RECENT CHALLENGES IN FIGHTING AGAINST TRANSBOUNDARY PLANT PESTS AND THE FAO STRATEGIES FOR HELPING FARMERS IN DEALING WITH THOSE PESTS

Jingyuan Xia

Secretary, International Plant Protection Convention (IPPC) Secretariat, Italy

Jingyuan Xia has been the Secretary to the Food and Agriculture Organization of the United Nations (FAO)-based International Plant Protection Convention (IPPC) in Rome since 2015. He holds a Ph.D. in Production Ecology from the Wageningen Agricultural University in the Netherlands. His experience includes work as Permanent Representative and Ambassador of the China Mission to UN Agencies (CNAFUN) in Rome, Italy; Director General of the National Agro-tech Extension and Service Center (NATESC) of the Chinese Ministry of Agriculture (MOA) in Beijing, China; and Director General of the China Cotton Research Institute (CCRI) at the Chinese Academy of Agricultural Sciences (CAAS) in Anyang, China.

ABSTRACT

Transboundary plant pests (TPPs) are those migratory insects, plant diseases and weeds that can spread to several countries and reach epidemic proportions, cause significant losses to farmers, threaten food security, and damage the local biodiversity and environment. There are three major pathways for the spread of TPPs, such as environmental forces (Fall armyworm), international trade (Fruit flies), and tourists & migrations (Banana fusarium).In recent decades, TPPs are becoming more and more important than ever before due to global movement of agriculture goods, global movement of tourists and migration, and global change of climate. Among the most important TPPs, five of them are briefed in this presentation.Locust plague is one of the three major natural disasters in history (Drought, Flood and Locust plague). Among all kinds of locusts, desert locust (Schistocerca gregaria) is the most destructive, with a wide range of host plants and distribution in over 50 countries, mainly in Africa and Central Asia.Fall Armyworm, which is native to the Americas but now spreads to 65 countries in Africa (47), Near East (3) and Asia (15), is the most recent emerging TPP. It feeds on more than 80 crop species, but mostly prefers maize.Wheat rust is a recurrent problem with its epidemics amplified with increased rains, seriously threatening wheat in all regions. It is distributed worldwide wherever wheat is grown (America, Africa, Europe, Asia and Australia).Banana Fusarium wilt, caused by Fusarium oxysporum, is an important disease of banana in almost all banana-producing countries of the world. Currently, a new strain of the fungus, Tropical Race 4 (TR4), is posing the most serious threat to banana production in Asia, Africa, Near East, Latin America and the Caribbean (most recently in Colombia). Bacterium Xylella fastidiosa, a vector-borne pest that can lead to the death of the infected plants, is a threat to agriculture, the environment and the economy. It occurs primarily in America, but has recently appeared in many countries such as Italy, France, Spain, Iran and China. Xylella has over 500 host plants, mainly olive, grapevine, citrus and coffee.The first major impact of TPPs is on food security. Globally annual crop losses due to plant pests and diseases are estimated to be 20–40%, while those due to the TPPs are frequently even worse. For example, desert locust outbreak in West Africa for 2003–2005 resulted 80–100% of losses of cereal, 85–90% of legume, and 33–85% of pasture.The second major impact of TPPs is on biodiversity. All TPPs, in particular invasive alien species, are very destructive to biodiversity. For instance, Xylella is a major threat to forest biodiversity in many regions of Europe, and water hyacinth (Eichhornia crassipes), one of the most destructive invasive alien aquatic plant pests in the world, is a strong killer of aquatic biodiversity.The third major impact of TPPs is on farmers' livelihood. All TPPs often cause significant reduction in crop yield and quality, imposing a great effect on farmers' livelihood. Thus, 400 million people in the world depending on banana for staple food, jobs and livelihoods are under threat from Banana Fusarium wilt, especially the Tropical Race 4 (TR4) strain.The fourth major impact of TPPs is on safe trade. Transboundary plant quarantine pests, such as fruit-flies and Cassava virus diseases, are major barriers to safe trade, often causing the closing of trade borders. The FAO, in cooperation with the IPPC, is playing a very important role in helping member countries and farmers in their fight against the TPPs in the following five key areas:

i) Coordination, such as legislation and policy advice, scientific guidance, project development and management, resource mobilization, and information sharing
ii) Prevention, such as prevention of introduction, prevention of spread, and prevention of damage
iii) Early warning and quick response, such as increasing the capacity to predict the occurrence or spread of TPPs, and to make quick reactive responses to contain or eliminate their risk
iv) Monitoring and sustainable management, such as strengthening/refreshing of technical capacities, preparedness, attention to human health and the environment, as well as regular financial support
v) Capacity development, such as improving national capacities to deal with TPPs through applying the tools of Phytosanitary Capacity Evaluation (PCE) and the Farmer Field School (FFS)

Based on the above discussion, ten recommendations are proposed for the global plant protection com-munity to work hand in hand in fighting against the TPPs.Finally, the briefing materials on the promotion and celebration of the international year of plant health (IYPH) in 2020, including the overall objective, approach, and promotion at global, regional and national levels, as well as the expected outcomes, have already been made.

Protecting the world's plant resources from pests

Recent Challenges in Fighting against Transboundary Plant Pests and the FAO Strategies for Dealing with Them

Dr. Jingyuan Xia, the IPPC Secretary

26 Nov. 2019, Tsukuba, Japan

Protecting the world's plant resources from pests

Transboundary Plant Pests (TPPs)

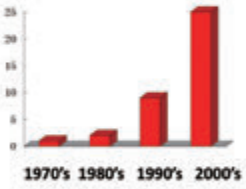
- ***Definition of TPPs:*** Transboundary plant pests (TPPs) are those migratory insects, plant diseases and weeds that can spread to several countries and reach epidemic proportions, cause significant losses to farmers, threaten food security, and damage the local biodiversity and environment
- ***Pathway of spread***
  - — Environmental forces (Desert locust, Fall armyworm, and Wheat rusts)
  - — International trade (Fruit flies, and *Xylella fastidiosa*)
  - — Tourists & migrations (Banana *fusarium)*

Protecting the world's plant resources from pests

♦ Global Challenge of TPPs

- ***Increased risk of plant pest spread*** due to global movement of agriculture goods
- ***Increased risk of plant pest spread*** due to global movement of tourists and migration
- ***Increased incidences of plant pests*** due to global climate change

No. regulated pests increased exponentially in China



Protecting the world's plant resources from pests

Outline

1. Recent Trend of TPPs
2. Major Impacts of TPPs
3. FAO Strategy of TPPs
4. Key Recommendations
5. Briefing on IYPH 2020

Protecting the world's plant resources from pests

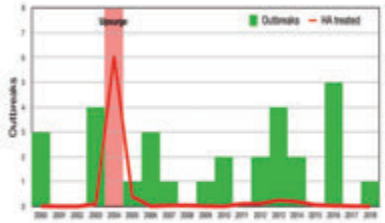
1. Recent Trend of TPPs: *Desert locust (1)*

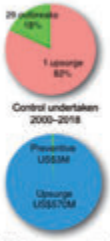
- ***Description:*** Locust is one of three major natural disasters in history (Drought, Flood and Locust). Among all kinds of locusts, desert locust (*Schistocerca gregaria*) is most destructive with a wide range of host plants
- ***Distribution:*** Desert locust is distributed in over 50 countries mainly in Africa and Central Asia
- ***Outbreaks:*** Frequent outbreaks can be better controlled; but failure in regular monitoring and implementation of preventive strategy can result in upsurges and plagues

♦ Wide Distribution of Desert Locust

Protecting the world's plant resources from pests

♦ Outbreaks and Losses of Desert Locust





More outbreaks are being detected and successfully controlled, *leading to a reduction in upsurges that are expensive to stop*

2003–2005 upsurge control = 170 years of preventive control

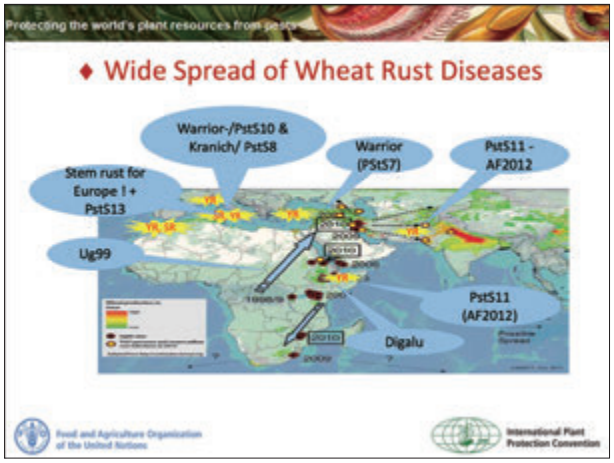
Protecting the world's plant resources from pests

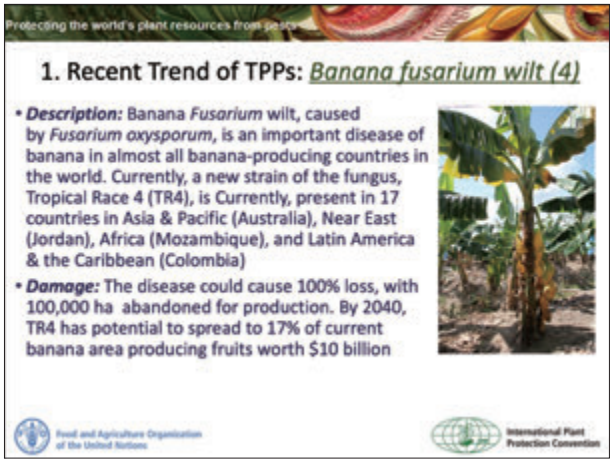
1. Recent Trend of TPPs: *Fall armyworm (2)*

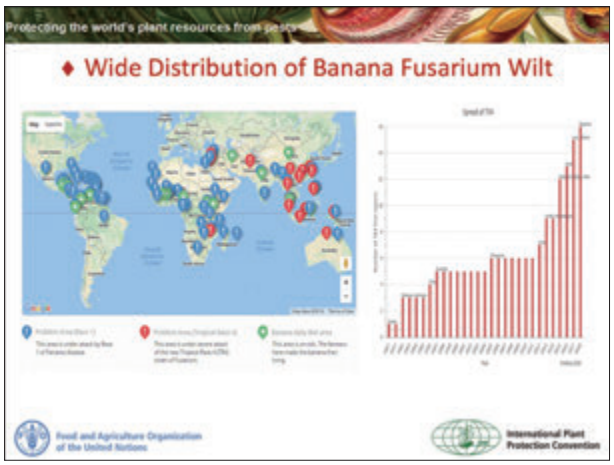
- ***Description:*** FAW is the most recent emerging TPP
- ***Distribution:*** FAW is native to the Americas but now spreads to 65 countries in Africa (47), Near East (3) and Asia (15)
- ***Host plants:*** FAW feeds on more than 80 crop species, but mostly prefers maize

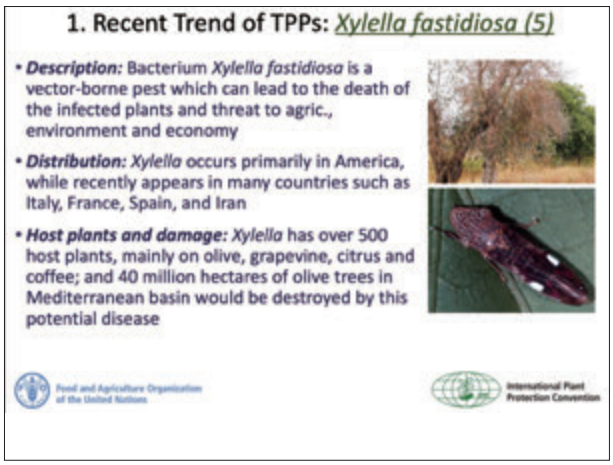

Protecting the world's plant resources from pests
♦ Rapid Spread of Fall Armyworm
Fall Armyworm
The spread of FAW since 2016 (as of July 2019)
Food and Agriculture Organization of the United Nations
International Plant Protection Convention

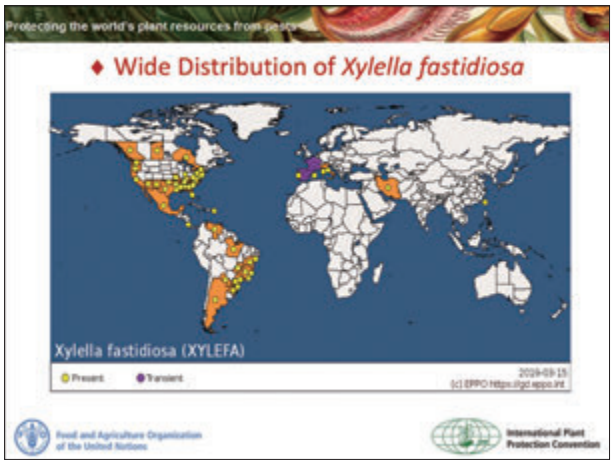

Protecting the world's plant resources from pests
1. Recent Trend of TPPs: Wheat rust (3)
• Description: Wheat rust is a recurrent problem with its epidemics amplify with increased rains, seriously threatening wheat in all regions
• Distribution: Wheat rust is worldwide distributed wherever wheat is grown (America, Africa, Europe, Asia, Australia)
• Host plants and damage: Annual global average yield loss of bread wheat and durum wheat is 6.2%, or 20-40% in rainy seasons
Food and Agriculture Organization of the United Nations
International Plant Protection Convention

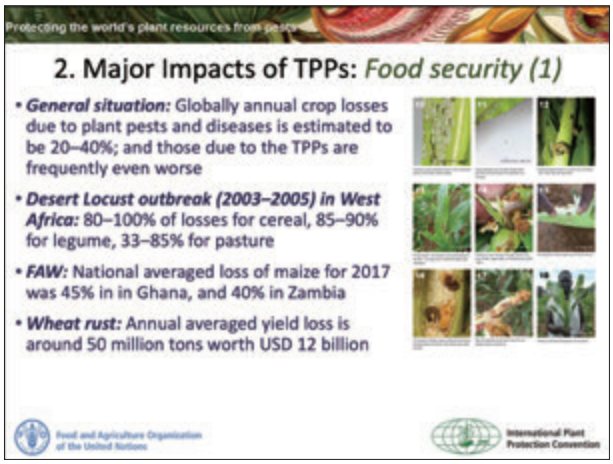

Protecting the world's plant resources from pests
♦ Wide Spread of Wheat Rust Diseases
Warrior-/Pst510 & Kranich/ Pst58
Warrior (PstS7)
PstS11 - AF2012
Stem rust for Europe ! + PstS13
Ug99
PstS11 (AF2012)
Digalu
Food and Agriculture Organization of the United Nations
International Plant Protection Convention


Protecting the world's plant resources from pests
1. Recent Trend of TPPs: Banana fusarium wilt (4)
• Description: Banana Fusarium wilt, caused by Fusarium oxysporum, is an important disease of banana in almost all banana-producing countries in the world. Currently, a new strain of the fungus, Tropical Race 4 (TR4), is Currently, present in 17 countries in Asia & Pacific (Australia), Near East (Jordan), Africa (Mozambique), and Latin America & the Caribbean (Colombia)
• Damage: The disease could cause 100% loss, with 100,000 ha abandoned for production. By 2040, TR4 has potential to spread to 17% of current banana area producing fruits worth $10 billion
Food and Agriculture Organization of the United Nations
International Plant Protection Convention


Protecting the world's plant resources from pests
♦ Wide Distribution of Banana Fusarium Wilt
Food and Agriculture Organization of the United Nations
International Plant Protection Convention


1. Recent Trend of TPPs: Xylella fastidiosa (5)
• Description: Bacterium Xylella fastidiosa is a vector-borne pest which can lead to the death of the infected plants and threat to agric., environment and economy
• Distribution: Xylella occurs primarily in America, while recently appears in many countries such as Italy, France, Spain, and Iran
• Host plants and damage: Xylella has over 500 host plants, mainly on olive, grapevine, citrus and coffee; and 40 million hectares of olive trees in Mediterranean basin would be destroyed by this potential disease
Food and Agriculture Organization of the United Nations
International Plant Protection Convention


Protecting the world's plant resources from pests
♦ Wide Distribution of Xylella fastidiosa
Xylella fastidiosa (XYLEFA)
Present
Transient
Food and Agriculture Organization of the United Nations
International Plant Protection Convention


Protecting the world's plant resources from pests
2. Major Impacts of TPPs: Food security (1)
• General situation: Globally annual crop losses due to plant pests and diseases is estimated to be 20–40%; and those due to the TPPs are frequently even worse
• Desert Locust outbreak (2003–2005) in West Africa: 80–100% of losses for cereal, 85–90% for legume, 33–85% for pasture
• FAW: National averaged loss of maize for 2017 was 45% in in Ghana, and 40% in Zambia
• Wheat rust: Annual averaged yield loss is around 50 million tons worth USD 12 billion
Food and Agriculture Organization of the United Nations
International Plant Protection Convention

Protecting the world's plant resources from pests

2. Major Impacts of TPPs: *Biodiversity (2)*

- ***General situation:*** All TPPs, in particular for invasive alien species, are very destructive to the biodiversity
- ***Xylella:*** It is a major threat to forest biodiversity in many regions of Europe
- ***Water hyacinth:*** Water hyacinth (*Eichhornia crassipes*), is one of the most destructive invasive alien aquatic plant pests in the world, is a strong killer of aquatic biodiversity

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

2. Major Impacts of TPPs: *Farmers' livelihood (3)*

- ***General situation:*** All TPPs often cause significant reduction crop yield and quality, thus imposing great effect on farmers' livelihood
- ***Desert locust in West Africa (2003–2005):*** 8.4 million people affected with 60% of indebted households in Mauritania and 45% in Mali, as well as 90% of food aid received in Mauritania, and 75% in Mali
- ***Banana Fusarium wilt*** 400 million people in the world depending on Banana for staple food, jobs and livelihoods are under threat of this disease. A single outbreak of this disease in Mozambique has put livelihoods of 2,000 local jobs at risk

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

2. Major Impacts of TPPs: *Safe trade (4)*

- ***General situation:*** Transboundary plant quarantine pests are the major barriers for safe trade, often causing in closing of trade borders, such as fruit-flies and Cassava virus diseases
- ***Implementation of the ISMPs*** increased agro-trade by over 40% in Kenya, and 26% in Australia
- ***In case of sea containers and e-Commerce:*** Phytosanitary risk accounts for over 70%

Taxon	Exterior	Interior (empty or full)	Refrigeration unit	Unknown location (in or on container)	Total	
Plants	113	102	515	466	1304	71 %
Insects and arachnids	41	106	1	122	366	20 %
Molluscs	70	4		20	100	6%
Other	12	8	2	19	58	3%
Grand total	236	220	518	627	1828	

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

3. FAO Strategy of TPPs: *Coordination (1)*

- ***Legislation and policy advice:*** Phytosanitary issues by IPPC; pesticide and IPM issues by AGP; and emerging TPP issues by EMPRES
- ***Coordination mechanism:*** Scientific committees, technical work groups, task forces, and networks, such as 3 FAO Desert Locust Commissions
- ***Project development and management:*** Organizing relevant stakeholders to apply projects at global, regional and national levels
- ***Resource mobilization:*** FAO-TCI, AGP, IPPC and EMPRES, such as US$ 57 million for FAW
- ***Information sharing:*** Essential to improve monitoring, early warning and timely response

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

3. FAO Strategy of TPPs: *Prevention (2)*

- ***Prevention of introduction:*** Take the Phytosanitary Measures on Import Regulation based on the pest risk analysis (PRA), and ISPMs
- ***Prevention of spread:*** Take the Phytosanitary Measures on Quarantine Arear for the infected region (containment) and of Pest-free Area for the non-infected region
- ***Prevention of damage:*** Take IPM Measures of Host Plant Resistance and GMOs

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

3. FAO Strategy of TPPs: *Early warning and response (3)*

- ***Early warning:*** Capacity to predict occurrence or spread of a pest and propose and reactive responses
- ***Emerging response:*** Capacity to implement reactive responses to contain or eliminate the risk
- ***Showcase:*** A recent rregional project on wheat rust monitoring and management in Central Asia and Near East has been funded by FAO-Turkey Partnership Programme (5 years, 1.067 m USD) with ccollaboration of Turkey, ICARDA & CIMMYT

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

3. FAO Strategy of TPPs: *Monitoring and sustainable management (4)*

- ***Monitoring:*** Is the cornerstone of early warning and essential but not sufficient for sustainable management; this requires an institutional framework, regional cooperation, strengthening/refreshing of technical capacities, preparedness, attention to human health and the environ. as well as regular financial support
- ***Sustainable management:*** System approach and agro-ecology
- ***Showcase:*** Several Desert Locust outbreaks successfully contained in the Western Region between 2012 and 2018

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

3. FAO Strategy of TPPs: *Capacity Development (5)*

- ***Global tools:*** Improvement of national capacities to deal with TPPs through PCE (IPPC) and FFS (AGP)
- ***National capacity:*** Personnel, Institutional and System

- ***Showcase:*** The IPPC International Symposium for Pest Free Areas and Surveillance was organized in Japan form 28 October to 1 November 2019, for capacity development and awareness raising of international framework on Pest Free Areas and Pest Surveillance

Food and Agriculture Organization of the United Nations — International Plant Protection Convention

Protecting the world's plant resources from pests

4. Key Recommendations: *01-06*

1. ***Challenge*** of TPPs is becoming more and more important than ever before
2. ***Prevention and preparedness*** pay positive dividends
3. ***Risk assessment, risk management and risk communication*** are equally important
4. **Sustainable funding** is badly needed at global, regional, national levels
5. **Awareness raising** is vital including private sector and the broader public (global mobility)
6. ***Research priorities*** are requested to address gaps in prevention and management of TPPs

Protecting the world's plant resources from pests

4. Key Recommendations: *07-10*

7. ***New technologies*** in monitoring & early warning and management should be innovated, e.g., AI, ICT, detection toolkits
8. ***International collaboration*** is key for combating against TPPs, e.g., EUPHRESCO, Fall Armyworm, R4D Consortium
9. ***FAO*** should paly more roles in developing global standards and providing technical support to regions and countries
10. ***International Year of Plant Health (IYPH)*** in 2020 will provide a unique opportunity for advocacy of importance of plant health at global, regional and national levels

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *Objective (1)*

- *To raise the awareness of the public and political decision makers at the global, regional and national levels about plant health`s contribution to achieving the UN sustainable development goals, in particular:*

→ **ending hunger**
→ **reducing poverty**
→ **protecting the environment**
→ **boosting safe trade and economic development**

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *Approach (2)*

- ***April 2015:*** Proposed by Finland at the CPM-10
- ***July 2017:*** Adopted by 40th Session of the FAO Conference
- ***December 2018:*** Endorsed by UN General Assembly (UN Resolution A/RES/73/252, proclaiming 2020 the IYPH and calling upon FAO, in collaboration with the IPPC, to lead the implementation of the Year)

CPM 2015 → CPM/FAO 2016 → FAO 2017 → UN 2018 → Prepare 2019 → IYPH 2020

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *Global promotion (3)*

- *2 December 2019:* **IYPH launch events** in FAO-HQs and possibly at the same time in UN-HQs
- *30 March – 3 April 2020:* **IPPC CPM-15** in FAO-HQs with a Ministerial segment at 2 April 2020
- *5-8 October 2020:* **International Conference on Plant Health (First)** in Helsinki, Finland
- *16 October 2020:* **World Food Day** focused on Plant Health
- *December 2019 – December 2020:* **IYPH photo competition**
- *January 2021:* **IYPH closing event** in Rome

INTERNATIONAL YEAR OF PLANT HEALTH 2020

Protecting the world's plant resources from pests

♦IYPH Visual Identities

INTERNATIONAL YEAR OF PLANT HEALTH 2020
AÑO INTERNACIONAL DE LA SANIDAD VEGETAL 2020
ANNÉE INTERNATIONALE DE LA SANTÉ DES VÉGÉTAUX 2020
2020
2020
2020

IYPH visual identity guidelines:

For IYPH logos, write to:

Protecting the world's plant resources from pests

♦IYPH Series of Gadgets

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *Regional promotion (4)*

- ***Organizing:*** FAO Regional conferences in 2020, and other regional workshops on plant health-related themes
- ***Establishing:*** regional capacity development programmes on emerging pests
- ***Liaising with:*** FAO Regional Offices to organize side events at FAO Regional Conferences in 2020, as well as with IPPC-RPPOs to organize some regional activities
- ***Coordinating with:*** regional institutions in relevant fields to include plant health in their agendas

INTERNATIONAL YEAR OF PLANT HEALTH 2020

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *National promotion (5)*

- ***Organizing:*** national launch events, a national plant health day, national IYPH conferences
- ***Investing in:*** education, such as creating an educational dossier on plant health for primary and secondary schools, plant health fellowships, citizen science
- ***Issuing:*** coin, stamps, etc.
- ***Running:*** memorial events, i.e. planting trees and caring for them

INTERNATIONAL YEAR OF PLANT HEALTH 2020

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Protecting the world's plant resources from pests

5 Briefing on IYPH 2020: *Expected outcomes (5)*

- ***Awareness*** of the importance of plant health towards UN SDGs and major topics in the international agenda is raised
- ***importance of plant health*** is realized by citizens in relation to their daily lives and their behavior
- ***Knowledge, research and partnerships*** on plant health are encouraged and coordinated
- ***National, regional and global plant health efforts and their resources*** are strengthened in light of increasing trade and reducing new pest risks due to climate change

INTERNATIONAL YEAR OF PLANT HEALTH 2020

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Protecting the world's plant resources from pests

Acknowledgements

- ***High appreciation:*** to Hans, Shoki, Annie, Allan, Fazil, and Keith from FAO-AGP for sharing information on the Plant Protection Issue
- ***Sincere gratitude:*** to Sarah, Mirko, Ketevan and Masumi from the IPPC Secretariat for sharing information on the IPPC Issue, as well as to Lihui and Craig for integrating information
- ***Many thanks:*** to the organizer for the kind invitation and financial support

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Protecting the world's plant resources from pests

Thanks for your kind attention

INTERNATIONAL YEAR OF PLANT HEALTH 2020

Food and Agriculture Organization of the United Nations

International Plant Protection Convention