0	0	0	1	3
Policy										
Weak phytosanitary legislation/strategy at national level	3	1	2	3	2	0	0	0	1	12
Political situation of the country	1	0	1	0	0	0	0	0	0	2
International guidance on the declaration of a phytosanitary emergency	0	0	2	0	2	0	0	0	0	4
Phytosanitary Measures on sea containers	1	1	0	0	0	0	0	0	0	2
Resource limitations										
Financial resources	4	2	2	2	3	1	0	3	1	18
Appropriately trained staff	5	1	5	1	3	0	0	1	2	18
Sufficient infrastructure	4	2	3	2	0	1	0	2	0	14
Access to facilities	3	2	1	0	1	0	0	0	1	8
Capacity development needs										
Pest surveillance	3	7	3	2	8	2	1	3	2	31
Use of new agricultural practices	4	3	0	1	1	1	2	1	0	13
Inspection and pest reporting	4	5	4	2	5	1	1	1	4	27
e-Phyto	1	2	1	0	1	0	0	1	0	6
Diagnostics	4	4	4	1	5	1	0	1	1	21

Emerging issues	Contracting party responses (count)									
	Africa	Asia	Caribbean	Europe	Latin America	Near East	North America	South West Pacific	RPPOs	Total
Pest risk analysis	1	1	1	2	2	0	1	1	1	10
Use of phytosanitary treatments	0	4	2	0	6	1	1	3	2	19
Ability to raise national phytosanitary awareness	4	3	2	0	1	2	1	3	1	17
Trade issues										
Implementation of the economic partnership agreements	1	0	1	0	1	0	0	0	1	4
Market access	4	3	1	1	3	0	2	2	0	16
Increasing tourists	0	2	1	0	2	1	0	1	0	7
E-commerce	0	0	0	0	1	1	1	0	0	3
Illegal plant trade	0	1	0	1	1	0	0	2	0	5

IPPC

The International Plant Protection Convention (IPPC) is an international plant health agreement that aims to protect cultivated and wild plants by preventing the introduction and spread of pests. International travel and trade are greater than ever before. As people and commodities move around the world, organisms that present risks to plants travel with them.

Organization

- ◆ There are over 180 contracting parties to the IPPC.
- ◆ Each contracting party has a national plant protection organization (NPPO) and an Official IPPC contact point.
- ◆ Nine regional plant protection organizations (RPPOs) work to facilitate the implementation of the IPPC in countries.
- ◆ IPPC liaises with relevant international organizations to help build regional and national capacities.
- ◆ The Secretariat is provided by the Food and Agriculture Organization of the United Nations (FAO).

Food and Agriculture Organization of the United Nations

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