Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

Plant Health and Food Security

Prof. Dr. Martin Kropff
Managing Director,
Resilient Agri-Food Systems, Science Area, CGIAR

London, 21 – 23 September 2022

International Plant Health Conference

PROTECTING PLANTS PROTECTING LIFE

"In the next 50 years we will need to produce as much food as has been consumed over our entire human history."

Megan Clark
Former CEO of the Commonwealth Scientific and Industrial Research Organization (CSIRO)
Australia

More

Less

Better

THE 'PERFECT' STORM IN AFRICA AND SOUTH ASIA

- Number of hungry people: now 700+ mil. mainly in SA and SSA
- 2 billion more people in 2050 mainly in SA and SSA
- Climate change reducing yields, especially in SA and SSA
  - Drought
  - Heat

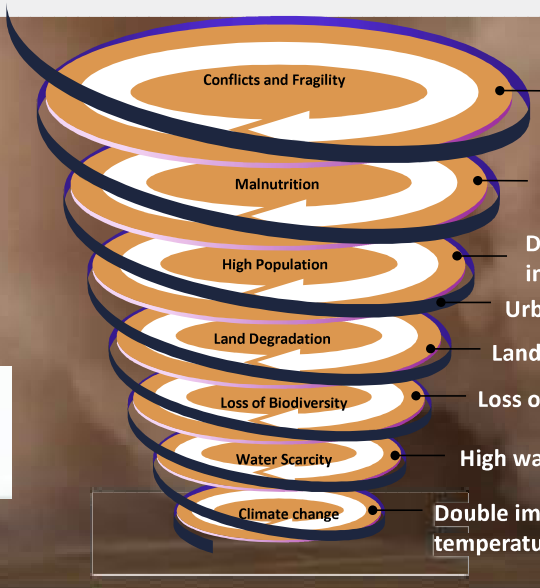
- +COVID
- + Ukraine war !!!
  - Food Prices
  - Fertilizer cost
  - Energy cost

Need Action: CGIAR with partners support innovations at scale

THE PERFECT STORM

SUSTAINABLE DEVELOPMENT GOALS

BY 2030

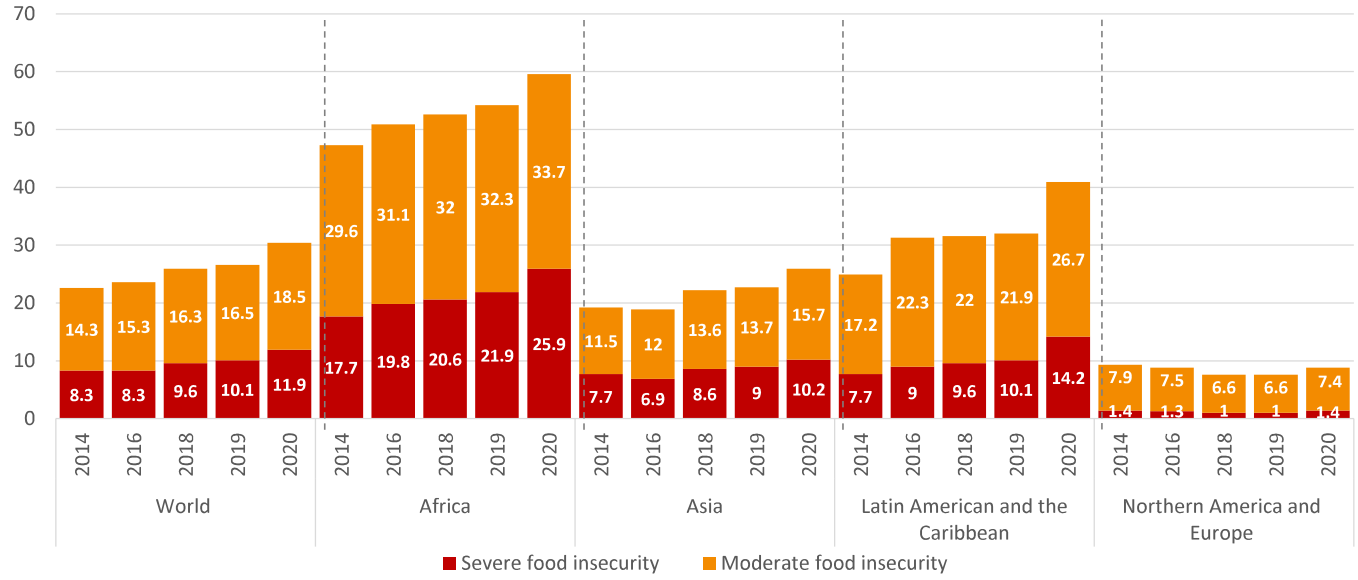


- High unemployment, unrest and migration
- Food and nutrition insecurity
- Demographic change, gender inequality
- Urbanization and heat islands
- Land degradation and desertification
- Loss of agrobiodiversity
- High water scarcity and low efficiency
- Double impact of climate change; increasing temperature and reducing precipitation

Only nine harvests left: we need to move fast to accomplish our vision of thriving and resilient livelihoods

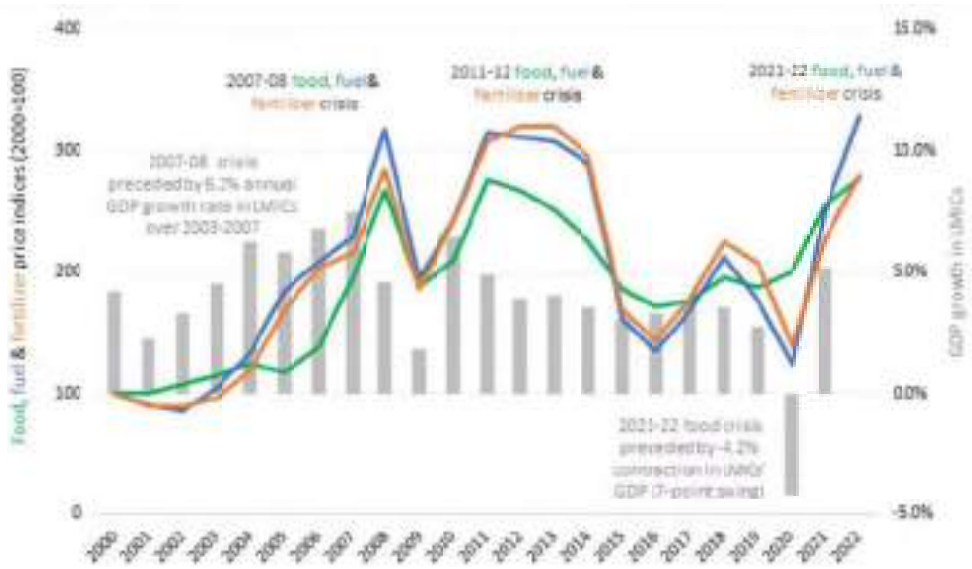
Regional differences in food security

Millions of people facing severe and moderate food insecurity by region



Price shocks "the new normal"?

Food, fuel & fertilizer prices compared with GDP Growth (%)



- Hunger and malnutrition were on the rise
- The poor are still recovering from COVID crisis
- Cash strapped governments have little room to maneuver
- Fertilizer shortages have dynamic effects

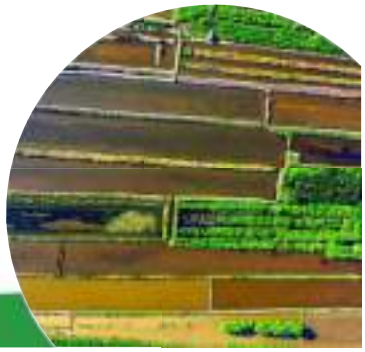
Smallholders' Food Security and Livelihoods are deeply impacted by Plant Health Management…

- **Around 40% of the world's food is grown by smallholders.**
- **Over 50% of the people going hungry worldwide work on the smallholders' farms.**
- **Practical plant health information to keep crops healthy is vital** for protecting the food and nutritional security, and the livelihoods of millions of smallholders and their families, especially in Africa, Asia and Latin America.

RAFS Overarching Objective

Contribute to regional Agri-Food systems transformation for affordable sufficient and healthy diets produced within planetary boundaries in a climate crisis …

Plant Health protection is fundamental to allow CGIAR and stakeholders to achieve this objective



Transboundary Threats to Plant Health

Changing climates + Human activities + Market globalization

Devastating Transboundary Crop Pests and Diseases

Massive economic and environmental implications

US$26.8 billion crop losses annually

Six devastating epidemics in Africa alone in the last decade

Plant Disease Diagnostics and Surveillance:

Local-to-Global and Global-to-Local

- **Strengthen the diagnostic and surveillance capacity** of NPPOs/NARES in LAC, Africa, Asia.
- Facilitate **exchange of knowledge** from **local-to-global/global-to-local**, on research approaches, tools/technologies for detection/characterization and surveillance of prioritized pests and diseases.
- **Surveillance activities** through national partners (NPPOs) in 15-20 target countries for 13 prioritized pests and diseases.

Regional Diagnostic Hubs, leveraging **CGIAR Germplasm Health Units** and **NPPO Networks**

Risk Assessment, Data Management and Guiding Preparedness for Rapid Response

1. Develop/enhance tools and standards for pests and diseases data management, risk assessment and prediction.
2. Facilitate preparedness and response plans against emerging pests and diseases.
3. Guide surveillance, integrated pest and disease management, and mycotoxin control.

Example

Banana disease occurrence data from the **Tumaini mobile app** mapped on the **PestDisPlace platform → an early warning system for banana diseases**, especially Banana Bunchy Top and Banana Xanthomonas Wilt.

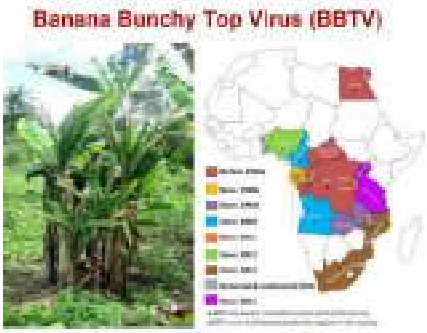
Anticipate, Predict and Prepare against Plant Health Risks

Overcoming IPM Integration & Adoption Barriers

- **Plant Health Innovation Platforms** in targeted countries to cocreate, validate and demonstrate of IPDM Innovation Packages → **bringing together innovations from CGIAR, IARCs, NARES, ARIs, and Private sector**
- **Participatory engagement and collective actions of farming communities, with gende and social inclusion focus**
- **Global Plant Health R4D Consortium**, leveraging existing networks established by CGIAR and partners to tackle different plant health threats

Source: Prasanna et al. (2021)

Building on a foundation of work on plant health management by CGIAR & Partners…



Protecting Food Chains from Mycotoxin Contamination

- Strengthening local, national & regional capacity to use bioprotectants (e.g., Aflasafe) as a part of integrated mycotoxin management
- Enabling private sector actors to sustainably manufacture and distribute bioprotectants against mycotoxin contamination

Target Countries

- ESA: Kenya, Uganda, Tanzania, Mozambique & Malawi
- WCA: Nigeria, Senegal, Benin, Burkina Faso
- LatAm: Mexico

CIMMYT IRRI AfricaRice IITA

Equitable and Inclusive Scaling of Plant Health Innovations

Equitable and inclusive innovations need to start by involving women farmers in surveillance and technology development to learning from their rich experiences, observations, and knowledge.

Strong collaboration needed between social and biophysical scientists to address important questions:

- Which farming, ecological and socio-economic conditions do the plant health innovations best fit?
- Whose labour will increase or decrease due to application of the innovation?
- Who has digital literacy and access to ICTs within the community?
- What are the communication methods appropriate for resource-poor women in marginalized/remote communities?

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CGIAR

Plenary Session-Global Perspective on Food Security

Louise Byrne, Chief Plant Health Officer for Ireland

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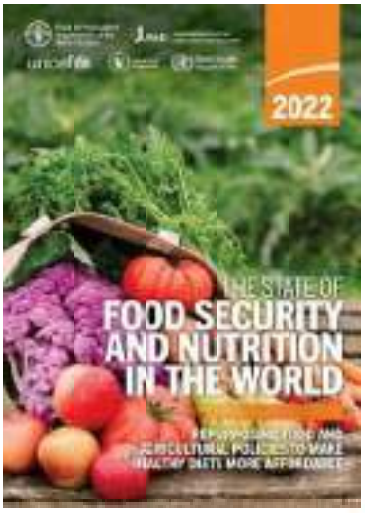
Global Food InSecurity

- Global Food Crisis is worsening- driven by Covid 19, conflict and climate change
- In 2021 828 million people (9.8% of global population) were affected by hunger (46 million more than in 2020 and 150 million more than in 2019)
- Projections that nearly 670 million people (8% of the world population) will still be facing hunger in 2030-even if a global economic recovery is taken into consideration
- Ireland is committed to supporting a global transformation to sustainable food systems



Food Vision 2030

- Food Vision 2030 is the strategy for the sustainable development of the agri-food sector in Ireland.
- Food Vision 2030 sets out four high-level Missions for the sector to work towards:
  - A Climate Smart, Environmentally Sustainable Agri-Food Sector
  - Viable and Resilient Primary Producers with Enhanced Well-Being
  - Food that is Safe, Nutritious And Appealing, Trusted And Valued at Home and Abroad
  - An Innovative, Competitive and Resilient Agri-Food Sector, Driven by Technology And Talent

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The impact of plant pests on food security

- Potato Blight and The Great Famine in Ireland 1845-1852
  - Population of 8 million people
  - Monoculture and the over-reliance on one variety of potato
  - *Phytophthora infestans* (Potato Blight)
  - 1 million people died from starvation and disease and over 2 million people forced to emigrate

- According to the IPPC
  - Plant pests and diseases are responsible for losses of **20- 40% of global food production**

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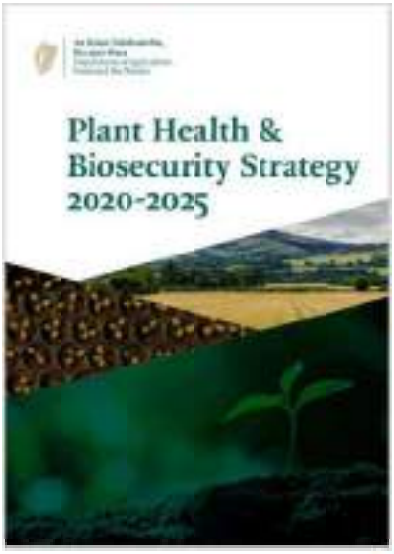
Protecting Plant Health

- The International Plant Protection Convention
- Ireland - Member of the European Union and the European and Mediterranean Plant Protection Organisation, Contracting Party to the International Plant Protection Convention
- The European Union Plant Health Regulatory Framework
- Plant Health & Biosecurity Strategy 2020-2025 underpinned by 3 strategic principles:
    - Risk Anticipation
    - Surveillance
    - Awareness



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Plant Health Challenge- Trade, Travel and Climate Change

- Trade between countries drives economic development, prosperity and higher living standards.
- Global trade offers unprecedented opportunities for plant pests to hitch a ride and potentially invade new areas.
- eCommerce a new challenge for NPPOs.
- Movement of people increasing and with it plant health risk.
- Climate Change impacts on plant health and food security.

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A Call to Action - Protecting Plant Health, Ensuring Food Security

- Raise Awareness
- Build Phytosanitary Capacity
- Surveillance
- Communication and Collaboration - Internationally, Regionally (EPPO), EU level (EFSA, EURLs), Nationally
- Data, IT systems
- Risk Analysis and Risk Management
- Advances in Diagnostics
- Research and Innovation
- Support

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Thank you

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Louise Byrne
Chief Plant Health Officer for Ireland

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Introduction to the Scientific Symposium

Plant pests diagnostic: its importance and its relation to food security

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In **1** year (2021)

811 million people in the world

were in **hunger** (food insecurity)

Approximatly **118 million** more in 2020 than in 2019

Forecast

- **670 million** people will still be undernourished in **2030**:

78 million more than in a scenario in which the pandemic had not occurred.

Source: FAO, IFAD, UNICEF, WFP and WHO. 2021 and 2022 (SOFI).

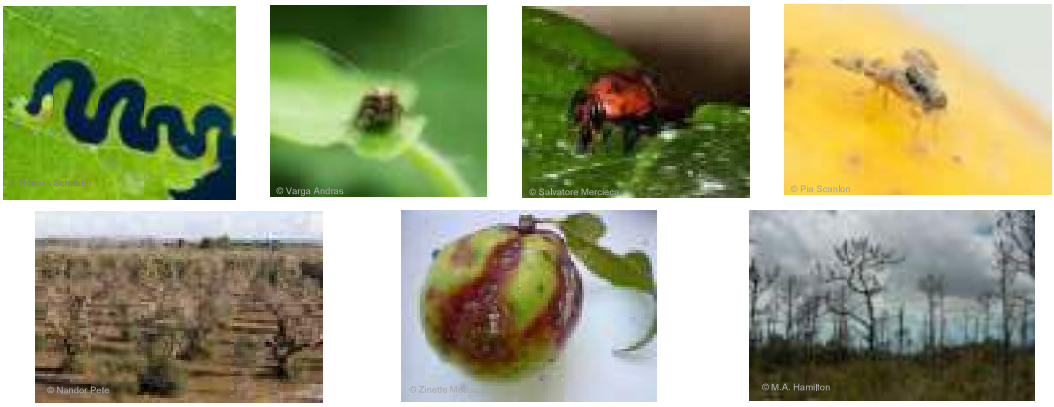
Main drivers:

- Conflicts and wars
- Climate change
- Economic downturns and crises
- Unaffordable healthy food
- COVID-19 pandemic in 2020 and its effects

Source: FAO, IFAD, UNICEF, WFP and WHO. 2021 and 2022 (SOFI). FAO 2017.

Scientific Symposium Plant pests diagnostic: its importance and its relation to food security

The impact of plant pests



Loss: 10-16% global harvest Costs: at least 220 billion USD

~35-40% global food supply

- **More plant pests are appearing in places where they had never seen before…**

Source: FAO and IPPC 2020. Agrios, 2005.

- The most effective way to **prevent** and **limit** the international **spread of pests** from trade and passenger movement is through **regulatory means**, establishing **phytosanitary measures**.

- It is also important to ensure that **best agricultural practices** are followed to reduce the incidence of pests at the place of origin.

- **Phytosanitary import legislation is the first line of defense** in preventing the international spread of any pest.

Source: FAO 2021 (IPPC)

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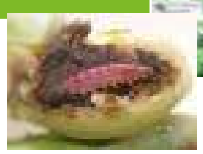
National Plant Protection Organizations activities

Surveillance
to delimit the distribution of known pests and detect new ones

Pest outbreaks management

Import inspection



Export inspection

- Pre-export inspection of crop and consignment
- Issuance of phytosanitary certificates

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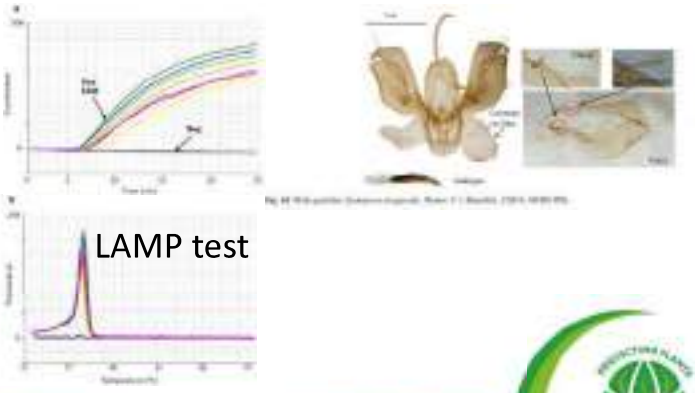
National Plant Protection Organizations activities

- During inspections, samples are collected and are examined for visual symptoms or signs of presence of pests
- Insects are collected in traps and need identification
- Identification of pests is critical

We need to recognize the enemy!

Diagnostic plays a crucial role



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IPPC Strategic Framework

The 2020-2030 agenda

ISPMs: the framework for phytosanitary systems and operations

- 46 ISPMs
- 31 diagnostic protocols
- 44 phytosanitary treatments
- 10 CPM Recommendations

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The IPPC diagnostic work programme

"**Pest diagnosis** is a cross-cutting issue that underpins most International Plant Protection Convention (IPPC) activities. **In order to take action against a pest, it must be accurately identified**. To enable safe trade, pest diagnosis must further be completed quickly and to a **high level of confidence**".

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The IPPC diagnostic work programme

Diagnostic Protocols for Regulated Pests

- **31** adopted diagnostic protocols (as of Sep 2022)
- **27** subjects in the work programme (as of Sep 2022)
- Considered international standards – not scientific publications
- Adopted as annexes to ISPM 27
- Minimum requirements for reliable diagnosis of regulated pests
- Accurate pest diagnosis (basis of an effective pest surveillance)
- Fundamental to national plant pest surveillance system

The IPPC diagnostic work programme

Technical Panel on Diagnostic Protocols (TPDP)

> 60 authors from around the world

EPPO Diagnostic programme

More than 150 diagnostic standards

- One horizontal diagnostic Panel
- 5 discipline specific Panels
- In total more than 160 experts involved in the Panels plus others in protocols drafting teams
- 19 protocols for viruses and viroids
- 15 protocols for nematodes
- 32 protocols for bacteria
- 46 protocols for insects and mites
- 29 protocols for fungi
- 11 horizontal Standards in particular on quality assurance

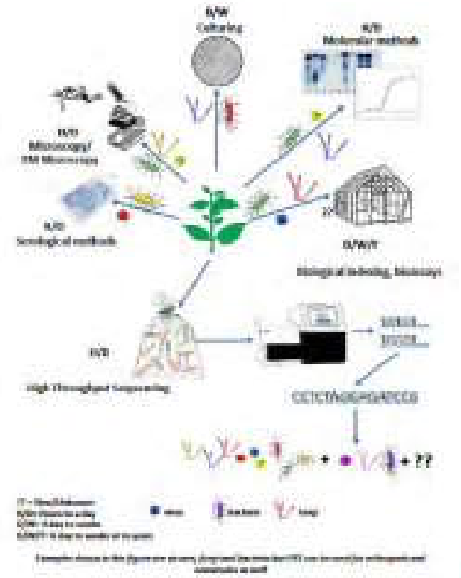
Input from research projects Euphresco and EU funded projects

Euphresco

One of the 10 RPPOs

EPPO Diagnostic programme – main highlights

- New Standard on High Throughput Sequencing
- Revision of the Standard on Interlaboratory Comparisons
- Also Standards on Quality Assurance and Accreditation



EPPO Diagnostic programme

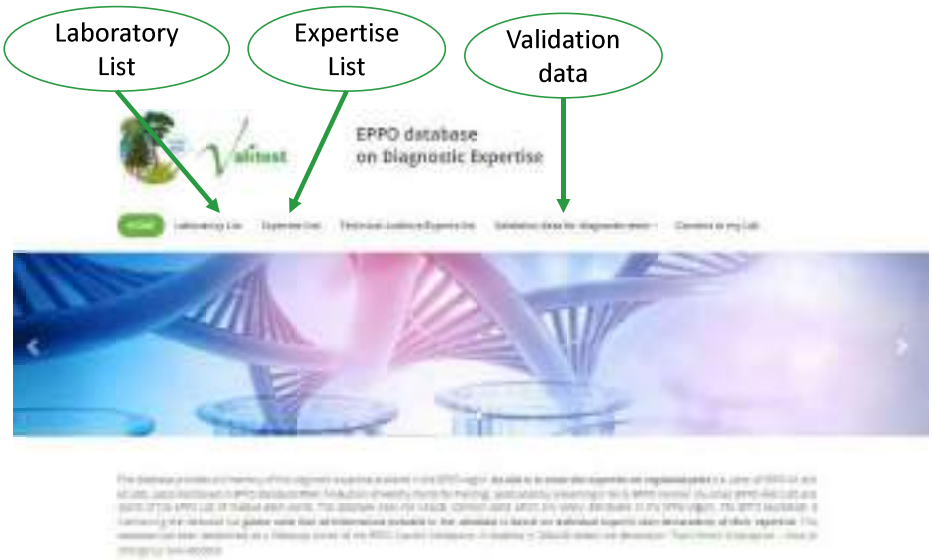
Regular Conferences/Workshops on plant pest diagnostics

Workshop on the use of NGS technologies for plant pest diagnostics
2017

Regular workshops for heads of plant pest diagnostic laboratories

Next workshop 2023
Organisation of Proficiency Testing
Future of HTS in plant health diagnostics

EPPO Diagnostic programme - Databases



Linked to EPPO Global Database

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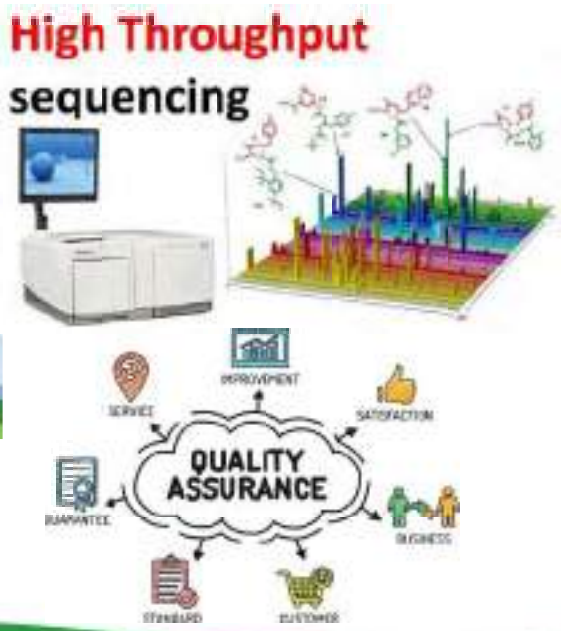
What is on our programme today?



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The Plant Clinic Network in the Plantwise Programme in Africa

Frontline diagnostic support through agro-advisors

Washington Otieno

CAB International

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Overview of Plantwise

- A global programme led by CABI
  - Focus on reduction of crop losses due to plant health problems
- Operates through
  - networks of plant clinics manned by plant doctors
  - knowledge bank - interactive information management built on, *inter alia*, resources to aid diagnosis.
  - In-built M&E system for continual improvement
- Referral system - support to diagnosis beyond plant clinic interactions
  - DAS – referral to CABI labs at Egham
  - linkage with national labs & experts

Plantwise components

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Key Features of plant clinics

- Situated at locations easily accessed by farmers
  - regular time & place
- Run by '*plant doctors*'
  - extension workers trained in visual diagnosis & giving good advice to farmers.
- Farmers bring 'sick' plants; causative factors diagnosed based on symptoms, supported by open access PWKB
  - Referral arrangement, when diagnosis difficult
  - Diagnosed problem, the basis of advice to farmers, documented in a prescription form – data uploaded to restricted access POMS

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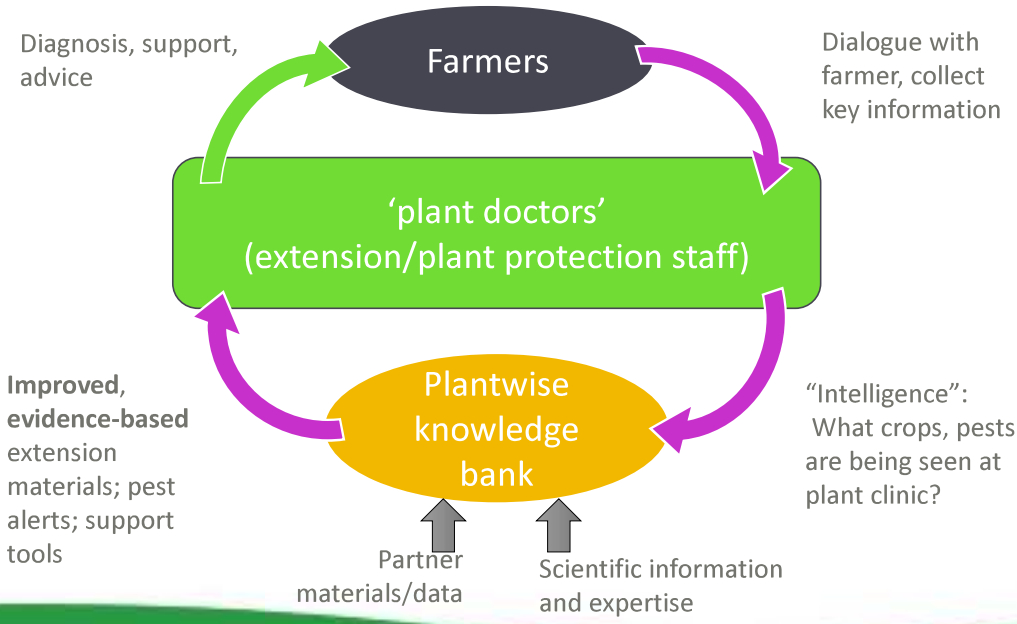
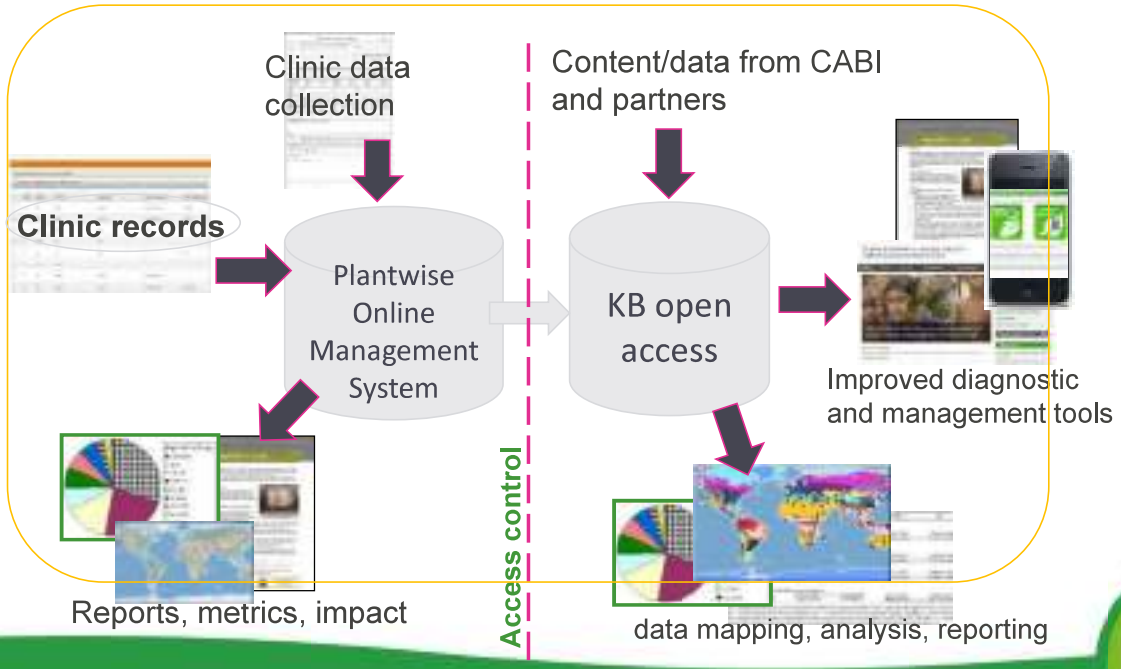
Information flow



Plantwise Knowledge Bank



Lessons from Plantwise

- Systems for pest early detection lacking, leads to many pest introductions detected too late
  - Examples - since mid-2000s in Africa alone
    - ➢ *Bactrocera dorsalis*, *Tuta absoluta, Spodoptera frugiperda,* BXW, MLND, etc.
- Networked [satellite] diagnostic labs with functional links to reference plant health labs needed
- Plant protection measures at farm level remain largely curative rather than preventive
  - ➢ missed opportunities for **early interventions** & lack of demonstrable benefits from investments in preventive pest management to avert new introductions
- **Response systems** to deal with endemics/new introductions that are still not widely distributed generally lacking
  - ➢ *Fusarium oxysporum* fsp. *cubense* TR4, CBSV, etc

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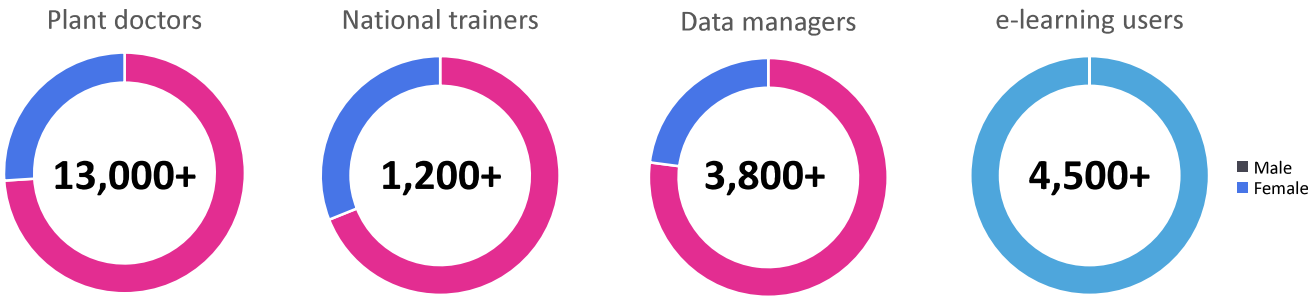

As a result:

- Increased reach of farmers to plant health advice

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Quality content

Major transformative change in delivery of plant health advice: - use of ICTs, including social media platforms

Knowledge bank:

- 1,723 Factsheets for Farmers
- 2,028 Pest Management Decision Guides
- 6,703 external factsheets
- 4,039 technical factsheets on individual pests

Decision-support tools:

- Apps for accessing advisory materials
- App for data collection and management
- Interactive diagnostic tool
- Social media to support pest diagnosis and identification

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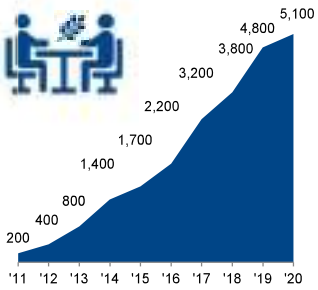
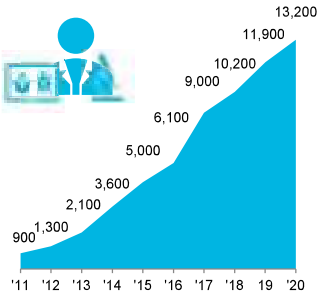
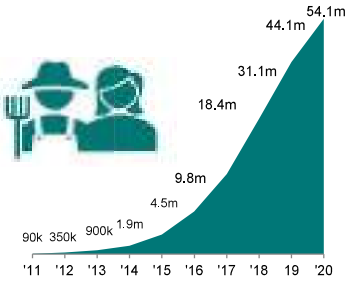


5,000+
plant clinics established



13,000+
plant doctors trained



54 million+
farmers reached 9directly & indirectly)

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Achievements/2

>1.5 million queries brought to plant clinics

- on >500 different crops
- Diverse problems diagnosed per crop

Plantwise services have led to:

- >20% increase in yield due to improved management of plant health
- >30% increase in crop-based household income

➔ Stronger capacity for diagnosis, better plant health management, reduced crop damage & loss, improved productivity

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Conclusion

- The value of diagnosis, regardless of the method, is its contribution to building **pest records**
- Pest records are beneficial only if they sit in **regularly updated** databases
- Databases useful if they support **decisions on phytosanitary controls**
    - Possible only if data policies do not unnecessarily restrict **data sharing** and **reporting obligations** e.g. of the IPPC on **changing status of pests**

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We wish to acknowledge the support of our donors, as well as our national and international partners, who made Plantwise possible

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UKaid

Swiss Agency for Development and Cooperation SDC

Irish Aid

IFAD

Ministry of Agriculture and Rural Affairs, People's Republic of China

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Six millions of SARS-Cov-2 genomes sequenced…

How can plant health scientists transfer high throughput sequencing technologies toward plant pest diagnostics ?

Prof. Sébastien Massart – Liège University – Gembloux AgroBio Tech - Belgium

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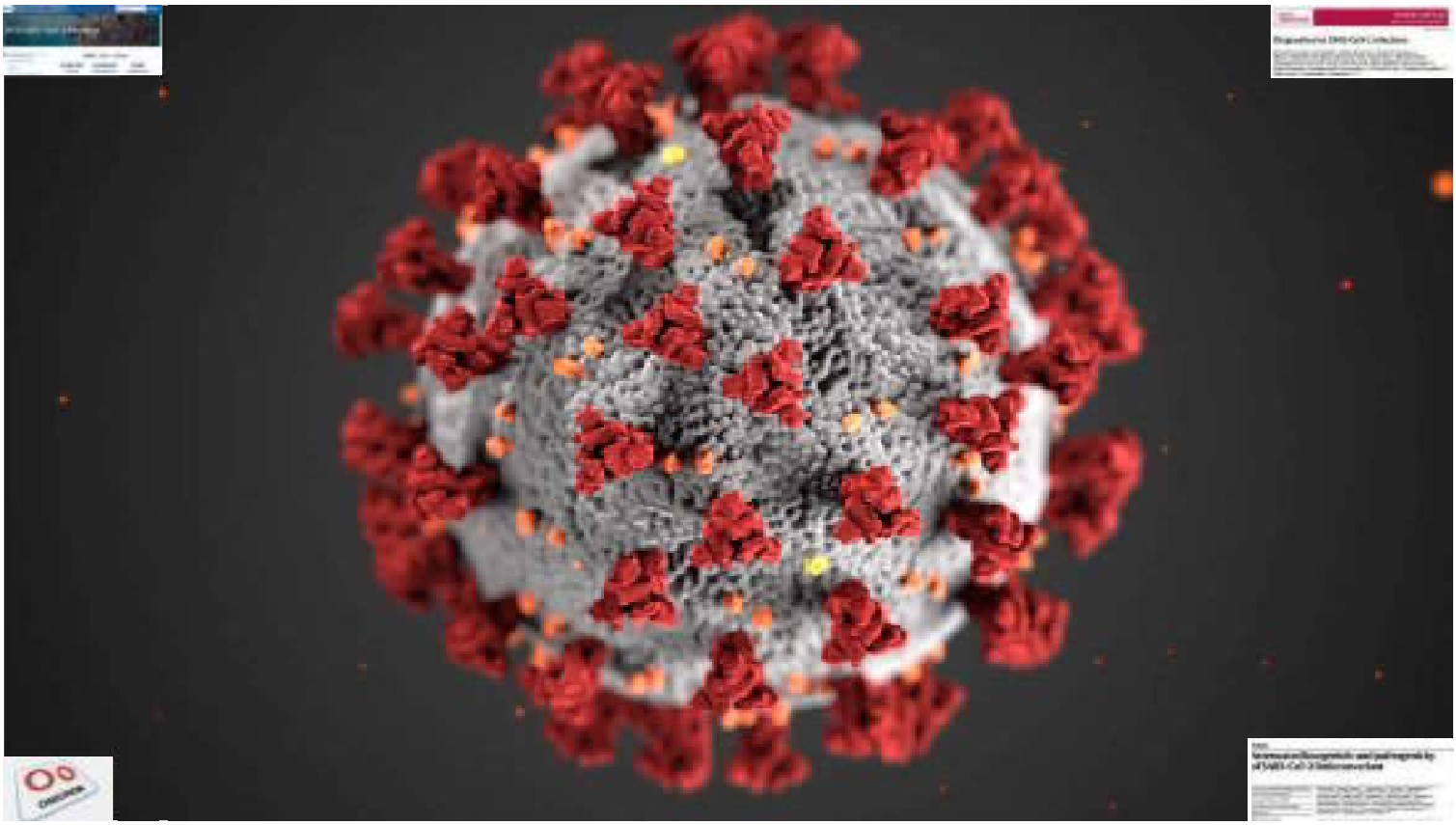

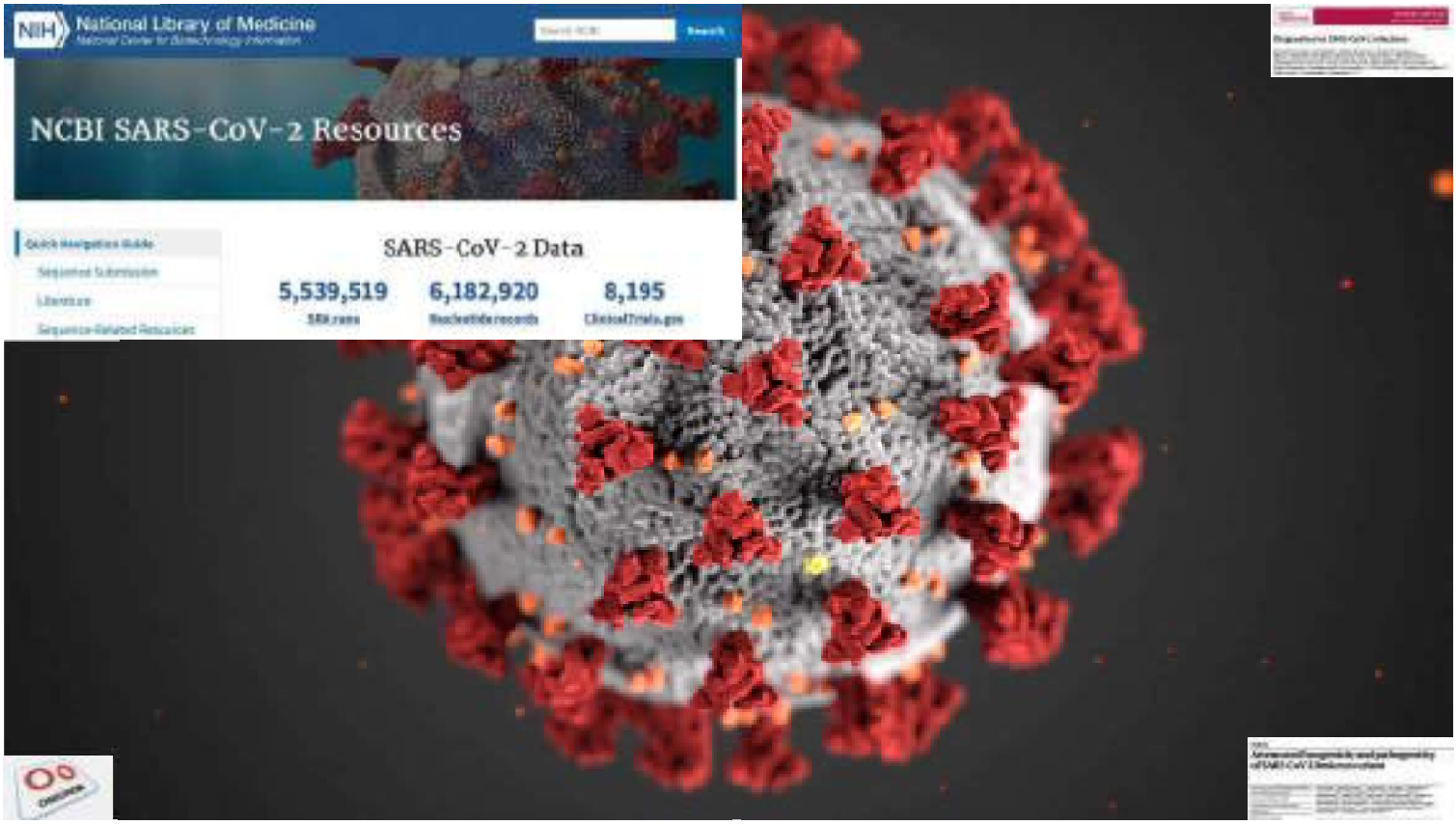
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SRA runs
6,182,920
Nucleotide records
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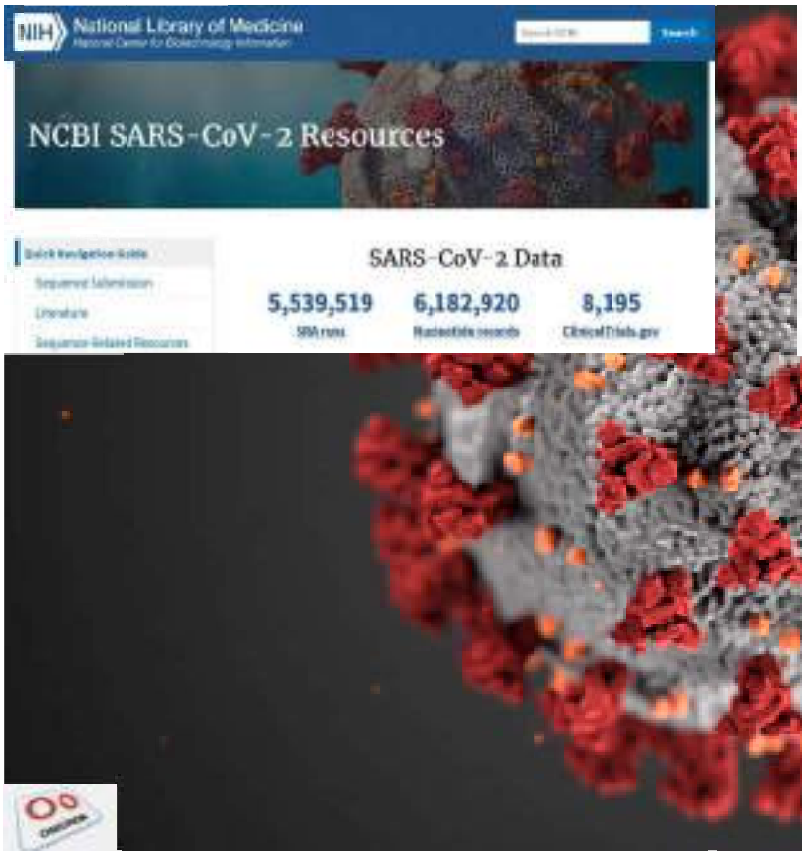
ClinicalTrials.gov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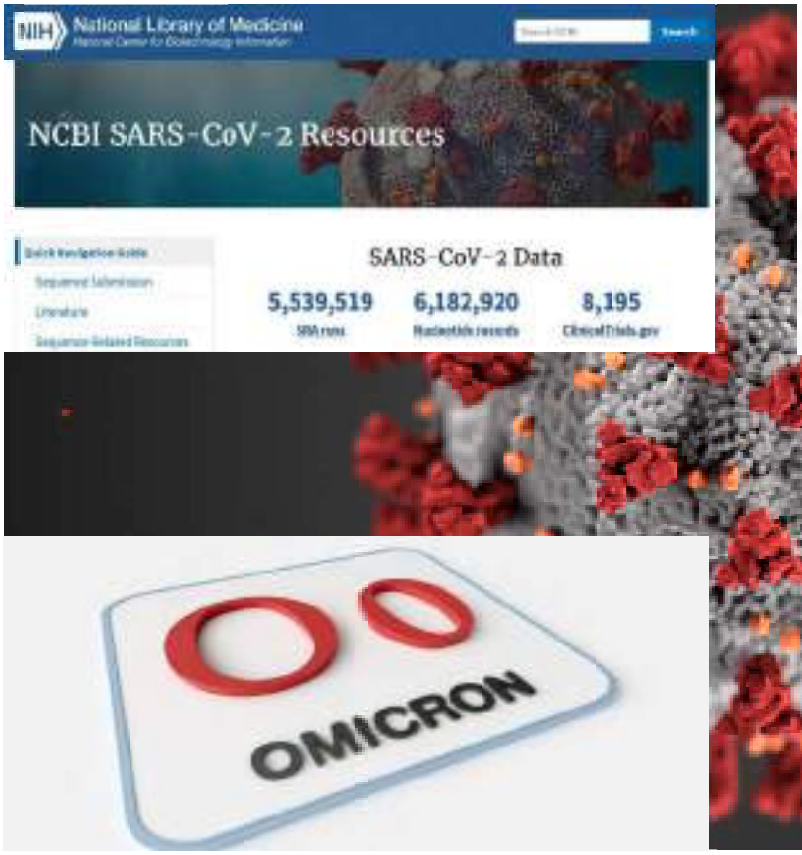
nature materials
REVIEW ARTICLE
Diagnostics for SARS-CoV-2 infections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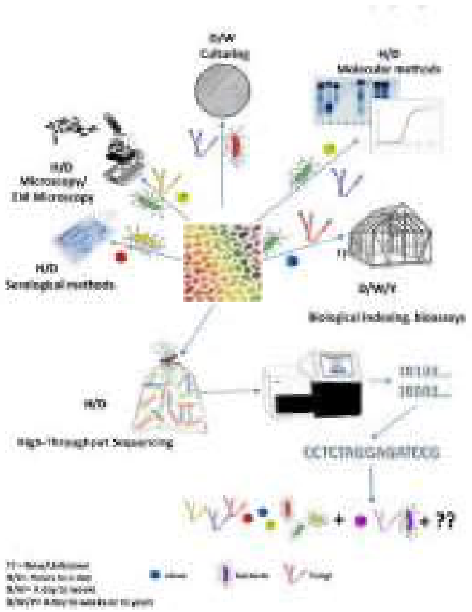
OMICRON

What about us ?



What about us ?

What about plant health and its stakeholders ?

Transfer toward diagnostics :

The impact of high throughput sequencing on plant health diagnostics

2018

HTS for plant health diagnostics

What about us ?

What about plant health and its stakeholders ?

Transfer toward diagnostics :

International Organization for Standardization
ISO
17025
ACCREDITED LABORATORY

2022

London, 21 – 22 September 2022 | International Plant Health Conference

What about us ?

What about plant health and its stakeholders ?

Transfer toward diagnostics :

From research to diagnostics : technical verification or validation

From research to diagnostics : technical verification or validation

Best practices in metabarcoding of fungi: From experimental design to results

Towards the validation of high-throughput sequencing (HTS) for routine plant virus diagnostics: measurement of variation linked to HTS detection of citrus viruses and viroids

High-Throughput Sequencing of Small RNAs for the Sanitary Certification of Viruses in Grapevine

Side-by-Side Comparison of Post-Entry Quarantine and High Throughput Sequencing Methods for Virus and Viroid Diagnosis

Quality Assessment and Validation of High-Throughput Sequencing for Grapevine Virus Diagnostics

Writing international guidelines for using HTS to detect plant pests

Valitest

Guidelines for the selection, development, validation and routine use of high-throughput sequencing analysis in plant diagnostic laboratories

Coordination: Lebas B., Massart S.

Contributors: Adams I., Al Rwahnih M., Baeyen S., Bilodeau G., Boyin A., Boonham N., Bruisma M., Candresse T., Chandelier A., De Jonghe K., Fox A., Gentit P., Gaafar Y., Haegeman A., Ho W., Hurtado-Gonzales O., Kutnjak D., Jonkers W., Kreuze J., Landa B., Lette Vicente C., Lieffing L., Liu M., Maclot F., Malapi-Wight M., Maree H., Martoni F., Mehle N., Minafra A., Mollov D., Moreira A., Nakhla M., Pettec F., Piper A., Porchet J., Rae R., Remenant JP., Rivera Y., Rodoni B., Roenhorst A., Rollin J., Sabaredil F., Santala J., Souza-Richards R., Spadaro D., Studholme D., Suffnanis S., van der Vlugt R., Tarmizer L., Tronin C.Wetzel T., Ziebell H.

55 co-authors

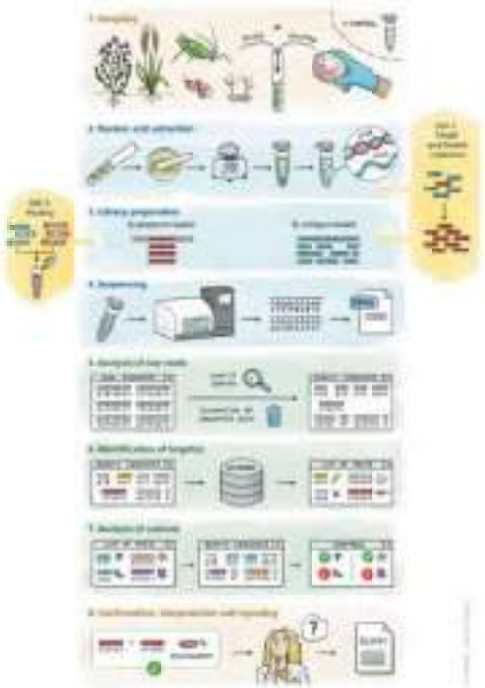
>1,500 revisions

Any pest

Any technology

Writing international guidelines :

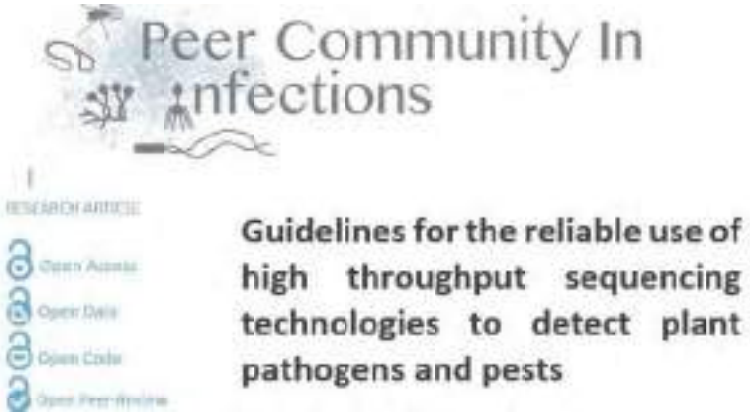
First publication: « building the house »

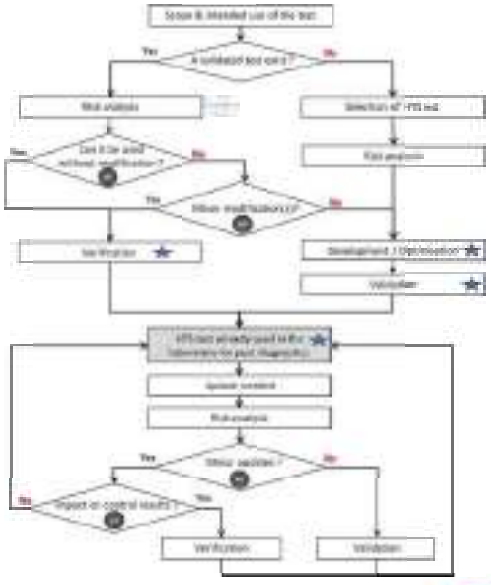


HTS for plant health diagnostics

Writing international guidelines :

Second publication: « running the tests»





Writing international guidelines :

HTS for plant health diagnostics

Writing international guidelines :

Landslide on external control ?

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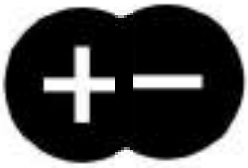
Writing international guidelines :

Landslide on external control ?

- Positive control also negative control
- Negative control often useless
- New alien control !



HTS for plant health diagnostics

From guidelines to an official standard :

COUNTRY CONSULTATION – Deadline 2022-05-05

European and Mediterranean Plant Protection Organization
Organisation Européenne et Méditerranéenne pour la Protection des Plantes

22-17406

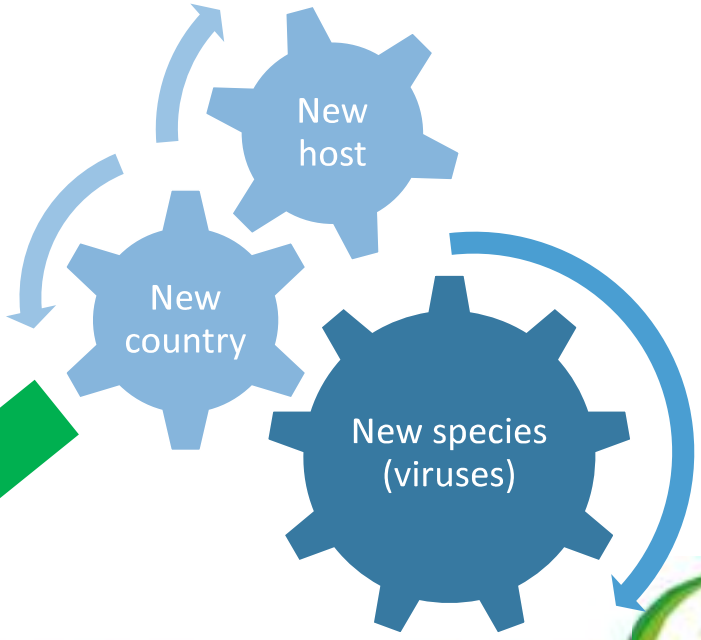
PM 7/XX

Diagnostics

PM 7/XX Considerations for the use of High Throughput Sequencing in plant health diagnostics

Conclusion & challenges

- From research to diagnostics in plant health
- Guidelines to guide this transition
- ISO17025 accredited HTS tests right now
- Scientific and regulatory challenges :



How to deal with the information and share the data ?

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

London, 21 – 23 September 2022

Thank you for your attention and let's exchange on this !

International Plant Health Conference

Sebastien Massart
Professor – Liège University – Gembloux AgroBio Tech -Belgium

INTERNATIONAL PLANT HEALTH CONFERENCE

LONDON, 21-23 September 2022

European Reference Laboratories in Plant Health: a regional network

Françoise MUNAUT, Policy officer,
DG Health and Food Safety
(Unit Plant Health)

FROM & FOR

Legal basis :

the Official Control Regulation

EU 2017/625

Networking : EURLs & NRLs & OLs

WHY

Official controls and activities

rely (e.g.) on

uniformity

quality

of test methods and of results

reliability

harmonisation

August 2019

Bacteria
Fungi and Oomycetes
Insects and Mites
Nematodes,
Virus, Viroids & Phytoplasmas

5 European Reference Laboratories in plant health

WHEN

⇒ **end 2017**: greenlight to set up Plant Health EURLs

⇒ 7 February 2018 : Commission Delegated Regulation (EU) 2018/631

⇒ June and October 2018 : 2 calls

⇒ 27 March 2019 : Commission Implementing Regulation 2019/530

⇒ **1st August 2019** : start of work

WHO

1. **BACTERIA consortium**
   - Led by the Netherlands Food and Consumer Product Safety Authority-National Reference Centre Plant Health (NIVIP/NVWA, **The Netherlands**)
   - Flanders Research Institute for Agriculture, Fisheries and Food (ILVO, **Belgium**)
   - Research Centre for Plant Protection and Certification (CREA-DC (DIALAB), **Italy**)
   - National Institute of Biology (NIB, **Slovenia**)
2. **FUNGI**
   - French Agency for Food, Environmental and Occupational Health and Safety (ANSES, **France**)
3. **INSECTS AND MITES consortium**
   - Led by the French Agency for Food, Environmental and Occupational Health and Safety (ANSES, **France**)
   - Austrian Agency for Health and Food Safety (AGES, **Austria**)
4. **NEMATODES consortium**
   - Led by the French Agency for Food, Environmental and Occupational Health and Safety (ANSES, **France**)
   - Flanders Research Institute for Agriculture, Fisheries and Food (ILVO, **Belgium**)
5. **VIRUS, VIROIDES and PHYTOPLASMAS consortium**
   - Led by the Netherlands Food and Consumer Product Safety Authority-National Reference Centre Plant Health (NIVIP/NVWA,**The Netherlands**)
   - Research Centre for Plant Protection and Certification (CREA-DC (DIALAB), **Italy**)
   - National Institute of Biology (NIB, **Slovenia**).

WITH

45 EURLs

- 26 in Food & Feed
- 14 in Animal Health
- 5 in Plant Health

WHAT

1. **Methods for analysis, testing or diagnosis**

2. **Test Performance & Proficiency tests &**

3. **Reference material and reagent lists, for NRLs**

4. **Trainings**

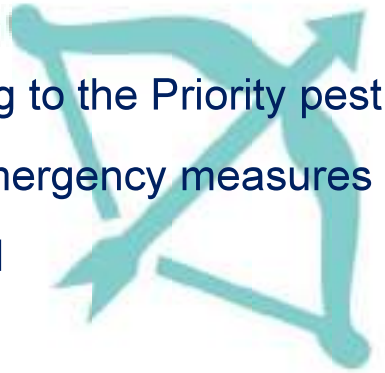
5. **Advices on methods, e.g. for new EU legislations related to movements and introductions in EU territory**

ON

- **Union quarantine pests pursuant to Art. 5 of Regulation (EU) 2016/2031;**
- **Plant pests not yet listed as Union quarantine pests, but are subject to the measures to be adopted pursuant to Art. 30(1) of Regulation (EU) 2016/2031;**
- **Emerging pests**
  - **presenting a risk for (a part of) the Union territory;**
  - **the entry or spread of those pests might have a significant impact for the Union agriculture or forests.**

ON

Prioritisation to those



- belonging to the Priority pest list (REGULATION (EU) 2019/1702)
- under emergency measures
- surveyed

ACHIEVEMENTS => EURL websites

TPs

PTs (1 or 2/y/EURL)

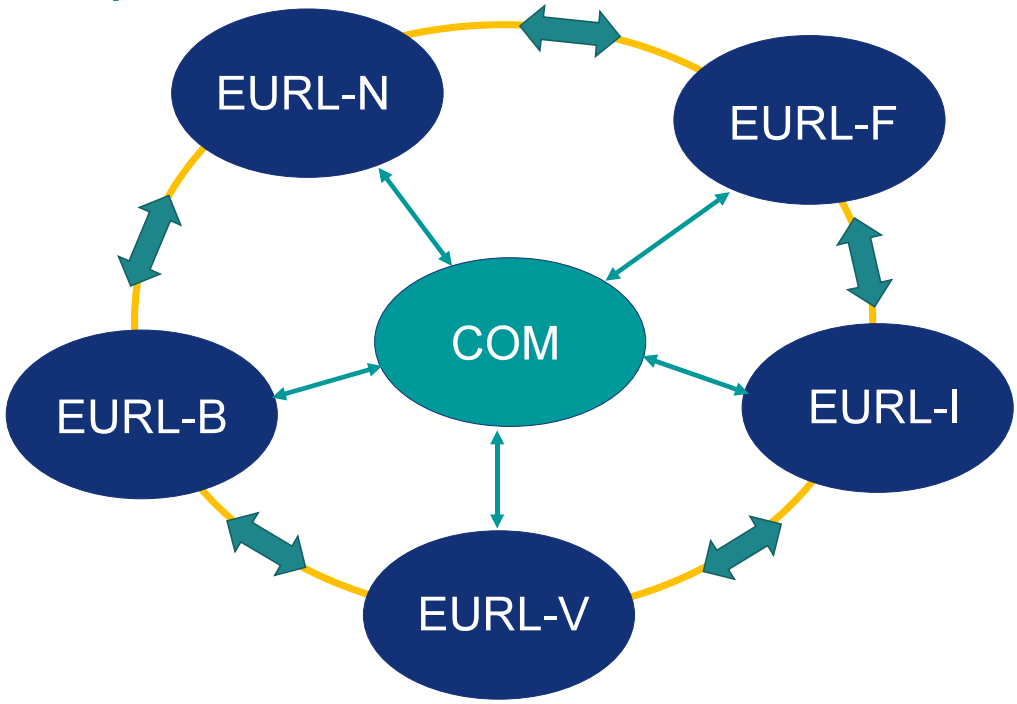
Trainings : follow-up of PTs, or on specific topics

Annual worskshops

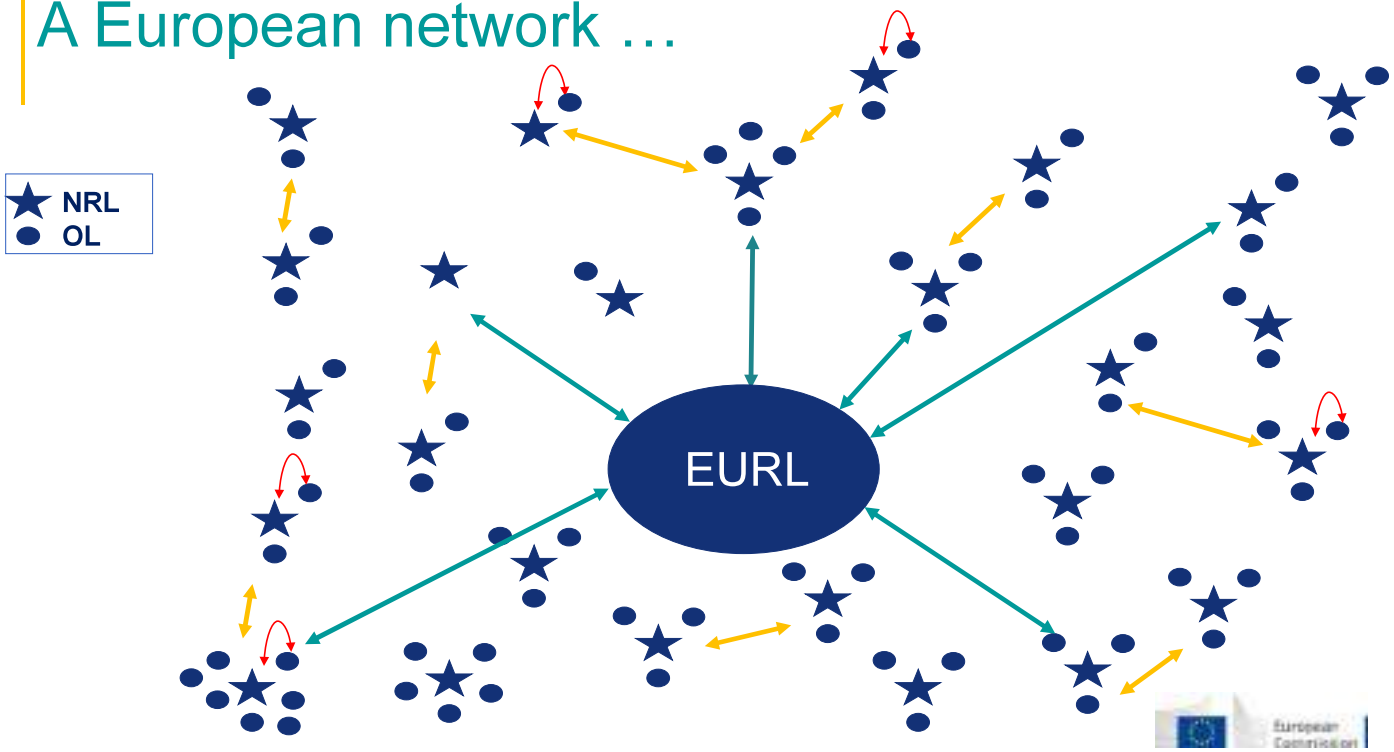
Diagnostic methods + validation data

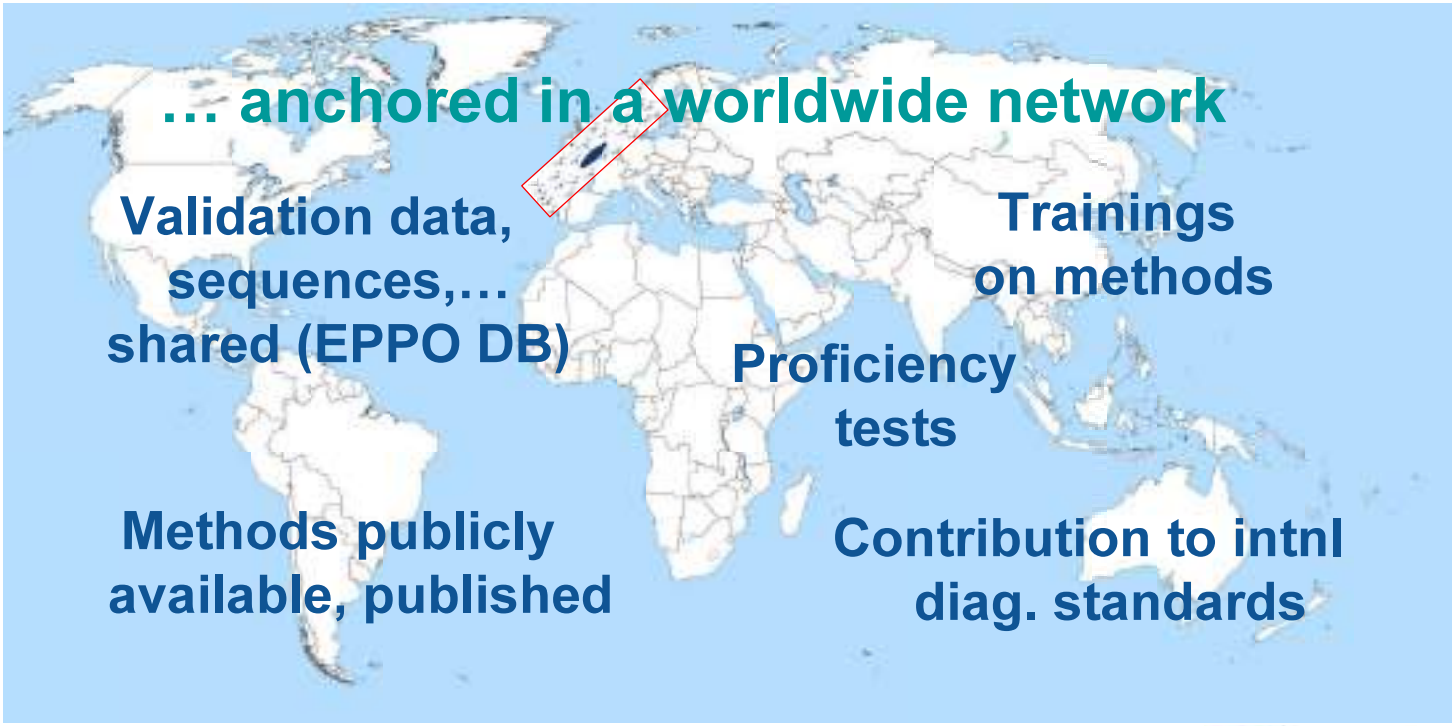
EPPO synergies : EURL's member in each diagnostic panel

A European network …



A European network …





Thank you

PROTECTING PLANTS PROTECTING LIFE

London, 21 - 23 September 2022

International Plant Health Conference

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

Quality assurance and validation in diagnostics: Why is it important?

London, 21 – 23 September 2022

International Plant Health Conference

Context

Global and increasing trade of plant and plant products

- Diversity of products
- Quick evolution of sectors

Critical challenges for plant production and plant health

- Facilitate safe trade
- Secure food supply
- Avoid loss of productions
- Avoid dissemination of pests
- Avoid environmental impacts

Need for rapid and reliable plant pests diagnostic

© https://unctad.org/webflyer/review-maritime-transport-2018

© ANSES

Context

Quality assurance and validation support the reliability of diagnostics

© https://unctad.org/webflyer/review-maritime-transport-2018

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Quality assurance and validation in diagnostics: why is it important?

How quality assurance support the reliability of diagnostic

Quality assurance implies in the laboratory:

- Written and standardized testing procedures
  - Reproducibility of testing
  - Traceability

    Mutual / multi-lateral recognition of diagnostic

- Staff competence monitoring
  - Confidence in testing and tests results

    Mutual / multi-lateral recognition

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How quality assurance support the reliability of diagnostic


PM 7/98 (5) Specific requirements for laboratories preparing accreditation for a plant pest diagnostic activity

PM 7/122 (1) Guidelines for the organization of interlaboratory comparisons by plant pest diagnostic laboratories'

Quality assurance implies :

- Standardization of diagnostic protocol
  - IPPC diagnostic standards (31 protocols available) https://www.ippc.int/fr/core-activities/standards-setting/ispms/
  - regional standards (e.g. 150 EPPO diagnostic standards available at EPPO website) https://www.eppo.int/RESOURCES/eppo_standards/pm7_diagnostics
  - Cooperation at international / regional levels (e.g European cooperation for Accreditation)

- Standardization of implementation of ISO standards and validation procedure
  - EPPO PM 7/98 - EPPO PM7/122

Quality assurance and validation in diagnostics: why is it important?

How validation support the reliability of diagnostic

Validation is a complex process:

Development of sampling and testing program

Expression of needs
From risk manager's perspective
From laboratory's perspective

Performance of test
Performance study
Standardized process
Appropriate metrics

VALIDATION
Test fit for purpose

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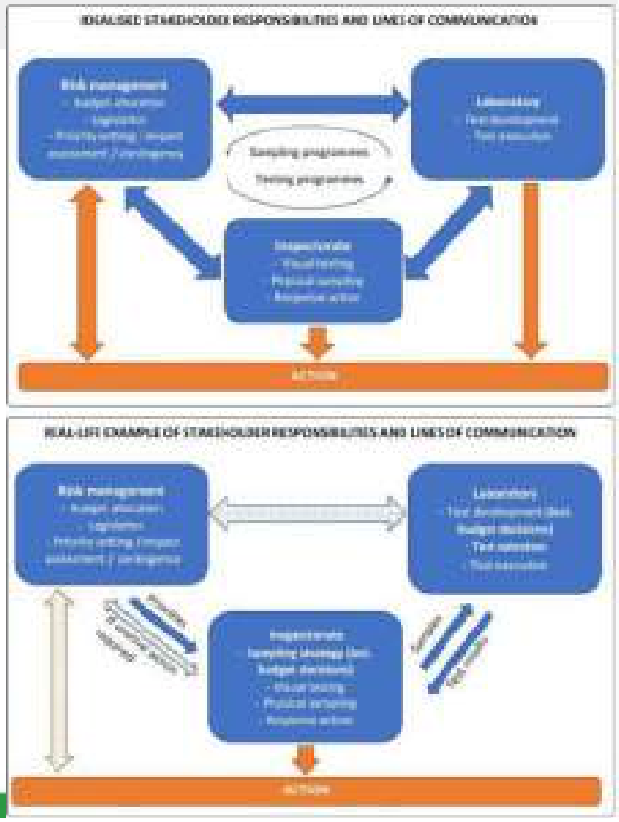
How validation support the reliability of diagnostic

Validation is a complex process:

Expression of needs
From risk manager's perspective
From laboratory's perspective

Misunderstandings
Ambiguities



Which common acceptable risk for false positive / negative result?

Harrison et al. 2022 – PhytoFrontiers https://doi.org/10.1094/PHYTOFR-03-22-0027-FI

How validation support the reliability of diagnostic

Validation is a complex process:

Expression of needs
From risk manager's perspective
From laboratory's perspective

Need for consensus tool to assist the design of **optimal sampling and testing program** for early detection of an invasive pest

⇨ **VALITEST** (EU funded project)
developed a prototype mathematical / statistical framework
To be further refined and evaluated
Harrison *et al.* 2022 – Phytofrontiers https://doi.org/10.1094/PHYTOFR-03-22-0027-FI

https://www.valitest.eu

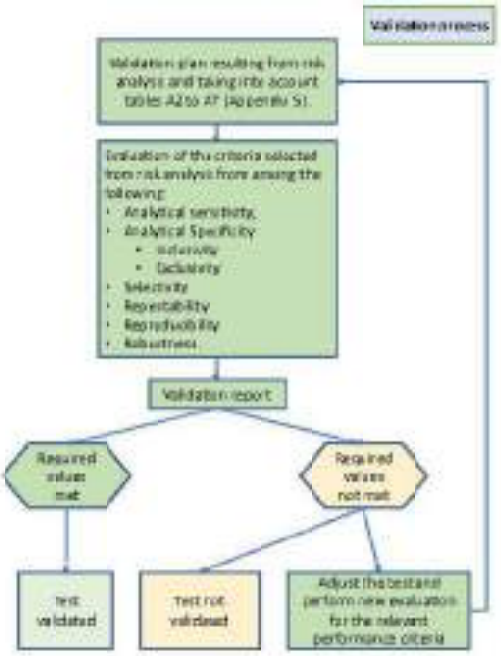
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

How validation support the reliability of diagnostic

Validation is a complex process:

Performance of test
Performance study
Standardized process
Appropriate metrics

Standardized process
Dedicated documentation
Shared data
International cooperation



EPPO 2021 PM 7/98 (5) Specific requirements for laboratories preparing accreditation for a plant pest diagnostic activity DOI: 10-1111/epp.12780

Quality assurance and validation in diagnostics: why is it important?

How validation support the reliability of diagnostic

Validation is a complex process:

Performance of test
Performance study
Standardized process
Appropriate metrics

Need for validation data and update of diagnostic protocols

⇨ **VALITEST** (EU funded project) produced validation data
11 pests concerned

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VALITEST test performance studies

Pests concerned by the test performance studies:

11 pests from different groups

- bacteria
- fungi
- nematodes
- viruses

Pest	TPS organizer	Tests	Number of participants	Number of samples prepared
Elasmo amylovora	NIB	6 tests (real-time PCR, LFDs and LAMP)	32 (from 20 countries)	~900
Pantoea stewartii subsp. stewartii	NIB	6 tests (real-time PCR, PCR)	23 (from 16 countries)	~450
Citrus tristeza virus	ANSES	11 tests (ELISA, TPIA, Conventional RT-PCR, real-time RT-PCR, RT-LAMP and ImmunoStrip)	17 (from 11 countries)	~1650
Bursaphelenchus xylophilus	ANSES	5 tests (conventional PCR, real-time PCR, LAMP)	21 (from 18 countries)	~430 DNA extracts ~280 spiked wood extracts
Plum pox virus	NVWA	8 tests selected (RT-PCR, real-time RT-PCR, DAS-ELISA)	17 (from 12 countries)	~700
Fusarium circinatum	FERA	6 tests (plating, PCR, real-time PCR)	20 (from 15 countries)	~640

Pest	TPS organizer	Tests	Number of participants	Number of samples prepared
Tomato spotted wilt tospovirus	NIB	8 tests (DAS-ELISA, on-site tests, conventional and real-time RT-PCR)	21 (from 12 countries)	~1540
Xylophilus ampelinus	FERA	9 tests (E:ISA, IF, conventional and real-time RT-PCR)	12 (from 11 countries)	~570
Cryphonectria parasitica	UNITO	3 tests (conventional and real-time PCR)	11 (from 8 countries)	~220
Plum pox virus	ANSES	3 tests (LFD, RPA, LFD)	15 (from 12 countries)	~640
Tomato brown rugose fruit virus	CREA	1 tests (conventional and real-time RT-PCR)	34 (from 18 countries)	~850
Xanthomonas citri pv. *citri*	ANSES	13 tests (conventional and real-time PCR, LAMP and direct molecular tests performed from immunostrips or Whatman™ FTA cards)	19 (from 14 countries)	~960

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

Quality assurance and validation in diagnostics: why is it important?

How validation support the reliability of diagnostic

Validation is a complex process:

Performance of test
Performance study
Standardized process
Appropriate metrics

Need for validation data and update of diagnostic protocols

⇨ **VALITEST** (EU funded project) produced validation data
11 pests concerned
12 test performance studies conducted
80 diagnostic tests evaluated (ELISA, IF, PCR…)
More details at https://www.valitest.eu

Revision of 13 EPPO standards
*Validation data available at EPPO diagnostic data base (*https://dc.eppo.int/)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

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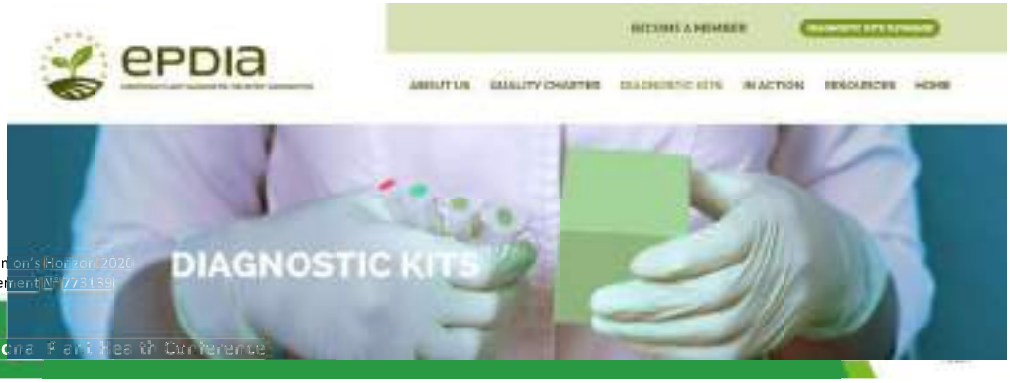
How validation support the reliability of diagnostic

Validation is a complex process:

Performance of test
Performance study
Standardized process
Appropriate metrics

Need for validation data and update of diagnostic protocols

⇨ **VALITEST** (EU funded project)
*Development of the **European Plant Diagnostic Industry Association (EPDIA)***



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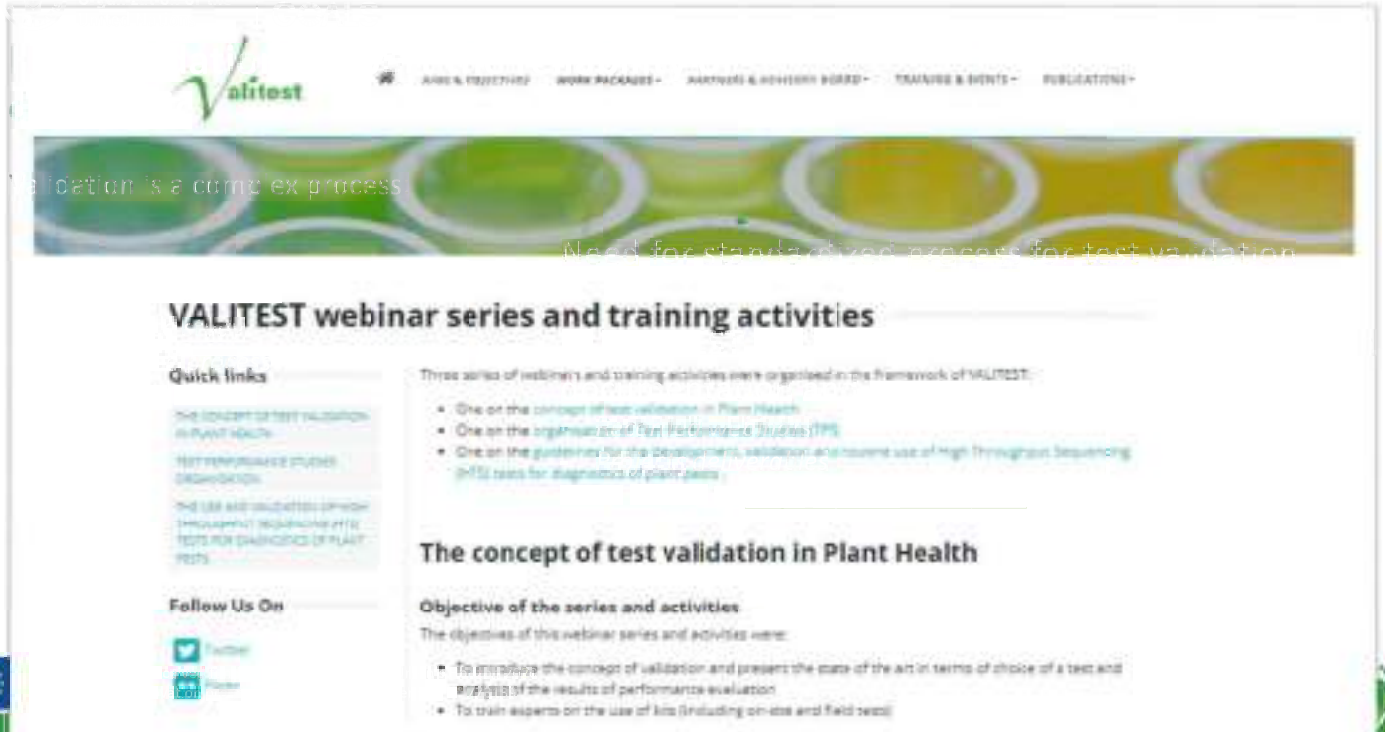
Quality assurance and validation in diagnostics: why is it important?



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How validation support the reliability of diagnostic

Validation is a complex process:

Performance of test
Performance study
Standardized process
Appropriate metrics

Need for standardized process for test validation

⇨ **VALITEST** (EU funded project) developed dedicated documentation and ressources

- *Recorded webinars*
- *Projects deliverables*

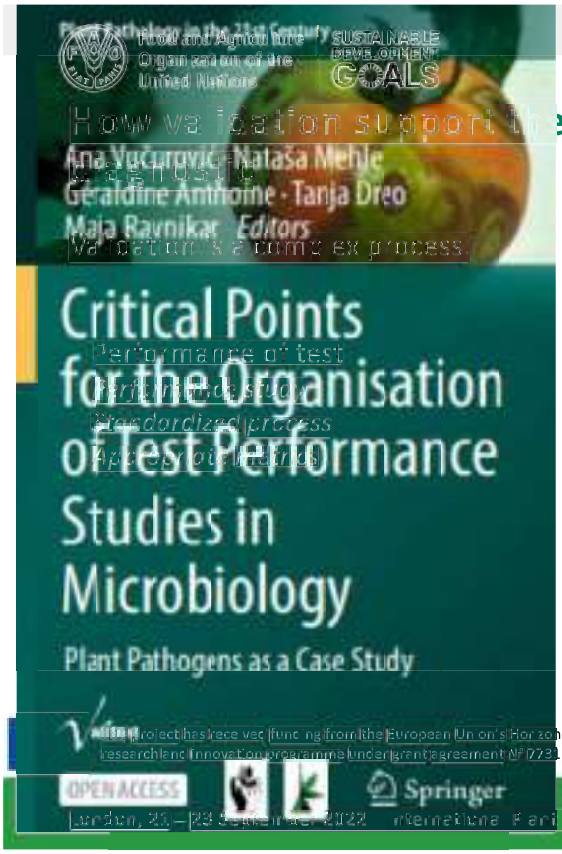
More details at https://www.valitest.eu

- *Booklet (Springer eds. – open access)*

Critical Points for the Organisation of Test Performance Studies in Microbiology

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

Quality assurance and validation in diagnostics: why is it important?



Need for standardized process for test validation

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Critical Points for the Organisation of Test Performance Studies in Microbiology

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N° 773139

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Current challenges

Improve communication between stakeholders, define a common langage

Co-design the sampling and testing programs

Improved validation process standard

Share validation data (e.g EPPO diagnostic database)

Harmonize diagnostic standards (IPPC ISPM n°27 annexes)

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

Thank you

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International Plant Health Conference

Geraldine ANTHOINE
Deputy head – Plant Health Laboratory - ANSES

Revolution in plant pest diagnostics since the last century

Fiona Constable and Brendan Rodoni

Agriculture Victoria Research

London, 21 – 23 September 2022

International Plant Health Conference

Symptomology

Saunders, et al. 2003. Nature 422, 831 (2003). https://doi.org/10.1038/422831a

Reproducing disease

For many years scientists thought disease causing organisms, including insects, arose spontaneously from abnormalities in the host plants

Mid-1700's onwards: transmission experiments

1755: "Brown powder" from bunt of wheat (*Tilletia tritici*) could reproduce disease (du Tillet)

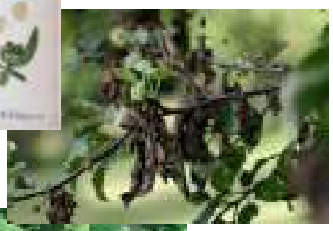
1847: Transmission of fireblight to a healthy pear tree (Gookins); Burrill proposed a bacteria 1879

1868: Transmission a bacteria from one plant to another and caused disease (Davaine)

1886: Transmission of tobacco mosaic disease from sap (Mayer)

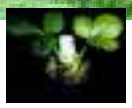
1890: Koch – association and cause of disease

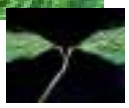
Biological indexing

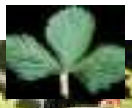


https://en.wikipedia.org/wiki/File:Apple_tree_with_fire_blight.jpg

https://www.apsnet.org/edcenter/disandpath/viral/pdlessons/Pages/TobaccoMosaic.aspx







Microscopy

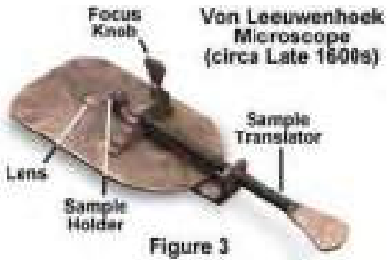


Figure 3

Joseph Jackson Lister 1830

John Leonard Riddell 1850

Fusarium oxysporum f.sp. cubense Manzo-Sánchez et al 2020

https://www.csiro.au/en/research/animals/insects/thrips-research

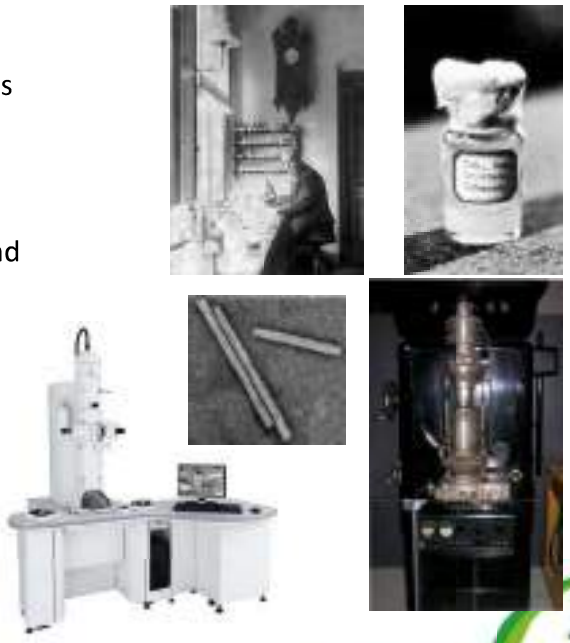
A revolution in plant virus discovery

1898 - the infectious agent for tobacco mosaic disease was shown to pass through a bacterial filter (Beijernick 1898).

1935 – Crystallised TMV was still infective when used to infect plants (Stanley 1935).

1937 – TMV consisted of 5% RNA & 95% protein (Loring and Stanley 1937).

1940s and 50s – invention of the electron microscope allowed the visualisation of viruses.



Revolution in plant pest diagnostics

Serology: revolution in high throughput pathogen detection

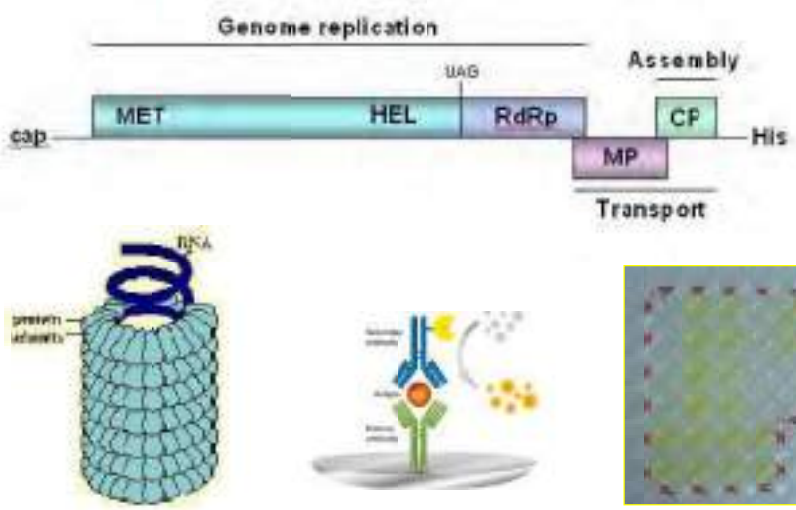
1929: Differences in antisera from TMV infected and healthy Sap (Beale)

1941: First IEM observation of a virus-antibody interaction with TMV (Anderson and Stanley)

1971: ELISA was developed (Engvall and Perlman)

1976: First application of ELISA for the detection of two plant viruses (Voller, Bartlett, Bidwell, Clark, Adams)

1977: Microplate ELISA method for plant viruses (Clarke and Adams)



https://www.moleculardevices.com/applications/enzyme-linked-immunosorbent-assay-elisa#gref

Molecular

1975: Electrophoresis for detection of PSTVd (Morris and Wright)

1981: Molecular hybridization for PSTVd (Owens and Deiner)

1983: Polymerase chain reaction (PCR)(Mullis et al)

2000's: Isothermal amplification for point of care testing – LAMP (2000), RPA (2006)

Sequencing

1965: tRNA *Saccharomyces cerevisiae* (Holley)

1972: DNA of a bacteriophage coat protein gene

1977: Sanger chain termination

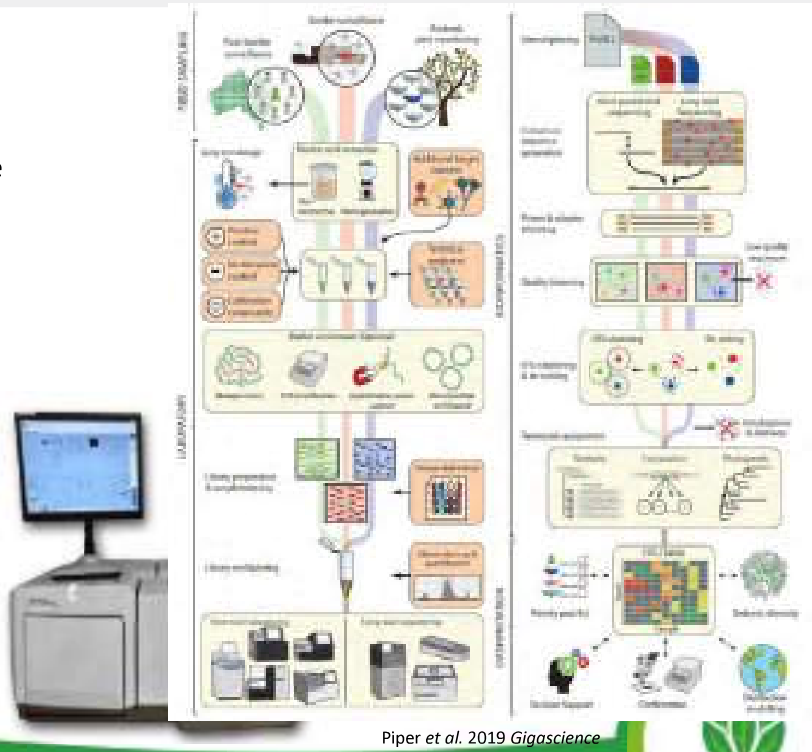
1987: Automation ABI 370 (Hood & Hunkapiller)

1996: High throughput sequencing

Metagenomic, Meta-transcriptomic HTS
- Genome informed diagnostics

Targeted sequencing and enrichment
- Metabarcoding
- Amplicon sequencing including tiling
- Hybridization probes

Genomic epidemiology
- Surveillance
- Pathogen discovery
- Pathogen diversity
- Improved understanding of biology



Piper *et al.* 2019 *Gigascience*

Reflection

Technological advancements:

- Understanding of disease
- Disease management strategies
- Diagnostic accuracy
- Throughput

New technologies are underpinned by traditional approaches

- Trusted data

Trusted data

- Accurate diagnosis
- Decision making
  - Biosecurity, market access, etc

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Thank you

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Fiona Constable
Research Leader – Microbiology, Agriculture Victoria Research
Brendan Rodoni
Research Director – Microbial Sciences, Pests and Diseases, Agriculture Victoria Research

Food and Agriculture Organization of the United Nations

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Transboundary Plant Pest Management for Food Security in Near East

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PROTECTING PLANTS PROTECTING LIFE

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Highlights

- Transboundary pests threaten NENA (Life examples)
- Economic Impact & Status
- Control measures
- General Recommendations

Transboundary pests threaten NENA

Transboundary plant pests and diseases (TPPDs) are migratory pests that pose a significant threat to food security, trade, and livelihoods of people in the affected countries, and generate huge losses of crops and pastures.

Important TPPDs are threatening NENA: Fall armyworm, Locusts, Fruit flies, Citrus black spot, Xylella.

Preventive measures, early action, and long-term solutions are essential for protecting crops and pastures from TPPDs.

➢ **Some examples will be presented:**

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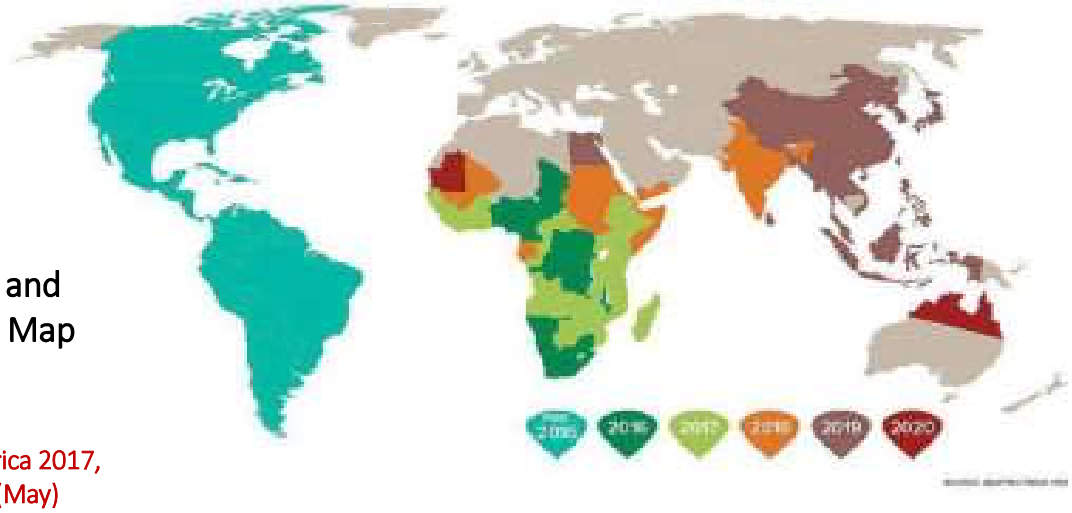
Fall armyworm



Pest status and Distribution Map

Presnted in Africa 2017,
In Egypt 2019 (May)

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Fall armyworm

Economic Impact & Pest status

The Fall Armyworm (FAW) is a dangerous insect that causes significant economic losses to maize production in Africa.

Invaded Africa since 2017, travelled North to reach upper Egypt in 2019.

This represented a serious threat to food security, especially as it attacks many basic crops such as corn, sorghum, rice and wheat.

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Phytosanitary Measures and Procedures Taken to Manage the Risk of Fall Armyworm in Egypt

In Egypt, program focused:

Communication: Technology utilization: Mobile App to provide information on the FAW (behavior, damage and the symptoms of its infection).

Coordination: national capacities in Egypt to use, monitor and manage the early warning system.

Awareness: Training for smallholder producers in upper Egypt to combat FAW and mitigate the damage.

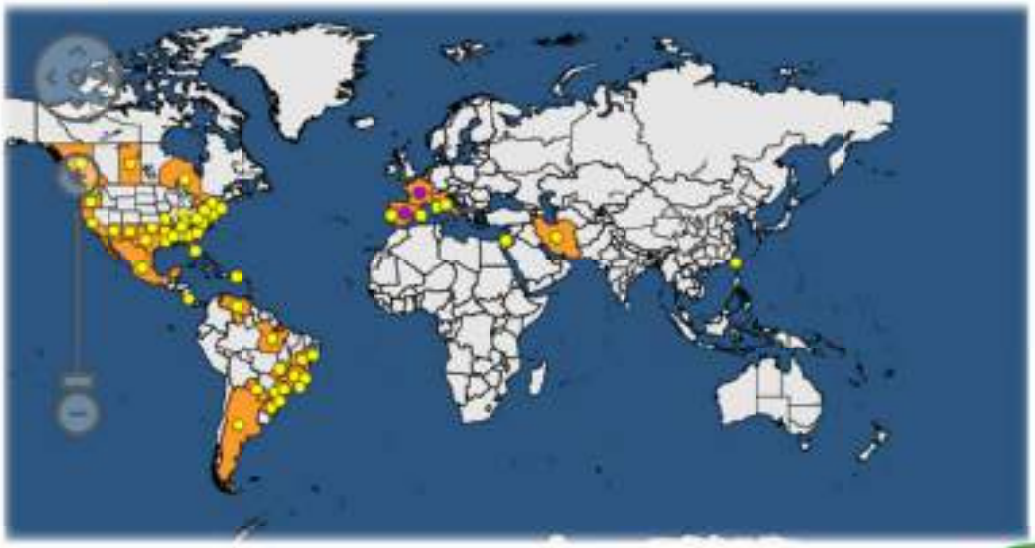
Control: Integrated Pest Management (massive release of parasitoids)

It was successful for minimizing its entry and spread (Presented in Country's case study in FAO Pub.).

Controling measures

Xylella fastidiosa

Pest status and Distribution Map



Xylella fastidiosa

Economic Impact & Pest Status

Completely devastating olive trees and other host plants, including 561 plant species which belong to 264 genera in 82 botanical families

Estimates that *X. fastidiosa* full spread could ultimately cost the EU over €5.5 billion Euros per year due to loss of production, with potential export losses of €700 million Euros per year

Rapid PRA for the potential risk that the pest can cause in the region was a reference for supporting following actions

Surveillance included nurseries and the main cultivated area with olives, grapevine and citrus

No officially confirmed reports in NENA region till now, except a few non-confirms from Iran, Lebanon and Palestine

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Xylella fastidiosa

Controling measures

strengthen prevention measures by increasing the awareness within phytosanitary specialists and inspectors for the risks of *X. fastidiosa* diseases, and the methods for diagnosis

implementing surveillance programs and having a contingency plan ready to apply

General surveillance for the bacteria and the xylem feeding insects, with scan survey for nurseries and the area cultivated with the main host plants

A case study from Tunisia will be included in the Guide on Contingency Plan for Outbreaks of Quarantine Pests to be published in due course by FAO

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Citrus Black Spot (CBS)

Citrus black spot (CBS) caused by the fungus *Phyllosticta citricarpa* occurs in tropical and sub-tropical citrus production regions and affects all varieties of citrus.

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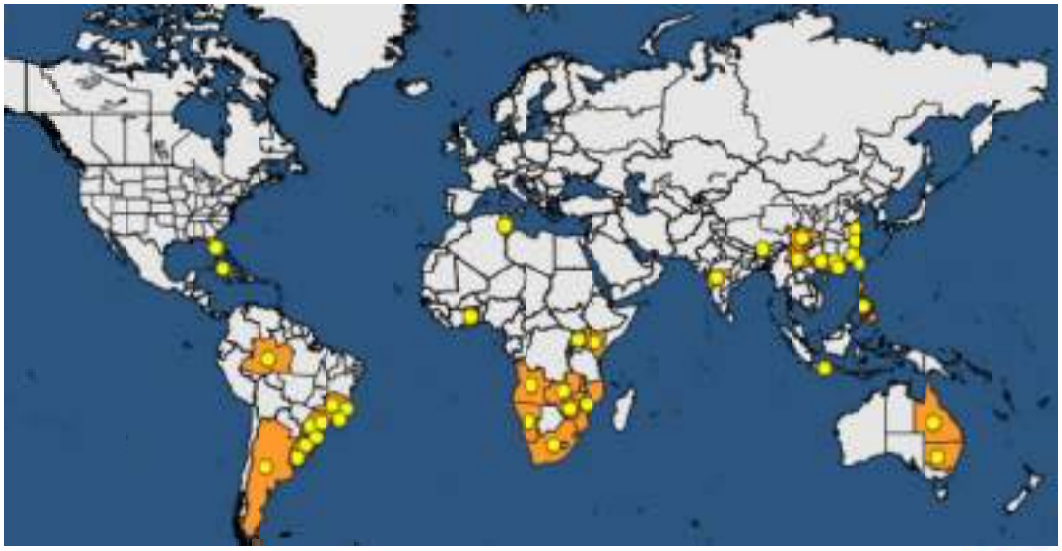
Citrus Black Spot (CBS)

Pest status and Distribution Map



No reports from NENA except Tunisia

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Citrus Black Spot (CBS)

Since eradication and containment are difficult, phytosanitary measures should focus on preventing the introduction of the disease into new areas.

certified *P. citricarpa* free nurseries should be used for the establishment of new orchards.

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Desert Locust

Pest status and
Distribution Map
for possible invasions

Desert Locust

Economic Impact & Pest Status

Schistocerca Gregaria **is considered as the most destructive migratory pest in the world.**

A single square kilometer of swarm can contain up to 80 million adults, with the capacity to consume the same amount of food in one day as 35,000 people or 20 Camels.

They can eat Crops, grass, bushes and wild plants.

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Controling measures

Monitoring swarms for early warning and alerts on the timing, scale and location of locust invasions and breeding.

Preventative control relies on established national locust units that are well equipped, have sufficiently trained staff and are funded by the government.

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General Recommendations

Raising awareness to policy makers of the importance of plant health to achieve Strategic Development Goals 2, 9, 15 (Zero Hunger, Innovation, Life on Land) policy of the UN 2030 Agenda.

Minimizing the risk of spreading plant pests through trade and travel.

Triggering higher compliance with International Phytosanitary Standards.

Protecting the environment through integrated pest management.

Promoting investment in plant health innovations.

Strengthening monitoring and **early warning systems** to protect plants.

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Thank You

Prof. Dr. Ahmed Kamal El Attar
Head of Egyptian NPPO
CPM Bureau (NENA)
Chairman of NEPPO

Regional Alert System for Locusts in the Americas

Development of a locust management, monitoring and alert system

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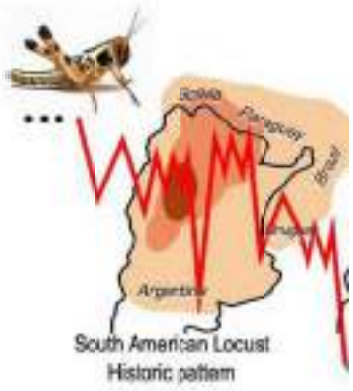
Cooperation project IICA - COSAVE: Phytosanitary Intelligence

Alert System for Locusts in the Cosave Region

Locusts can destroy crops in a few minutes, affecting crops and their export, and farmer´s livelihoods

Locusts of the American continent



Locust Potential Impact

Production at risk
USD 3.7
billion dollars
(Only in Argentina)

Consultoría Beneficio - Costo
(2020, IICA)

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Objectives

General Objective:

Contribute with the response system and risk assessment to reduce locust damage.

Specific Objectives:

- Implement an Information System for the surveillance and alert responses in COSAVE Region.
- Develop a System for the management and assessment of data using GIS.

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1) Mobile App at regional level

What for?

Collect data and information from the field

How?

- By the mobile APP (SIGAPP Senasa AR)

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1) Mobile App at regional level

Advantages

- Harmonization of surveillance criteria
- Information in real time (it works offline)
- Information is centralized in the Locust GIS.

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2) Locust Alert System

What for?

- Improve the communication between NPPOs and notify farmers about the locust location in real time.
- Improve the response capacities for locust outbreak.

How?

- Using the information from the Mobile App, through the Locust Alert System and the implementation of a website.

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2) Locust Alert System

Advantages:

- Constant and synchronized communication between NPPOs
- Fast decision making
- Countries can increase anticipation capacity and response
- Communication with the stakeholders

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3) GIS Locust

What for?

- To improve the management of the information, response capacities, risk assessment, decision making and pest control.

How?

- Use the system to analyze and manage surveillance data to facilitate decision making and pest control.

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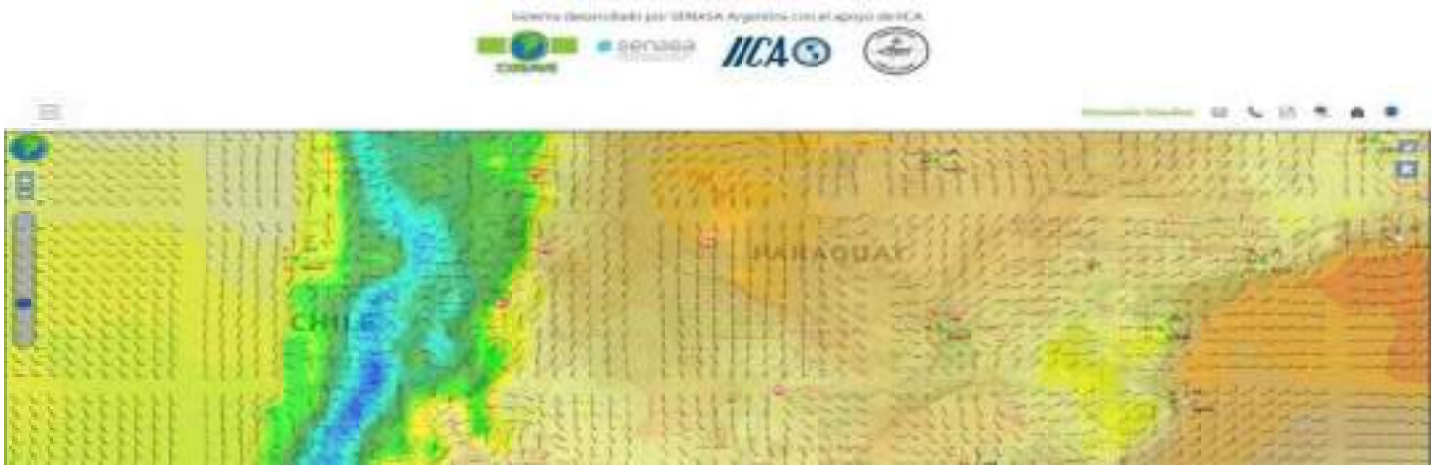
3) GIS Locust



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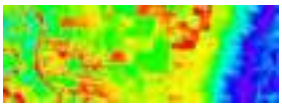
3) GIS Locust

Features:



- Integrated GIS System.
- Analyze, manage and download data.
- Upload layers in kml, csv, txt. formats.
- Share information and layers with users.
- Collect information from other systems.
- Incorporate information through WMS.

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Conclusion

- System available for pest surveillance, management and alerts of Locust in South America
- Easy system to be used by experts of different countries
- Integrated System to Strengthen Pest Outbreak Alert and Response Systems

https://test.senasa.gov.ar/langostas

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Next Steps

- Improve and develop the system, adding new features ($)
- Use the system for other pests, E.g HLB, *Lobesia botrana*, Fruit Fly in Argentina
- Implement this system at continental level (or similar system), through Inter American Coordinating Group in Plant Protection (GICSV)

GICSV

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International Plant Protection Convention

Department for Environment Food & Rural Affairs

Thanks for your attention

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Hector E. Medina hmedina@senasa.gob.ar
Contingencies and Emergencies General Coordinator - Senasa ARGENTINA
OSAVE Locust Technical Group - Coordinator
GICSV Locust Technical Group - Coordinator

Food and Agriculture Organization of the United Nations

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Prioritization of pests of higher phytosanitary risk in Brazil

Structured criteria to inform institutional decision-making

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Multicriteria prioritization based on stakeholders' nominations strengthens and drives both regulatory and research plant health actions and decision-making

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Objectives:

1)Identify priority/emerging threats to be managed by regulatory and research efforts at national level;

1)Provide guidance to the prioritization of requests for registration of products or pest control technologies;

Method:

Participatory identification of alternatives

Analytic Hierarchy Process (AHP)

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Preliminary list:

653 pests with "risk perception" listed based on:

i) indications of sectorial chambers and private sector stakeholders;

ii) list of regulated pests (20);

iii) scientific research priorities (Embrapa);

iv) pests affecting crops without sufficient phytosanitary support ("Minor Crops").

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Hierarchy: 5 dimensions and 19 criteria

1) Pest biology

2) Pest control

3) Direct impacts

4) Indirect impacts

5) Pest regulation

Final list:

83 pests sorted in three risk categories (Very High, High and Medium)

Risk categories defined by k-means clustering.

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Risk category *VERY HIGH*

Amaranthus palmeri (weed)

Bactrocera carambolae (insect)

Bemisia tabaci (insect)

Botrytis cinerea (fungus)

Candidatus Liberibacter asiaticus (bacteria)

Ceratitis capitata (insect)

Helicoverpa armigera (insect)

Ralstonia solanacearum raça 2 (bacteria)

Schizotetranychus hindustanicus (insect)

Spodoptera frugiperda (insect)

Tetranychus urticae (insect)

Xanthomonas campestris pv. *viticola (bacteria)*

Xanthomonas citri (bacteria)

Outcomes:

1)Provides a very good result to reevaluate the list of regulated pests (adding or removing);

1)Can show the necessity of redimension the efforts applied to some regulated pests;

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Carlos Goulart
Director of Plant Health and Agricultural Inputs - NPPO of Brazil

Emerging threats to plant health and food security
A view from the seed sector

DR ROSE SOUZA RICHARDS
Seed Health Manager - International Seed Federation (ISF)

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Countries

Risk Assessment
Implementation of phytosanitary measures
Surveillance

Seed companies

Deliver healthy seed, free from diseases
Follow national phytosanitary requirements

Common goal, shared need

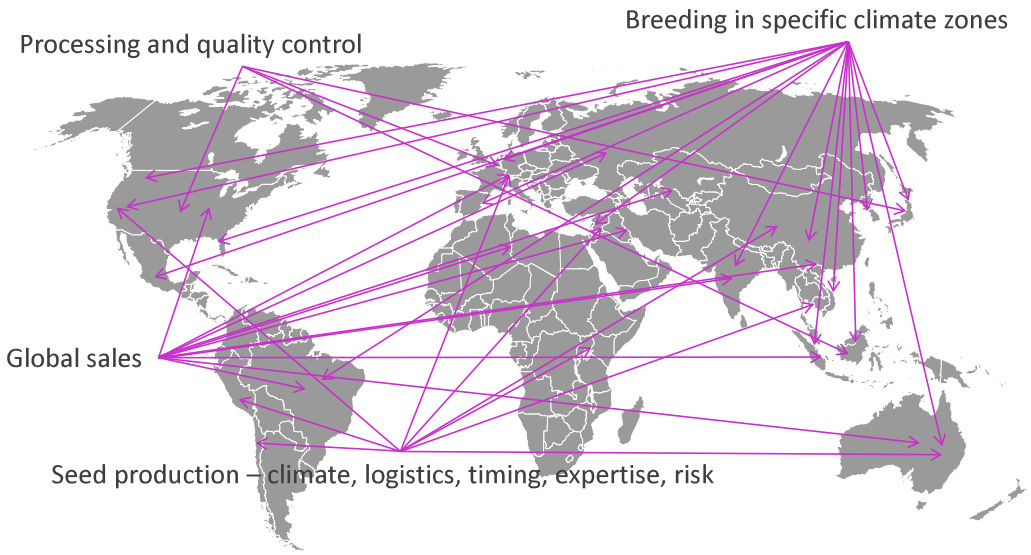
- Prevent pests from being introduced /established in new territories
- Facilitate trade

- It is in the interest of the seed industry to find mechanisms that ensure the safe movement of seeds in international trade in order to protect agriculture, human health and the environment and guarantee food security

- The IPPC recognizes the necessity for international cooperation in controlling pests of plants and plant products and in preventing their international spread

COLLABORATION IS KEY!

Vegetable seed business is global - import and export are essential



Quality control during the whole process

- Choice of seed production location (avoidance of pests), use of specialized and experienced seed producers
- During seed production – field inspections for diseases, off-types
- On arrival at the seed company – sampling by officially authorized samplers and testing
- Sampling and testing after processing steps when needed
- Information is kept in a database
- Analysis of data to take decisions about next steps

The GSPP Standard can be seen as a system that operates as described in the International Standard for Phytosanitary Measures No. 14 'The use of integrated measures in a systems approach for pest risk management' (FAO/IPPC, 2017), which reduces the phytosanitary risk of *Clavibacter michiganensis* subsp. *michiganensis* (Cmm) infection by applying various measures in the chain of production.

This process was developed by Industry.

Four Main Threats:

Water – Disinfect
People – Training & Protective Clothes
Propagation Material – Compliant
Materials & Equipment - Disinfect

Principles of the system:

- isolation of the seed and seedling production location from the environment
- prevention of infection by managing the risk factors *)
- constant monitoring during the growing season of both seeds and young plants
- check before delivery: all seed lots must be tested by seed tests approved by GSPP
- independent audits

Training Aides and Precautions
State of the Art Greenhouses
Attention to detail on sanitation and registration of all personnel
Stringent Greenhouse Sanitation and Management to reduce the risk of Cmm infection during the entire seed production process.

Challenges in seed trade and possible solution

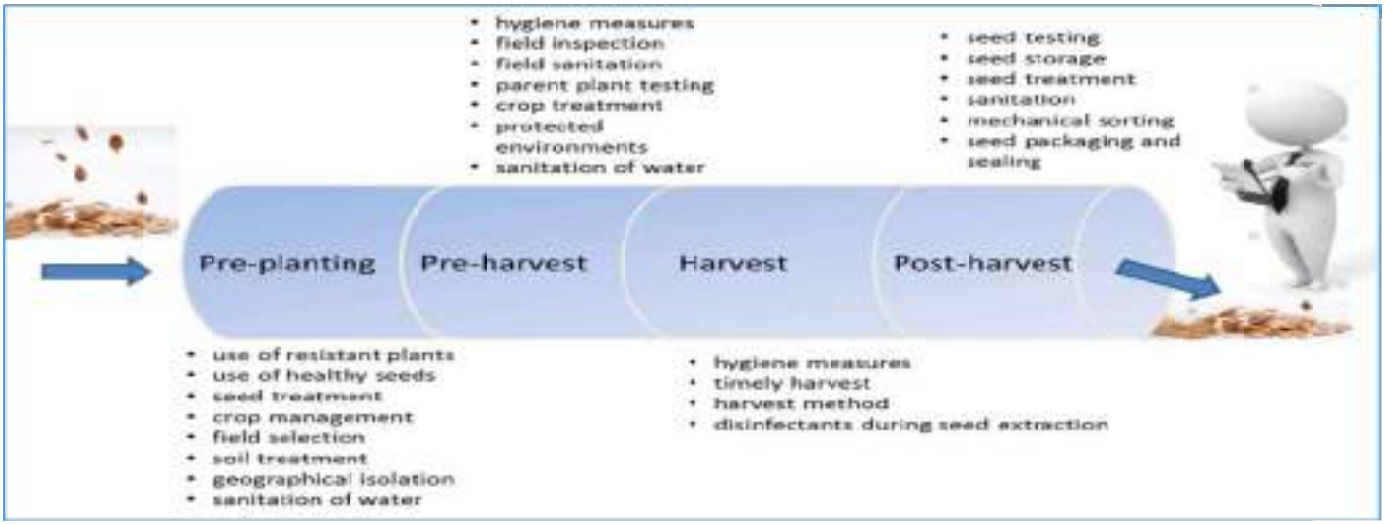
- **Challenges in the current trade system**
  - Consignment-by-consignment certif
  - Increasing number of specific
    and variation between NP
  - Import requiremer
  - Requiremer ests associated
    with se
  - P t business practice -
    the needs of all countries
    chain
  - N t of small lots of seeds for research and
    breeding purposes increasingly difficult

COMPLEXITY

Systems Approach as possible solution

- Approved companies produce 'Systems Approach-seed'
- Multilateral acceptance: seeds move easily between all countries where a systems approach has been agreed
- Phytosanitary certificates without the specification of individual pests
- An alternative option for countries to participate

Examples of pest risk management activities



THE VISION

One globally accepted Systems Approach that serves as an alternative to existing pest risk management options to secure phytosanitary certification for the international movement of seed

Global acceptance via IPPC

HOW CAN WE GET THERE?

The Proposal

https://www.youtube.com/watch?v=qwmow2mRRfc

Seed is Life

ISF Chemin du Reposoir 7 | 1260 Nyon | Switzerland www.worldseed.org

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Emerging threats to plant health and food security

Mariangela CIAMPITTI The perspective of Europe region

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PROTECTING PLANTS PROTECTING LIFE

Europe region and new plant pests

Xylella fastidiosa (Olive quick decline syndrome)

Bursaphelenchus xylophilus (Pine Wood Nematode)

Hymenoscyphus fraxineus (Ash dieback)

Agrilus planipennis (Emerald Ash Borer)

Halyomorpha halys (Brown Marmorated Stink Bug)

Popillia japonica (Japanese Beetle)

Anoplophora glabripennis (Asian Longhorn Beetle)

Anoplophora chinenis (Citrus Longhorn Beetle)

Aromia bungii (Red Neck Longhorn Beetle)

and more…….

Popillia japonica
Justin Starr, Photography

Bursaphelenchus xylophilus
Universidade de Evora, PT

Agrilus planipennis
A. Ismailov, RU

Anoplophora glabripennis
PPS Regione Lombardia, IT

Emerging threats to plant health and food security

Emergency situations

Unexpected situations due to:

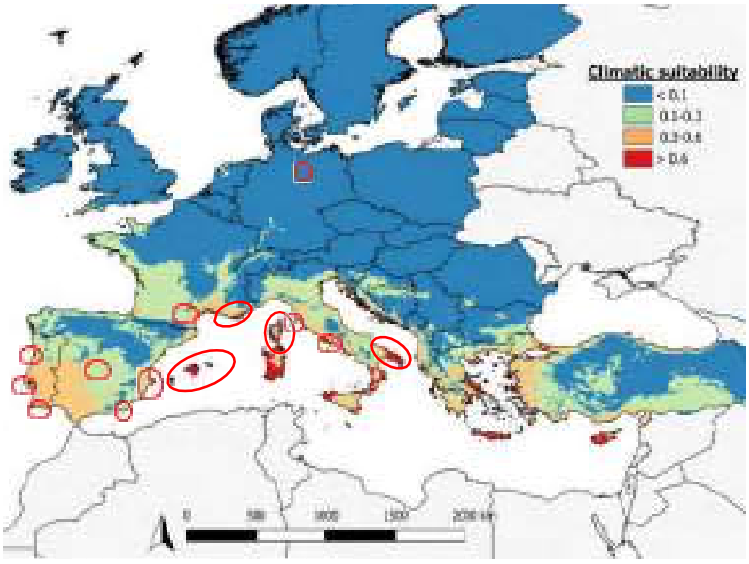
- accidental introduction of unknown pests and/or pests for which no risk assessment had previously been carried out
- disregard for the pest risk of some pathways
- undervaluation of certain risk assessment factors due to:
  - climate change
  - effective tools to control the pest no longer available (e.g. withdrawal of authorizations of several plant protection products)
  - opening of new trade flows (new commodities and new pathways)
  - changes in political scenarios

Halyomorpha halys
PPS Regione Lombardia, IT

Xylella fastidiosa

2013	Puglia, **Italy**
2014	Iran
2015-16	Corsica/Mainland, **France**
2016	**Germany**
2016-17	Balearic Island/Alicante, **Spain**
2017	Israel
2018	Madrid & Almería, **Spain**
2018	Tuscany, **Italy**
2019-21	**Portugal**
2020	Occitania, **France**
2021	Lazio, **Italy**
2022	

pauca, fastidiosa & multiplex
novel genotypes (ST)
novel host species



Estimated climatic suitability map for *X. fastidiosa* according to a SDM ensemble model with four thresholds. Update of the Scientific Opinion *on Xylella fastidiosa* www.efsa.europa.eu/efsajournal109 **EFSA Journal** 2019;17(5):5665

Source: Maria Saponari
Institute for Sustainable Plant Protection National Research Council – Bari (Italy)

Emerging threats to plant health and food security

Xylella fastidiosa: impact on olives trees in Italy

In autumn 2013, the area of olive trees infested with *Xylella fastidiosa* was about **80 km²**

Currently, the demarcated area is about **8.000 km²**
= 40% of the Apulia region

In 9 years, the area has increased **100 times**!

Soil tillage to control the vector *Philaenus spumarius, CNR, IT*

A 2017 study based on satellite images estimated the presence of around 6.5 million olive trees with severe damage (> 50 % of the crown)
https://doi.org/10.1073/pnas.1912206117

25 million olive trees are present in the demarcated area

It is currently estimated that more than **10 million olive trees** are damaged

Sampling for *Xylella fastidiosa, CNR, IT*

Xylella fastidiosa impact on landscape & culture in Apulia

www.perledipuglia.it

Olive trees completely compromised by *X. fastidiosa*

© puckillustrations - Adobe Stock

Uprooted olive trees for the implementation of eradication measures

LaPresse/Vincenzo Livieri

Emerging threats to plant health and food security

How to be prepared? Pest Risk Analysis and comprehensive impact assessment

Economic impact

Producer profits that result from changes in quality, production costs, yields or price levels

Changes to producer costs or input demands, including the costs of implementing eradication and/or containment measures

Costs of environmental restoration and prevention measures

Resources needed for additional research and advice

Social impact

Employment

Food security and safety

Mental health and human well-being

Environmental impact

Native plants, biodiversity and ecosystem services

Health of forests, landscapes, public and private green areas

Rice harvest in Lombardia, *Prima*Pavia, IT

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How to be prepared? Early detection & prompt reaction

Careful planning of surveillance activities to use human and financial resources cost-effectively

Implementation of survey programmes using innovative tools including traps and web apps for data collection

Setting up sampling procedures for symptomatic and asymptomatic plant materials

Performing inspections and diagnostics

Ensuring there is a legal basis for the implementation of urgent control measures in the event of unexpected situations

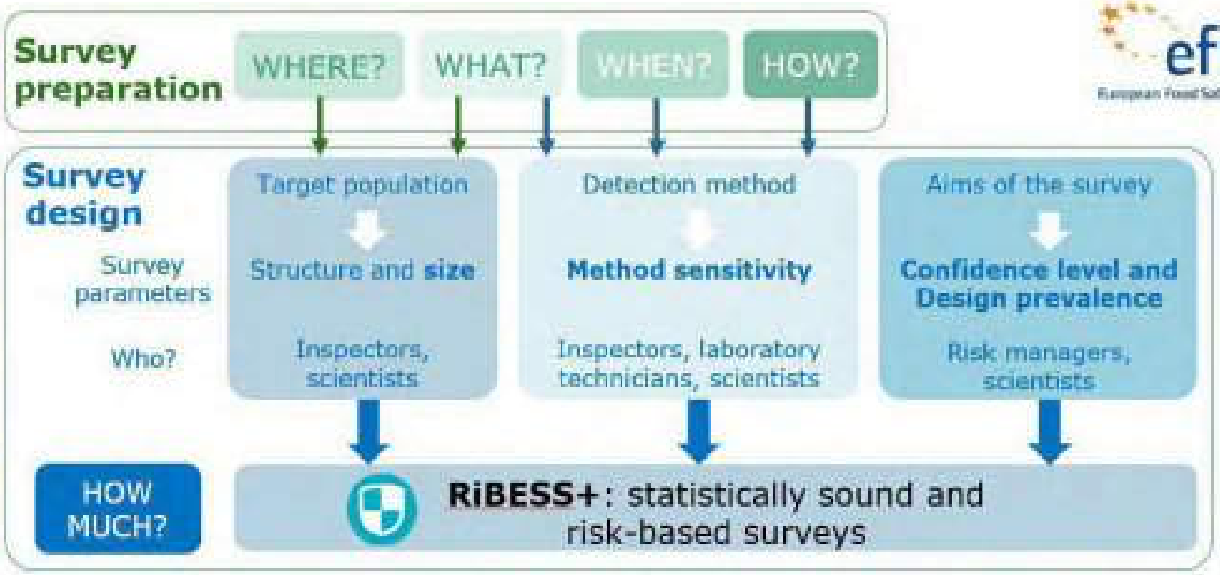
Communication and information sharing with stakeholders

Field data input into the MORGANA web app and sending information to survey plan managers and to the lab
PPS Regione Lombardia, IT

Sampling in maize fields for the early detection of *Pantoea stewartii*,
PPS Regione Lombardia, IT

Emerging threats to plant health and food security

How to be prepared? From Survey preparation to Survey design



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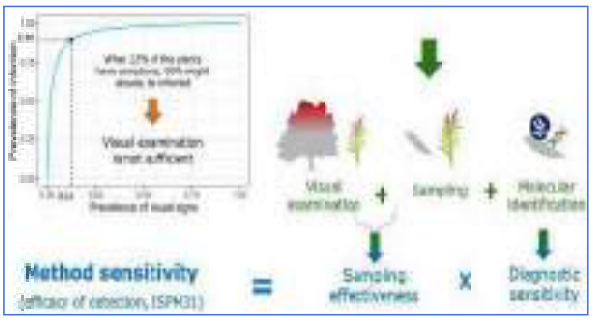
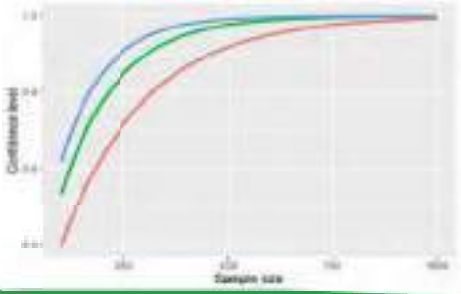
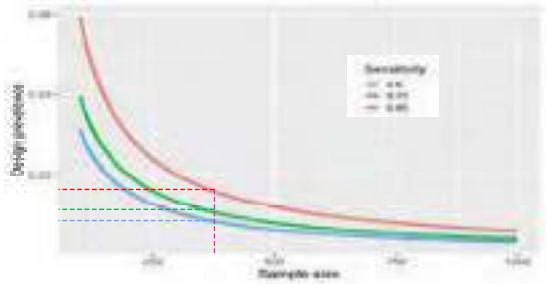
Detection method, target population & Interrelation of survey parameters





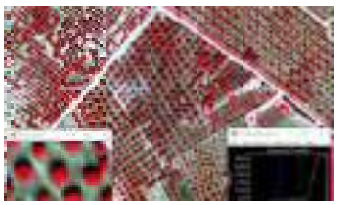


Emerging threats to plant health and food security

How to be prepared? Research & innovation on *Xylella fastidiosa*

Leccino and Favolosa FS-17 authorised by NPPO for the regeneration of the olive-growing heritage

Drone, aircraft and satellite surveys can identify plants potentially affected by the bacterium



Sniffer dogs trained to detect the bacterium within plants for planting

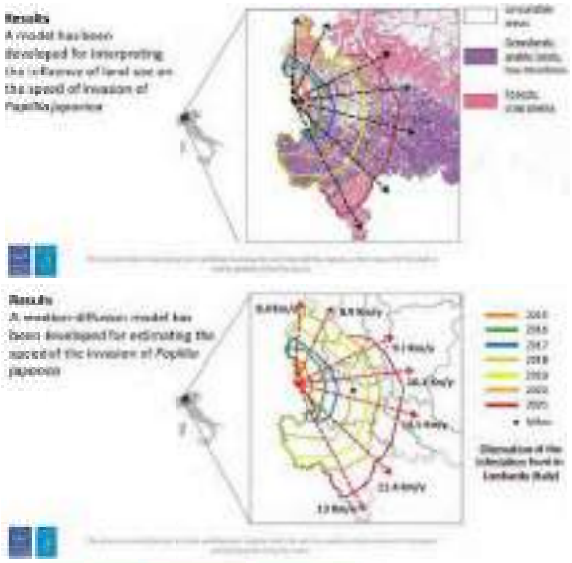
XylApp (and XylAppUE), developed by CIHEAM Bari, to optimize and streamline the collection, geolocation and archiving of data on plant material and/or insect samples

Source: Donato Boscia
Institute for Sustainable Plant Protection National Research Council – Bari (Italy)

How to be prepared? Research & innovation on *Popillia japonica*

Prof. Gianni Gilioli, University of Brescia, IT

Modelling the spread dynamics



"Attract & Kill" Strategy

National Committee on *Popillia japonica*, IT

Innovative and sustainable approach to apply insecticides and biocontrol agents to control larvae in the soil

Prof. Nicola Mori, University of Verona, IT

Emerging threats to plant health and food security

How to be prepared? Research & innovation on *Anoplophora spp.*

Surveys for *A. glabripennis* with binoculars, platforms and treeclimbers

Trapping for *A. glabripennis* and *A. chinensis*

Root destruction by grinding machines to control the larvae of *A. chinensis*

Re-planting of non-sensitive trees in place of destroyed ones

Information and engagement of citizens and stakeholders

Source: PPS Regione Lombardia, IT

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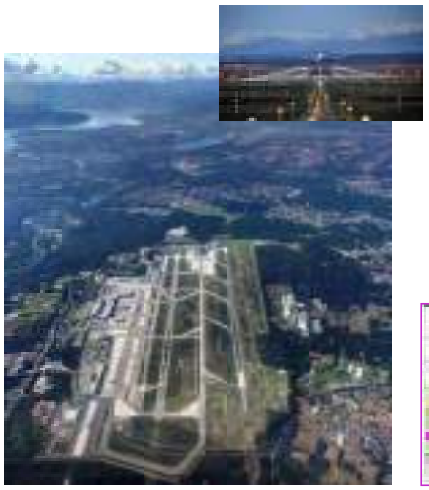
Measures to manage the risk of *Popillia japonica* spreading via aircrafts



Pest risk management plan at Milano Malpensa airport 2021-2025 (follow-up of 2016-2020 plan)
The plan identifies activities and official measures to be implemented at Malpensa airport and in the immediate vicinity in order to reduce the risk of Popillia japonica spreading via aircraft and passengers :

5 risk levels: as the risk increases, the areas involved and the time frame of the application of measures increase:

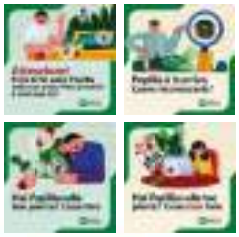
Risk level assessment and inspections of the application of measures are carried out by phytosanitary inspectors:

Source: PPS Regione Lombardia, IT

Emerging threats to plant health and food security

Raising public awareness of plant health

Social cards



YouTube Influencer

EPPO

Russian (Estonian NPPO)

German (Austrian NPPO)

Azeri

Macedonian

Turkish

and many more ....

Promoting a "culture" of plant health among the younger generation

Raising awareness of the importance of Plant Health and its environmental and social impact, in particular on **food security**

Fostering the desire of the younger generation to become personally involved in protecting green spaces and ecosystems

Message from Ralf Lopian to the students at the award ceremony for the school contest

The 3 training programmes on plant health one for each level of education

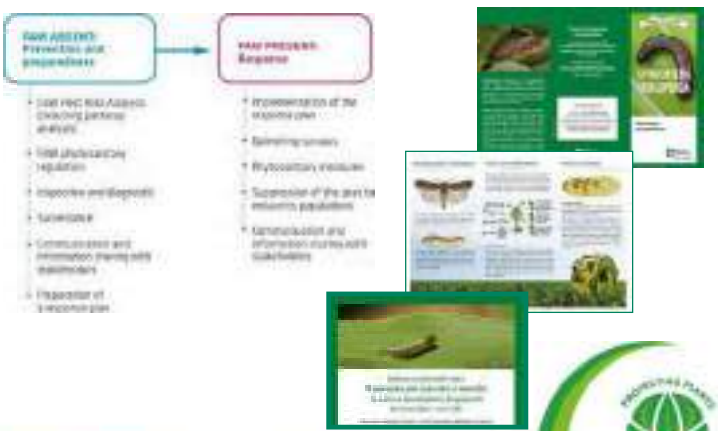
Global network: *Spodoptera frugiperda* (FAW) Technical Working Group

The FAO/IPPC Technical Working Group on Quarantine and Phytosanitary Measures for Global Action on *Spodoptera frugiperda* (FAW) Control

Prevention: implementing and promoting globally harmonized quarantine and phytosanitary measures

Preparedness: implementing and promoting globally harmonized FAW surveillance, management, and engagement resources

Response: promoting globally harmonized contingency and response resources and training materials



What we learnt

- To be ready and prepared
- To be innovative
- To be authoritative
- To raise awareness of plant health
- To promote a “culture” of plant health among the younger generation
- To global network

EUROPHYT data (2018- till October 2020) processed by the Lombardy Plant Protection Service

Analysis of trade flows and interceptions as the basis for planning import inspections for *Spodoptera frugiperda*
PPS Regione Lombardia, IT

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

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Thanks to
Sybren Vos, *EFSA EC*
Donato Boscia, Maria Saponari, *CNR Italy*
Carlo Cesaroni, *Mipaaf Italy*

Mariangela CIAMPITTI @pestsurvey
Regione Lombardia, NPPO Italy

Regione Lombardia
Plant Protection Service

Thank you for your attention

PROTECTING PLANTS PROTECTING LIFE

Global and regional models on early warning for emerging pests: Fall army worm, Fusarium TR4, Red Palm Weevil and Opuntia scale

Mekki Chouibani

NEPPO

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Surveillance

- An **official** process which collects and records data on **pest** presence or absence by **survey**, **monitoring,** or other procedures [**ISPM 5**, CEPM, 1996; revised CPM, 2015]
- An **obligation** of the NPPOs (IPPC, Art. IV.2b)
- A Key component in the national phytosanitary system

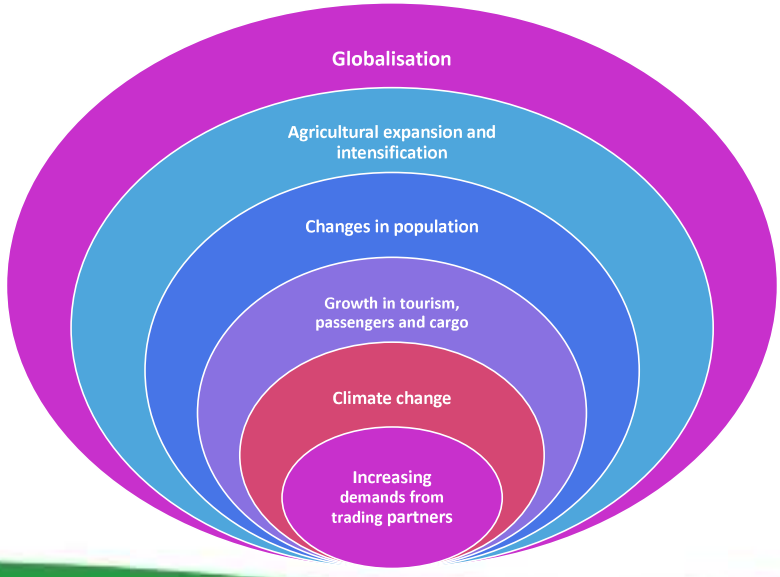
▪It provides NPPOs with a technical basis for many phytosanitary measures;

- Aiding early detection of pests new to an area
- ❑Phytosanitary import requirement (pest risk analyses)
- ❑Determining pest status in an area and developing a pest list
- ❑Establishing and maintaining Pest Free Areas
- •Pest reporting and eradication (ISPM 17 pest reporting)

https://www.ippc.int/static/media/files/publication/en/2016/01/ISPM_06_1[illegible]_En_2015-12-22_PostCPM10_InkAm[illegible]rmatted.pdf

Why Surveillance is so Important for Plant Health?

Growing Phytosanitary Threats and Challenges Domestically, Regionally and Globally



Global and regional models on early warning for emerging pests: Fall army worm, Xylella fastidiosa and Fusarium TR4

Global level:

At CPM 14 (2019), the issues related to "emerging pests" were merged with the activities to address the IPPC Strategic Framework (2020-2030) development agenda item on "Strengthening Pest Outbreak Alert and Response Systems."

Two pests of primary concern for the IPPC Community have been the subject of global efforts and activities to help address these pests have been incorporated into the IPPC Secretariat's work plan:

1. FAO/IPPC Technical Working Group on Quarantine and Phytosanitary Measures for Global action on *Spodoptera frugiperda* control
2. Implementation and Capacity Development Committee (IC) Team on *Fusarium oxysporum* f. sp. *cubense* Tropical Race 4 (TR4)

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At global level

The FAW Global action plan

- More than **80 hosts species**,
- **Two strains**: **maize**, **rice**
- **Reduce Crop yield loss of 5-10%** by applying area-specific IPM strategies in target countries
- **Prevent further spread to new areas** by applying phytosanitary measures
- **Conduct a global coordination**

http://www.fao.org/fall-armyworm/global-action/en

Global and regional models on early warning for emerging pests: Fall army worm, Xylella fastidiosa and Fusarium TR4

The FAO/IPPC Technical Working Group on Quarantine And Phytosanitary Measures For Global Action on FAW Control

Photo: first virtual meeting 03 Aug 2020

Prevention

Implementing and promoting globally **harmonized quarantine and phytosanitary measures**.

Preparedness

Implementing and promoting globally **harmonized FAW surveillance, management, and engagement resources**.

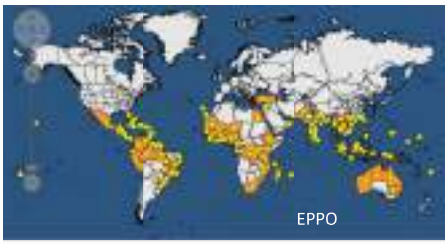
Response

Promoting globally **harmonized contingency and response resources** and training materials.

https://www.ippc.int/en/the-global-action-for-fall-armyworm-control/faoippc-faw-technical-working-group/

Fusarium oxysporum f.sp. cubense tropical race 4 (Foc TR4)

- TR4 was first reported in Taiwan in 1989.
- For more than 20 years, TR4 was restricted to Southeast Asia (Malaysia, Indonesia, Philippines, China) and the Northern Territory. In 2013, it was reported in the Middle East.
- TR4 continues to spread in the Indian subcontinent, Africa, and even Europe. In 2019, TR4 was reported for the first time in Latin America in Colombia. TR4 has recently been reported in new locations such as Turkey, Mayotte, and Peru.



Global and regional models on early warning for emerging pests: Fall army worm, Xylella fastidiosa and Fusarium TR4

IC Team on Fusarium TR4 activities

Support the revision of the contributed resources on Fusarium TR4

Questionnaire to assess countries' capacities on Fusarium TR4 response

A B C D

Drafting prevention, preparedness and response guidelines for Fusarium TR4

Support virtual training workshops on surveillance, diagnostic, inspection, and simulation exercises on TR4

Draft Prevention, preparedness and response guidelines for *Fusarium* TR4

Peer review process

49 reviewers worldwide + IC

Distribution and biological information

- Distribution of Fusarium TR4
- Biological information
- The pathogen Fusarium TR4: taxonomy, nomenclature, biological and morphological considerations
- The musaceous host: key elements to recognize Epidemiology of Fusarium Wilt of Banana

Prevention and preparedness plan: when the pest is absent

- Pest Risk Analysis
- Phytosanitary regulations
- Measures for large scale commercial plantations (mainly export)
- Measures for subsistence and smallholder banana cultivation
- Diagnostic of Fusarium TR4
- Surveillance: surveys to determine Fusarium TR4 condition
- Communication and information sharing with stakeholders
- Insights to perform simulation exercises

Response plan: when the pest is officially detected and confirmed

- Delimiting surveys
- Phytosanitary measures: control and containment
- Communication and sharing information with stakeholders

Global and regional models on early warning for emerging pests: Fall army worm, Xylella fastidiosa and Fusarium TR4

Regional level

1. FAO regional programme on Red Palm Weevil Eradication
2. NEPPO Technical Working Group on Quarantine and Phytosanitary Measures for Regional action on *Dactylopius opuntiae* control

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Regional programme on Red Palm Weevil Eradication

- **One of the most** destructive pests of **palms** species,
- **Significant socio-economic impact,**
- **Mainly visual detection. Early detection difficulties. Develop a new detection method (remote sensing & monitoring)**
- **prevent further spread to new areas** by developing phytosanitary protocols, establishing Free Pest Area, and Developing a palm propagative materials certification scheme
- **Conduct a regional coordination**

Global and regional models on early warning for emerging pests: Fall army worm, Xylella fastidiosa and Fusarium TR4

At regional level: *Dactylopius opuntiae* Cockerell

Detected in Morocco in 2014, and spread to Algeria, Tunisia, Lebanon, Palestine, Jordan, and Yemen

Organization of **webinar** for North Africa and Near East countries for awareness and phytosanitary measures to support infested countries to control it and to prevent its spread to a new area

Development of a guide on **Prevention**, **preparedness** for non-infested countries, and **response** for an infested country.

The plan is based on an **awareness and an** efficient **surveillance program** to ensure **early detection** and quick response to eradicate or contain the pest.

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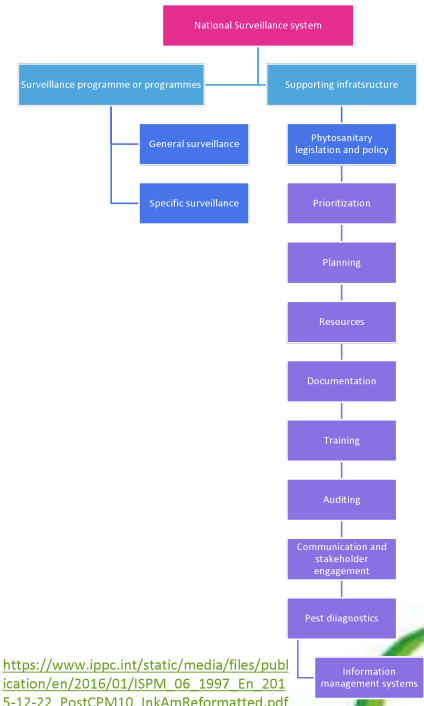
To conclude…

- Surveillance is a **core** activity of NPPOs,
- A **national surveillance program** on prioritized pests is important. Early detection, in detecting new pest incursions, is crucial to eradicating its first foci
- **Involvement** of relevant **stakeholders** will contribute to a surveillance program's success
- Needs a w**ell-trained staff**
- Needs also a **qualified diagnostic** laboratory
- **Transparency** is **pivotal** in supporting countries in preparedness, early detection, and management (**IPPC. Art. VIII.1.a**)



https://www.ippc.int/static/media/files/publication/en/2016/01/ISPM_06_1997_En_2015-12-22_PostCPM10_InkAmReformatted.pdf

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Name
Position

Tools and strategies for countries to implement early warning systems

International Plant Sentinel Network

London, 21 – 23 September 2022

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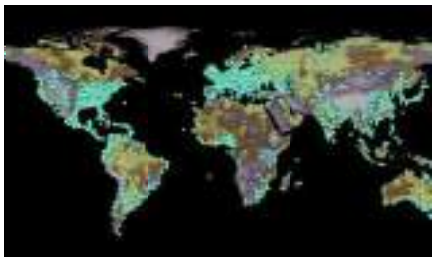
International Plant Sentinel Network (IPSN) - Background

- Invasive alien plant pests and pathogens pose a considerable threat to plant health worldwide
- Increasing globalisation of trade in plants and plant material + the effects of climate change means this threat will continue to rise
- Identifying the pests and pathogens likely to pose future threat is challenging but crucial

International Plant Sentinel Network (IPSN) Background



- Over 3,000 botanic gardens and arboreta around the world
- Cultivate over 100,000 species
- More than one third of the world's known plants
- Many grown in collections outside their native range
- Managed by skilled and committed staff
- Linked through Botanic Gardens Conservation International (BGCI)

CLICK ON *SLIDE MASTER* TO EDIT PPT TITLE

IPSN Background

- Plants growing outside their native range can be monitored for damage by pests and pathogens
- This provides information on the risk one of these organisms could pose if introduced into the plant's native range – thus providing early warning of threats
- Botanic gardens and arboreta are unique and under-utilised resources that can support sentinel research

IPSN
International Plant Sentinel Network

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IPSN – the network

- A global network of botanic gardens, arboreta, plant health institutes and National Plant Protection Organisations (NPPOs) working together to provide an early warning system for new and emerging pest and pathogen threats

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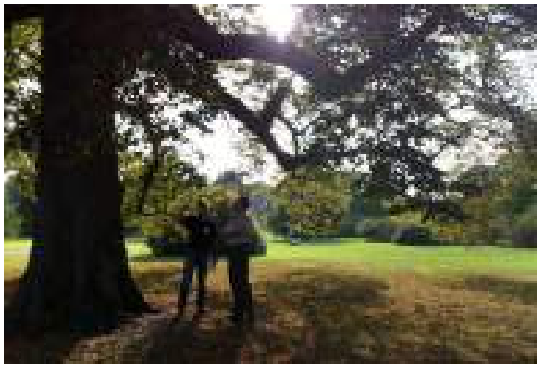
IPSN Activities

- Targeted surveys – gardens survey for specific pests on specific hosts (e.g. Emerald Ash Borer on Ash trees)
- General surveillance – priority species are monitored for any pests and diseases that may be present
- Capacity building – workshops / training courses on pest and disease identification, monitoring and surveying
- Information provision – posters and other materials proving information on new and emerging pests
- Information on general biosecurity issues and on specific pest and disease risks



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Emerald Ash Borer

- Gardens in Eastern Europe with *Fraxinus* in collections identified
- Training in identifying EAB by UK/US experts
- Survey forms and other resources (posters / videos) provided
- Traps and lures provided to selected gardens
- Contacts with local entomologists facilitated
- On-going surveying across Eastern Europe
- Focus on susceptible *Fraxinus* species

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FAGUSTAT: Investigating Beech Leaf Disease in Europe

- A new disease affecting several species of *Fagus (F.grandifolia, F. sylvatica)*
- Present in US and Canada
- Linked with a nematode but disease association not clear
- Require leaf samples and surveillance

Euphresco

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General Surveillance

- Identification of priority species in collections outside native range
- Collection of historical data – any records of past P&D on these hosts
- Investigation of any present problems using Plant Health Checker form and with diagnostic support
- Linking collections with NPPOs before sharing any new findings

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Tools and resources

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Some results

- Information on impact of US oak-boring beetles on English oaks
- First reports of a number of P&D in countries through surveys in botanic gardens and arboreta
- Development of electronic data gathering tools
- Enhanced networks and linkages between plant collection holders and NPPOs
- Capacity in P&D monitoring built amongst botanic garden staff

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Acknowldgements

fera

Department for Environment Food & Rural Affairs

USDA Forest Service U.S. DEPARTMENT OF AGRICULTURE

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PROTECTING PLANTS PROTECTING LIFE

Suzanne Sharrock
Director of Global Programmes, Botanic Gardens Conservation International

Food and Agriculture Organization of the United Nations

International Plant Protection Convention

Department for Environment Food & Rural Affairs

CABI innovations in early warning systems

PRISE, Plant clinics, Horizon scanning tool, Insight analysis, Pest risk analysis

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PROTECTING PLANTS PROTECTING LIFE

How early is early warning?

- Predicting timing of an already established problem
  - (Pest Risk Information Service PRISE)

- Rapid recognition and identification of a newly arrived problem
  - (Plant clinics)
- Identification of a potential external threat
  - Horizon scanning tool; HST
  - Insight reporting
  - Pest risk analysis tool; PRA

The work of CABI in early warning systems

Within-season early warning: Pest Risk Information Service (PRISE)

- Developed in Kenya, Zambia, Malawi and Ghana
- Models give the optimum time to apply intervention for maximum efficacy

- Essential to spot the pest early/in advance if biological control is to be used

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Within-season early warning: Pest Risk Information Service (PRISE)

- Pest and disease development is strongly linked to ambient conditions
- Global satellite data is now available covering many different variables e.g. precipitation, temperatures, evapotranspiration, vegetation health indices
- These data can be used to drive early warning models

Optimizing the timing of management interventions against fall armyworm in African smallholder maize: Modelling the pattern of larval population emergence and development

Alyssa Lowry, Lena Durocher-Granger, MaryLucy Oronje, Daniel Mutiya, Tibunge Mfune, Christine Gitonga, Ilunde Musesha, Bryony Taylor, Suzy Wood, Duncan Chacha, Tim Beale, Elizabeth A. Finch, Sean T. Murphy

https://www.sciencedirect.com/science/article/pii/S026121942200062X

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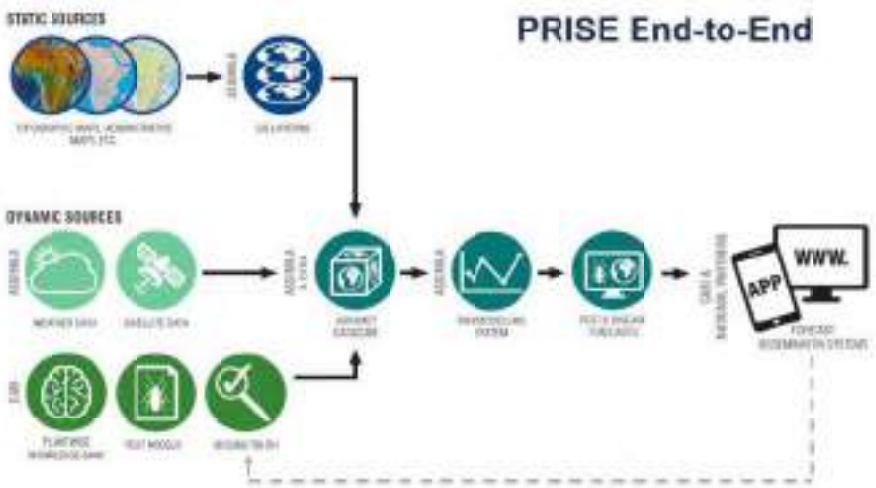
Within-season early warning: Pest Risk Information Service (PRISE)



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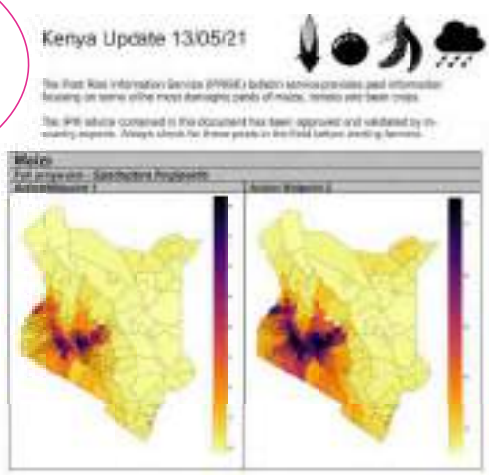
Extension of messages to farmers

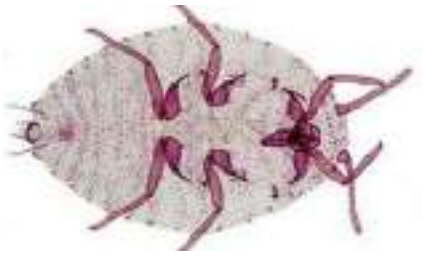
SMS advisories to smallholder farmers

Tailored bulletins to extension workers



The work of CABI in early warning systems

CABI modelling: Future pest risk



- Species distribution modelling- *Paracoccus marginatus**
- CLIMEX- future climate scenarios - *Halyomorpha halys* Switzerland * *

* Finch et al (2021) https://doi.org/10.1002/ps.6151

**Stoeckli et al (2020). https://doi.org/10.1007/s00484-020-01992-z

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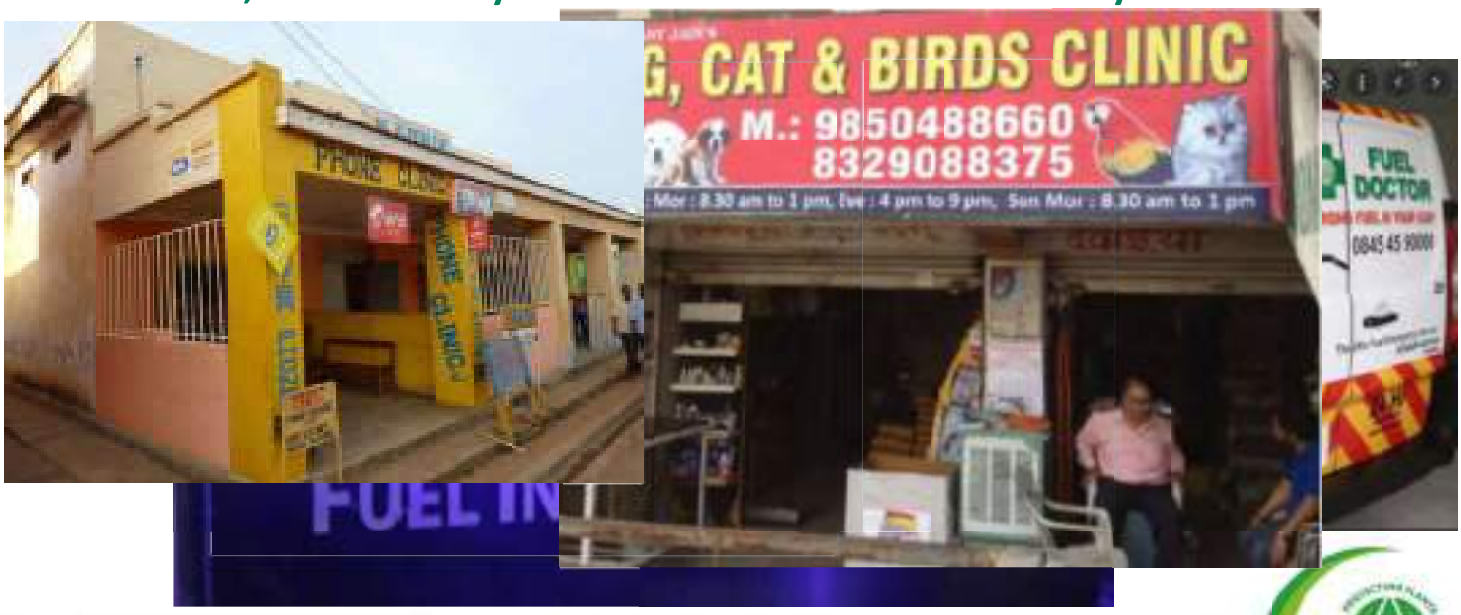
Plant clinics; unashamedly modelled on the human health system.



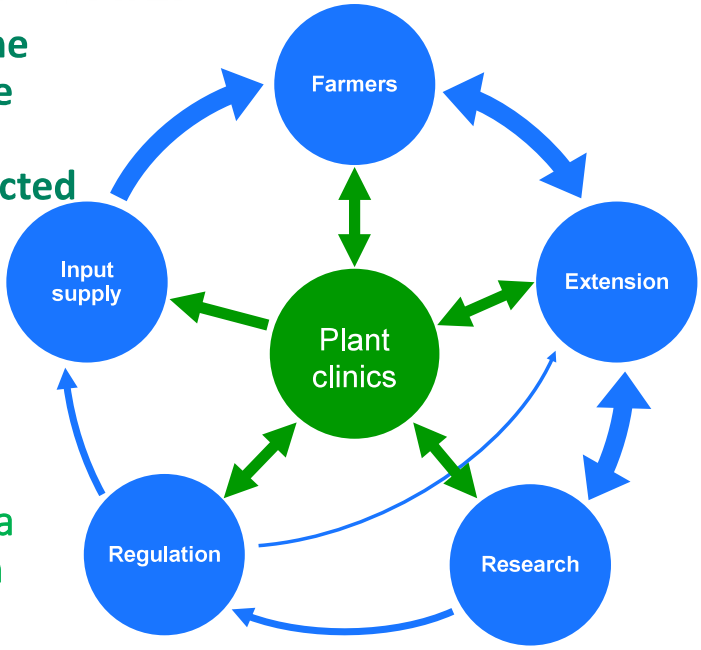
The work of CABI in early warning systems

The plant clinic:

Plant clinics are regular events where farmers can get advice on growing their crops.

Medical		Crop equivalent
The GP	is	the plant doctor
GP surgery	is	the plant clinic
The pharmacy	is	the agro dealers supply shop
The medical diagnostic laboratory	is	the plant diagnostic laboratory
Medical regulator	is	Pesticide board

Ensuring the parts of the system are interconnected



Concept of a plant health system

The work of CABI in early warning systems

General Surveillance

Early warning system?

If all parts of a plant health system are working correctly;

In the case of unfamiliar problem pests or disease…….

- Sent to the diagnostic laboratory
- Identified by experts
- Information on diagnosis and control measures supplied to the farmer

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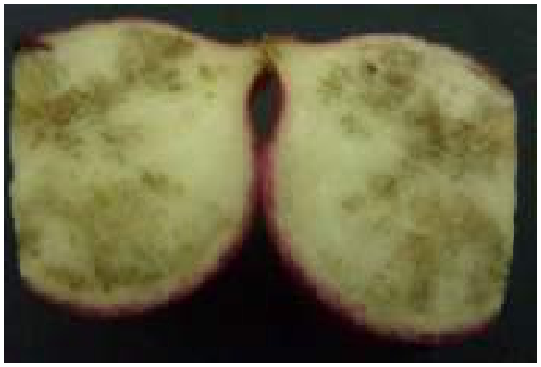
General Surveillance

Early warning system?



Problems with this idea;

Extension workers cannot be familiar with every problem on every crop:

- Too much traffic to laboratories (expense)
- Labs often don't have the identification skills
- Delays can lead to a deterioration of the sample and problems getting the results back to the farmer by which time it will be too late
- The problem has already arrived in the country

The work of CABI in early warning systems

General Surveillance

Nevertheless the system can work:

If the problem:

- Has unique symptoms or appearance is striking
- Is on a widely grown crop
- Is present on an otherwise healthy crop

It is likely that it will be identified as something new and would be picked up by a clinic

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Diseases and pests picked up at Clinics:

Banana xanthomonas wilt

Cassava brown streak virus

Maize lethal necrosis disease

Fall army worm

Social networks: Banana skipper

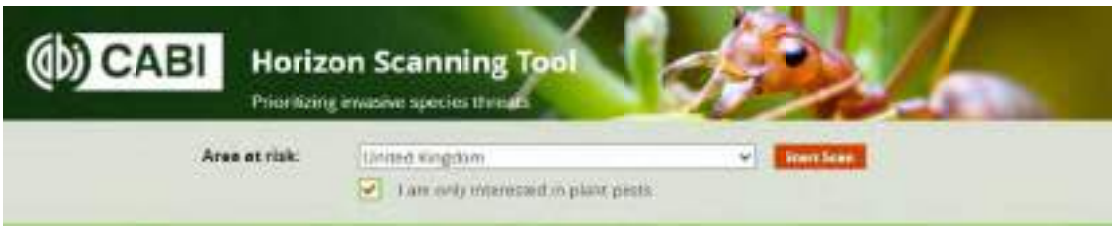
CABI Diagnostic and Advisory service:

	Invertebrates	Plants	Viruses	Bacteria	Fungi
2017	4		3	1	1
2018			2		
2019	5		2		
2020	5	1			
2021	1	1			

The work of CABI in early warning systems

Invasive threat prediction Horizon scanning tool

A website that allows you to see what pests/diseases you have not got and what could be coming your way



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Invasive threat prediction HST

What does it do?

- Helps with first step of risk assessment
- Uses distribution database to find list of pests that are:
  - Absent in specified area at risk (eg your country)
  - Present in specified source area
- Output is a (long) list of species
- Filters can be applied

The work of CABI in early warning systems

Invasive threat prediction HST

Selections other than countries;

The tool also assists with the selection of:

- **Trade partners**
  UN Comtrade data
- **Countries with matching climate zones**
  Köppen-Geiger climate classification system

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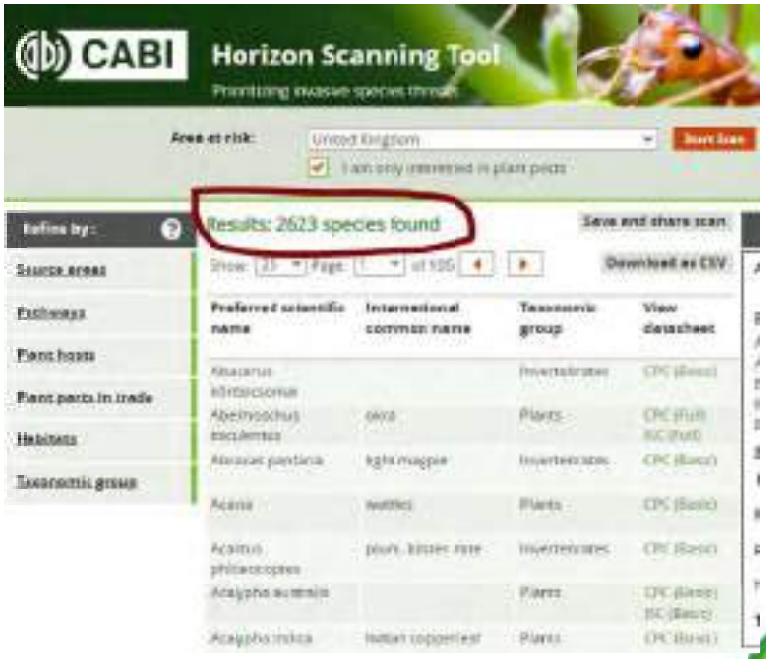
Invasive threat prediction HST

Comparing UK with “Europe” provided 2623 potential plant pests



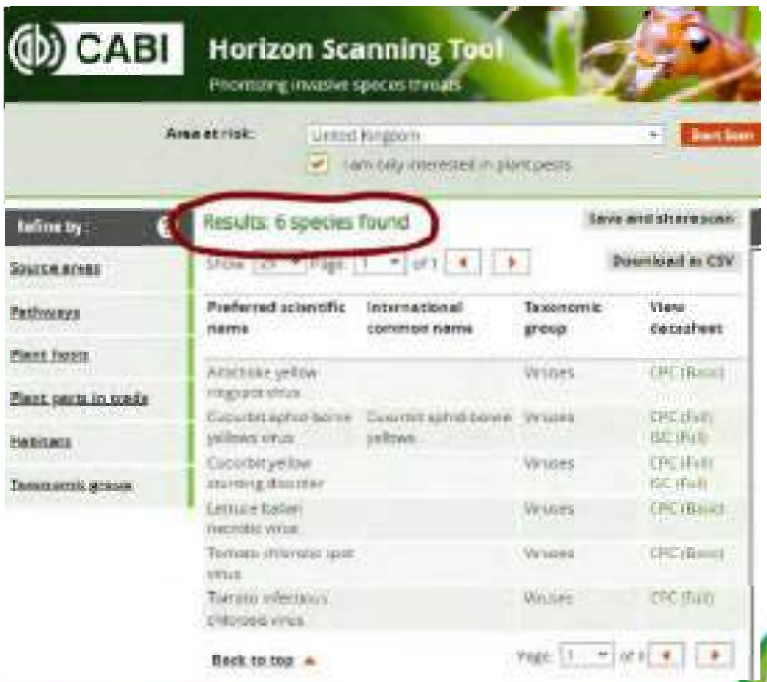
The work of CABI in early warning systems

Invasive threat prediction HST

Comparing UK with “Europe” provided 2623 potential plant pests

Adding “lettuce” as the only crop reduced this to 60

Adding “virus” only reduced this to 6



Insight reporting

What is it?

- Spotting "emerging issues" (equivalent to the EFSA newsletters)
- Monitoring information for possible changes to risk (to the country)
  - Media
  - Scientific literature
- Changes to probability (of entry etc)
  - Eg Spread to a nearer country, or to a trading partner
- Changes to potential consequences/impact
  - Eg New highly effective control method; New host
- Change of risk may need change of risk management

The work of CABI in early warning systems

Invasive threat prediction
Pest Risk Analysis Tool

What does it do?

- Generates a list of potential pests for a commodity (similar to HST)
- Guides user through a formal PRA according to ISPM11 (IPPC)
- Provides access to information (but no assessment or analysis)
- Generates a report
- Allows team working; off/online work
- Various enhancements have been made based on user feedback

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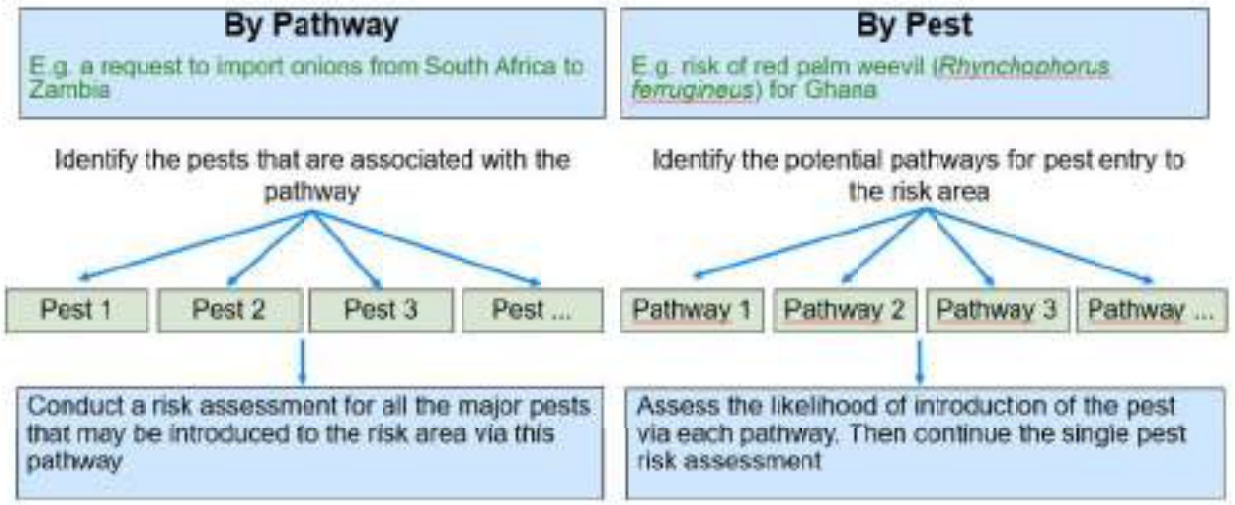
Invasive threat prediction

PRA Tool



The work of CABI in early warning systems

Risk register

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To be forewarned is to be forearmed

Having the information is not enough;

- The data needs to be used;

so as to reduce the risk to crop health/plant health in as many ways as possible

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A GLOBAL PEST OUTBREAK ALERT AND RESPONSE SYSTEM (POARS)

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International Plant Protection Convention Secretariat

London, 21 - 23 September 2022

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Background

1. During CPM-14 (2019), the concept of emerging pests and emergency issues was discussed, and several countries expressed their concern regarding the situation with *Spodoptera frugiperda.*
2. The concept of emerging pests was aligned with the development agenda item listed in the IPPC Strategic Framework (2020-2030) entitled “Strengthening Pest Outbreak Alert and Response System”
3. The scope would be **limited to species qualifying as quarantine or potential quarantine pests.**
4. A Focus Group was set and met virtually every month from January to September 2021.

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Outline:

1. POARS overarching components
2. Considerations related to relations with other bodies and stakeholders
3. Considerations related to the information systems and tools available through the POARS
4. Considerations on definitions
5. Considerations related to the governance of the POARS

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1. POARS overarching components

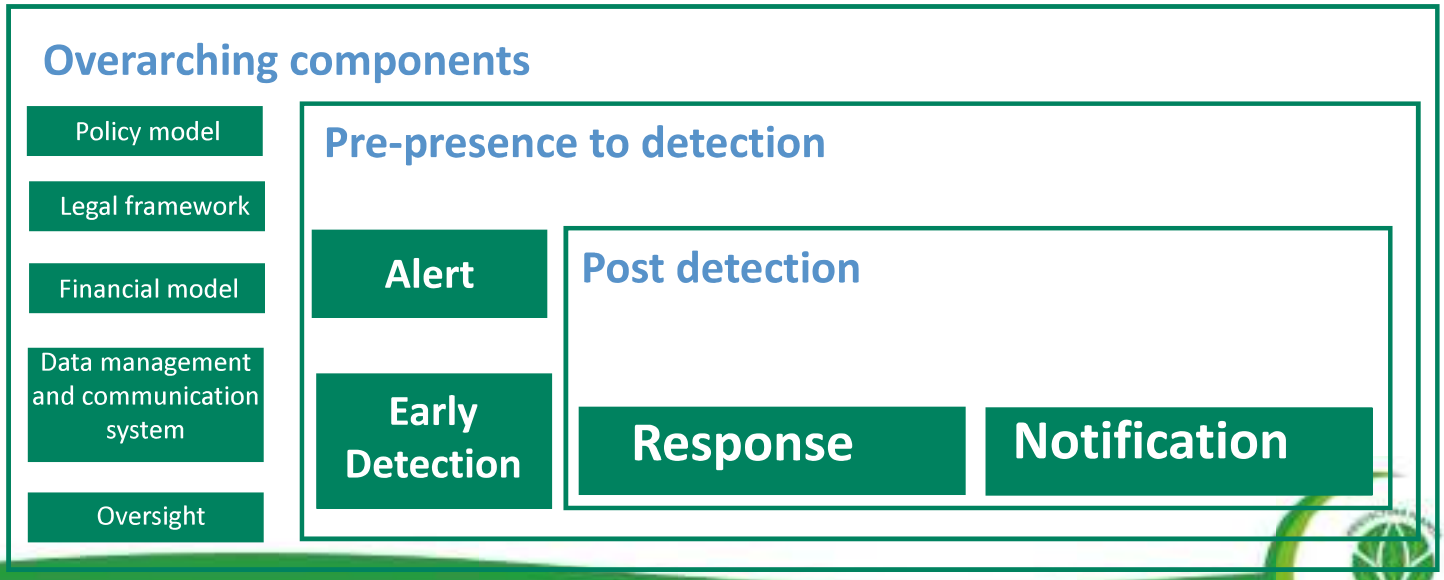

Figure 1. Basic components of an alert and response system

2. Considerations related to relations with other bodies and stakeholders

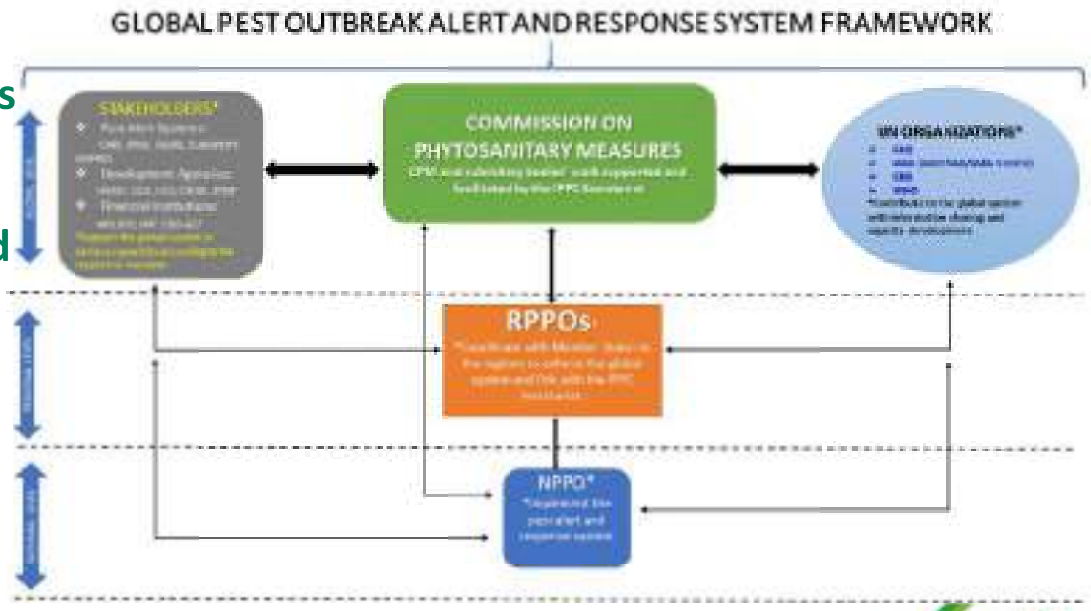

Figure 2. Proposed framework for the Pest Outbreak Alert and Response System (POARS).

3. Considerations related to the information systems and tools available through the POARS

A **dedicated webpage** should be set up and connections with links to RPPOs' websites. The webpage should provide access to a toolbox to include:

- **Automated processes**
  - **to scan media and scientific sources for information** on emerging pests.
  - of the geographic distribution of emerging pests, and their progressive spread .
- **Data visualization**
  - for the collection and sharing of surveillance data for emerging pests and facilitate access more readily to expertise on diagnostics, surveillance and eradication.
- **Tools**
  - Simple, Timely (up to date) and Accurate pest specific pages on emerging pests.
- **Pest specific webpages**

POARS must include capacity development for NPPOs and pest reports need to be submitted in a timely and transparent manner.
The information system must be legally supported (e.g., ensure no liabilities issues for the IPPC Secretariat).

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Some pests which invade quickly with huge impact and over large areas could cause a global concern

- Pests which invaded most of Africa within 10 years after first detection

  Bactrocera dorsalis: 2003-2013
  South of Sahara all countries except Lesotho

  Tuta absoluta: 2006-2016
  First in North Africa. From 2013 -16 all Countries South of Sahara

  Spodoptera frugiperda: 2016-2017
  South of Sahara all countries

Photo:D. Visser

4. Definitions

The FG advised the Standard Committee to request the Technical Panel on the Glossary (TPG) to consider the term 'emerging pest' and a definition to be included in ISPM 5 (Glossary of Phytosanitary Terms):

> *"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".*

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5. Considerations related to the governance of the POARS

- The FG considered whether POARS should be established as part of the IC, or whether a new subsidiary body should be established. **The FG recommended that a new subsidiary body is established, provisionally named the Pest Outbreak Alert and Response Systems Committee (POARSC).**
- **As a start, the CPM recommended that a POARS Steering Group would be set for two years.**

The **POARS Committee should:**

1. be established to provide general direction to the POARS;
2. ensure overall coordination between stakeholders' organizations globally; and,
3. drive resource mobilization.

This Steering Group could be composed of nine members with relevant skills and experience in Alert and Response Systems, among which there will be at least a RPPO representative.

Recommendations of the POARS focus group

- the recommendations from the Focus Group had been published on the International Phytosanitary Portal at https://assets.ippc.int/static/media/files/mediakitdocument/en/2022/03/POARS_All_Recommendations.pdf

- **following the CPM decision, a call for experts for the POARS steering group was open until the 19th of September:** https://www.ippc.int/fr/calls/call-for-experts-for-the-pest-outbreak-alert-and-response-systems-steering-group/.

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Thank You

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Jan Hendrik Venter. Representing the POARS focus group
Director Plant Health NPPOZA

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Pest Surveillance in the United States

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USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

Organizational Chart

- U.S. Department of Agriculture (USDA)
  - Animal Plant Health Inspection Service (APHIS)
    - Plant Protection and Quarantine (PPQ)
      - Emergency and Domestic Programs (EDP)
        - Surveillance Programs

USDA Animal and Plant Health Inspection Service
U.S. DEPARTMENT OF AGRICULTURE

PPQ's Mission Statement

Plant Protection and Quarantine (PPQ) safeguards U.S. agriculture and natural resources against the entry, establishment, and spread of economically and environmentally significant pests, and facilitates the safe trade of agricultural products.

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Pest Surveillance

Keep your country's agriculture and environment safe

Show to other countries that your agricultural commodities are safe

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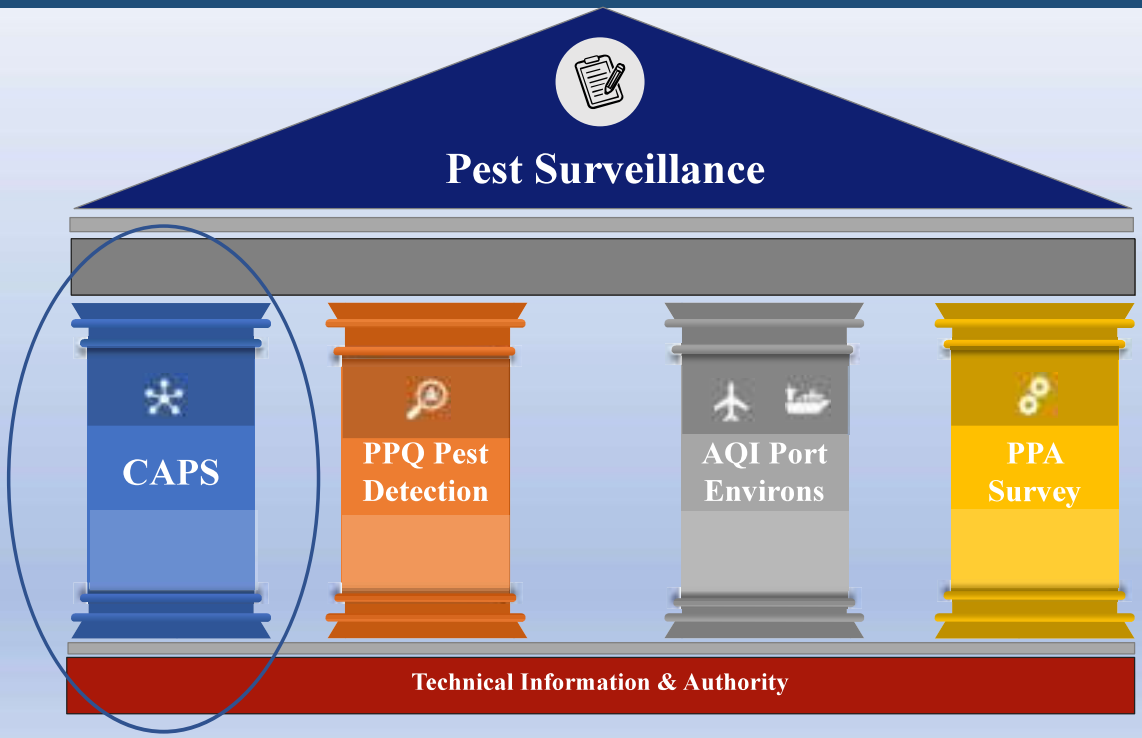

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CAPS Mission Statement

The Cooperative Agriculture Pest Survey (CAPS) program's mission is to conduct exotic plant pest surveys through a national network of cooperators and stakeholders to safeguard American agriculture and natural resources.

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CAPS

Primary Focus Areas

Conduct Surveys

Detect New Pest Incursions

Maintain Network of Cooperator and Surveyors

Outreach to the Public

ISPM 6: Guidance for Surveillance (1997)

Survey Types:

- General Surveillance
- Specific Surveys

Verified Information Determines Pest:

- Presence
- Distribution
- Host or Commodity
- Absence From an Area

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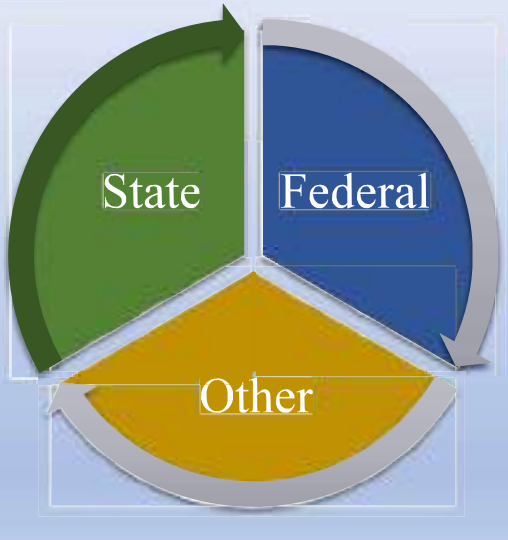
CAPS Network

State Employees

- Survey
- Administrative

Institutions

- State Agriculture Departments
- Tribal Nations
- Universities



Surveys Conducted by the Network

- Are Pest Specific
- Use Approved Survey Methods
- Consider Host Availability
- Consider Potential Climate
- Consider Pathways
  - Commodity
  - Transportation

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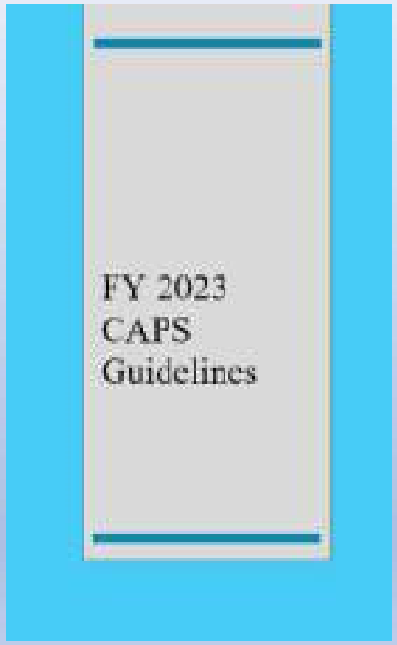
Support Provided to the Network

National Guidelines
- Policies
- Expectations
- Procedures

National Priority Pests
- Detailed Pest Information
- Survey Supplies When Appropriate
- Approved Survey Methods



https://caps.ceris.purdue.edu/

Survey Tool - Climate Suitability Maps

https://safaris.cipm.info/safarispestmodel/StartupServlet?safarishome

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Public Outreach by the CAPS Network

Aims to:

- Increase Reporting Pests
- Communicate Pest Threats
- Increasing Cooperation

Targets:

- Public
- Schools
- Industry

CAPS Secondary Focus Areas

- Support Trade
- Respond quickly to plant pest outbreaks/pest detections
- Protect U.S. agriculture and the environment

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CAPS

Primary Focus Areas

Conduct Surveys

Detect New Pest Incursions

Maintain Network of Cooperator and Surveyors

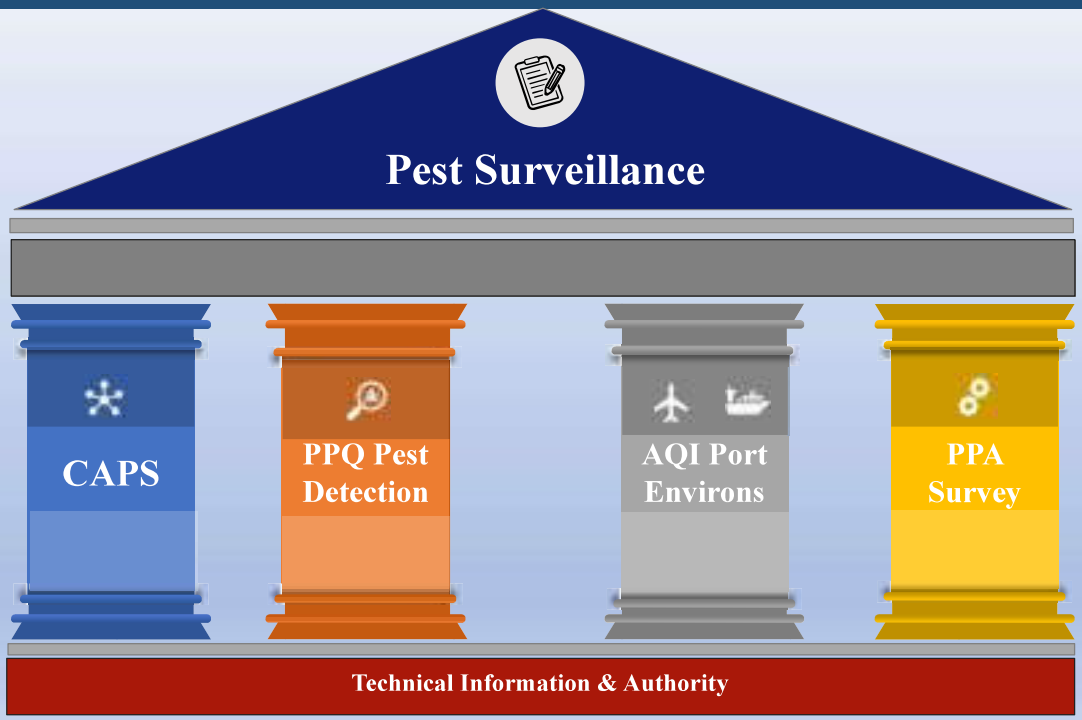
Outreach to the Public

Secondary Focus Areas

Support Trade

Respond to Plant Pest Incursions

Protect Agriculture and the Environment



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Pest Surveillance Numbers

- 54 States and Territories Participated
- 581,000 Sites Surveyed
- 2+ Million Traps & Lures
- 200+ Pests Surveyed
- 97% Priority Pests Surveyed

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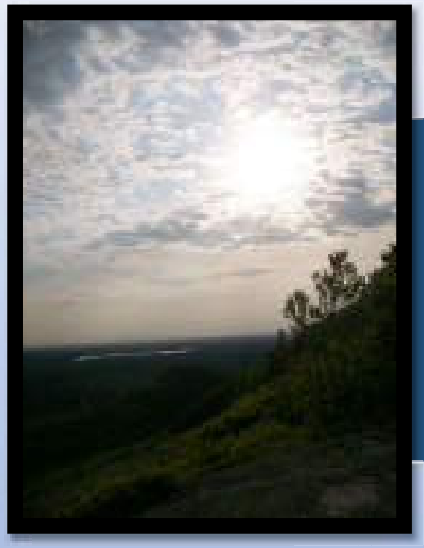

Thank you!

John Crowe - john.f.crowe@usda.gov

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SESSION: EARLY WARNING SYSTEM

National Reporting Obligations (NRO)

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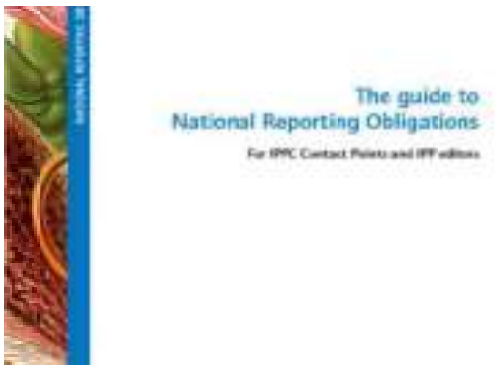
NROs overview

Aim: To enhance international cooperation in controlling pests of plants and plant products and in preventing their international spread.

Obligation under the Convention: All countries that signed the Convention are responsible for the implementation of all reporting obligations.

NROs assure that a minimum amount of official phytosanitary information is available



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Type of obligations

Public: 7 obligations*

Bilateral: 6 obligations

**Pest reports*

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Relationship with Early Warning System

Public obligations: among these, are **pest reports of outbreaks** in the IPP.

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PEST REPORTING (ISPM 8)

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PEST REPORTING (ISPM 8)

ABSENT

IPPC Contact point Key functions

One contact point

Adequate resources

Information Exchange

Communicate phytosanitary issues

Capacity Building for CPs.

Phytosanitary Capacity Evaluation (PCE)

- A tool that empowers NPPOs to put in place **a sovereign plan** for how they wish to address any gaps identified, though the application of the modules
- **In 2020-2022**, 9 PCEs completed and 5 in progress
- **It contributes to build capacity of CPs** in their: systems, organization and core activities
- **Activities related to early warning**: Pest diagnostic capacity, NPPO pest surveillance and pest reporting capacity, Pest eradication capacity
- **Guides (21) and training materials (5)**: e.g. surveillance guide, e-learning course on surveillance and pest reporting (2022)
- **For more information on conducting a PCE, please contact:**
  - **Sarah Brunel**: sarah.brunel@fao.org
  - Officer in Charge for Implementation Facilitation Unit – daily matters, International Plant Protection Convention Secretariat
- **visit the PCE home page at**: https://www.ippc.int/en/core-activities/capacity-development/phytosanitary-capacity-evaluation/#a

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PCE conducted in Nicaragua, completed.

Capacity Building for CPs.

Contributed Resources

- Contribution from NPPOs, RPPOs, other Organizations
- In relation to phytosanitary issues (ISPMs, CPM recommendations, etc)
- 277 Resources posted
- Related to early warning, we have contingency plans: https://www.ippc.int/en/core-activities/capacity-development/phytosanitary-system/contingency-plans/contingency-plans/
- Web page: https://www.ippc.int/en/core-activities/capacity-development/guides-and-training-materials/contributed-resource-list/

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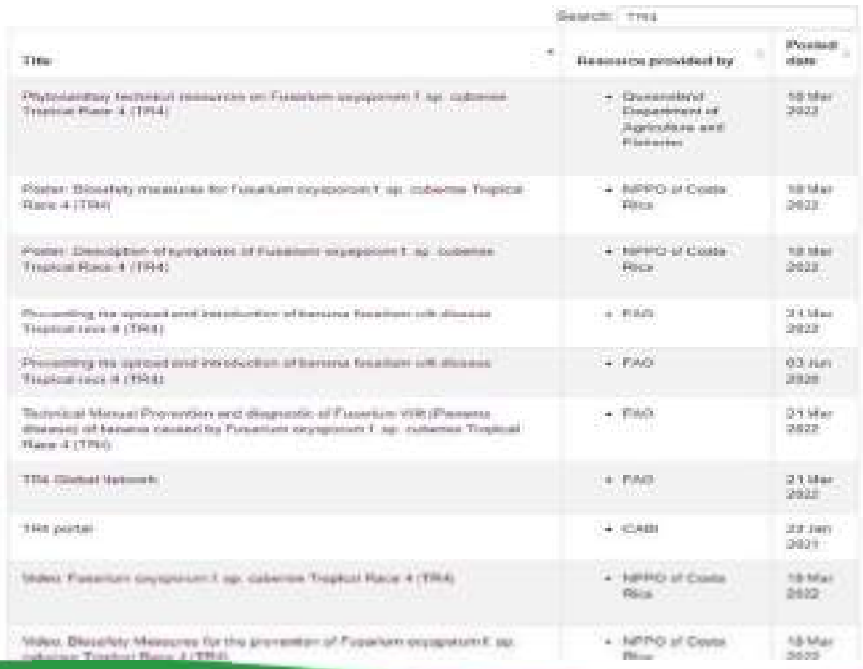
Examples of resources in IPP

TR4



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Some examples of resources in IPP

Examples of pest-specific response guidelines

(Organization in parentheses shows the organization which submitted the technical resource to the IPPC Secretariat.)

Insects

Tephritidae (fruit flies)

Action Plan for the Control of the African Invader Fruit Fly (Bactrocera invadens Drew, Tsuruta and White)(FAO/IAEA)

Action Plan Peach Fruit Fly *Bactrocera zonata* (Saunders) (FAO/IAEA)

Economic Evaluation of Three Alternative Methods for Control of the Mediterranean Fruit Fly (Diptera: Tephritidae) in Israel,

Exotic Fruit Fly Regulatory Response Manual (NPPO of USA)

Mediterranean Fruit Fly Action Plan (NPPO of USA)

Lepidoptera (Moths)

New Pest Response Guidelines False Codling Moth *Thaumatotibia leucotreta* (NPPO of USA)

New Pest Response Guidelines Leek Moth (Acrolepiopsis assectella (Zeller)) (NPPO of USA)

New Pest Response Guideline Lymantriidae (NPPO of USA)

New Pest Response Guidelines Spodoptera (NPPO of USA)

Special Alert – Fall armyworm, *Spodoptera frugiperda*, found in the EPPO region (PM 7/124 (1) Spodoptera littoralis, Spodoptera

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Conclusions

- All Contracting Parties should be able to comply with NRO obligations in order to inform other CPs about their pest situation
- CPs should be aware of the importance regarding pest reporting in light of transparency and potential impact on trade of agricultural goods with partners.
- There are available tools and publications produced by the IPPC, NPPOs, RPPOs and other Organizations regarding capacity building to CPs in relation to Early Warning

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Thank for your attention

Magda GONZALEZ
Expert member_Latinamerica-Implementation and Capacity Development Committee