Disease Resistance Characteristics in DUS Examinations: Breeders' perspective

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ISF

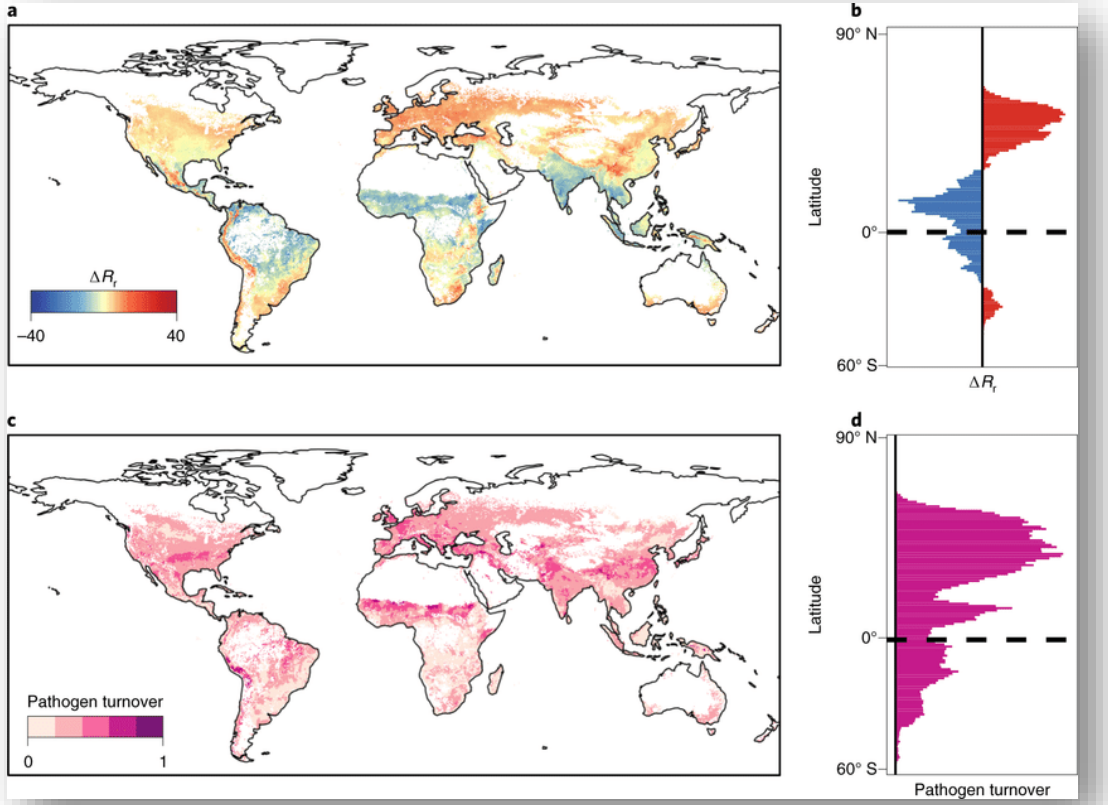
Pathogen Outbreaks Are Increasing In The Face Of Climate Change

- Pathogens evolve constantly – An arms race!
- Phenomenon exacerbated by climate change

- Example of Outbreaks affecting various crop types include:
  - ToBRFV in Tomato
  - Wheat Blast in rice, wheat, barley, lolium
  - Fusarium wilt in Banana

- Plant breeding is key to address those unforeseen outbreaks of pests and diseases

Projected shifts in relative abundance in 80 fungal and oomycete plant pathogens for 12 major crops is Temperature dependent



Challoner et al., 2021, Nature

Plant “Pandemics” in the News!

In the news | Media coverage of health and science topics

The Washington Post MAY 21, 2021

Plant pandemics and how they could endanger our food supply. Scientists sound alarm on growing menace.

by Erin Blakemore

In PNAS commentary, experts say we need better ways to detect, track and stop outbreaks of such diseases.

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The next pandemic could hit global crop supplies

As plant diseases spread across continents, greater scrutiny is needed

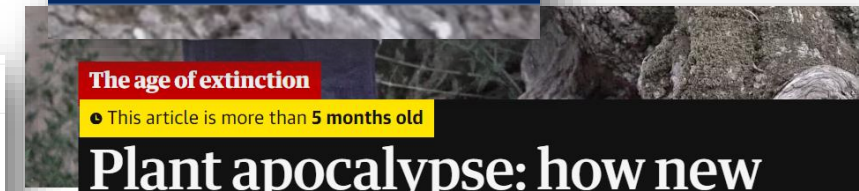
IMAGE: GETTY IMAGES

Nov 13th 2023 | Share

By Caitlin Talbot

WHEAT BLAST, a fungal disease, is poised to turn the world's breadbasket into a chalky mess. It has spread more than 15,000km in a decade—from Brazil to Argentina, and then Zambia and Bangladesh. It may yet get to India, the second-biggest producer of wheat.

The Guardian Eur



The age of extinction

This article is more than 5 months old

Plant apocalypse: how new diseases are destroying EU trees and crops

From ancient olive groves to root vegetables, foreign pests introduced via the bloc's open import system are causing damage worth billions – and outbreaks are on the rise

By Agostino Petroni and Regin Winther Poulsen in Puglia

PERSPECTIVE | AGRICULTURAL SCIENCES

The persistent threat of emerging plant disease pandemics to global food security

Jean B. Ristaino, Pamela K. Anderson, Daniel P. Bebber, +13, and Qingshan Wei Authors Info & Affiliations

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THIS ARTICLE HAS BEEN UPDATED

nature > nature reviews microbiology > review articles > article

Review Article | Published: 02 May 2023

Climate change impacts on plant pathogens, food security and paths forward

Brajesh K. Singh, Manuel Delgado-Baquerizo, Eleonora Egidi, Emilio Guirado, Jan E. Leach, Hongwei Liu & Pankaj Trivedi

Nature Reviews Microbiology **21**, 640–656 (2023) | Cite this article

ELSEVIER

Rhizosphere

Volume 27, September 2023, 100719

Rhizosphere

Climate change, a booster of disease outbreaks by the plant pathogen *Phytophthora* in oak forests

Hexon Angel Contreras-Cornejo [a b], John Larsen [b], Sylvia Patricia Fernández-Pavía [c], Ken Oyama [a]

100 YEARS 1924-2024 ISI

Tomato Brown Rugose Fruit Virus Outbreak Example in Tomato

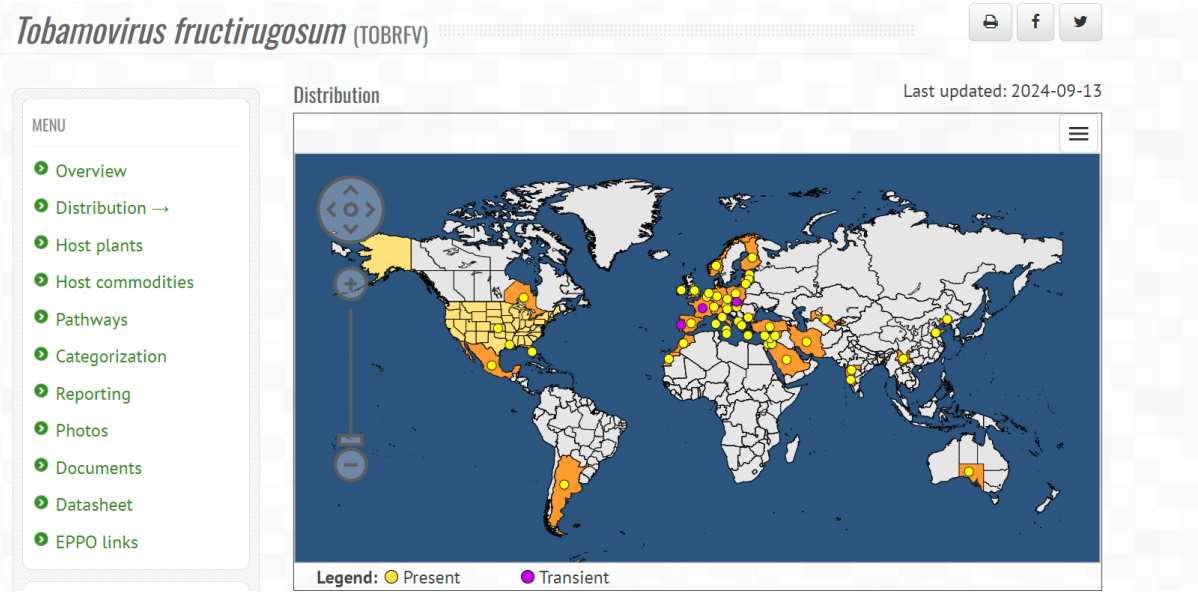
- 2014: Discovery in the Middle East
- 2024: Distribution Worldwide
- Infects all plant parts
- Symptoms only visible after 3 weeks of infection
- Yield Losses between 25% & 70% reported !
- **Quarantine disease** – Major issue for Trade

Figure 2: Leaf deformation (Source Defra / Neil Giltrap)

Figure 3: Tomato fruit discoloration (Source Defra / Neil Giltrap)

Figure 4: Tomato fruit discoloration (Source Defra / Neil Giltrap)

Source: Plant Pest sheets DEFRA



Source: https://gd.eppo.int/taxon/TOBRFV/distribution

Regions with high virus pressure includes North America, the Middle East and West Europe.

ToBRFV: What Happened Between 2014 And 2024

- **2020:** First resistant varieties appear on the market

- Actions undertaken by Examination Offices
  - **2022 - 2026 :** CPVO project to develop a test protocol
  - **2024:** CPVO additional characteristics accepted, enables breeders access to protect their varieties especially when it is the only distinguishing characteristic, permits access to growers to their resistant varieties
  - **Next step:** once the project is finalized - inclusion of characteristic in CPVO protocol

- In the meantime, no inclusion of this disease resistance characteristic in the Tomato TG.

- **What are the expectations going forward?**

Is there a Common Understanding?

- There is a **NEED TO PRIORITIZE INNOVATION AND PLANT VARIETY PROTECTION** for the benefit of farmers, consumers and society

- ISF initiated a survey on this topic (initial results are provided here - more time required to have further representation from breeders)

- Disease Resistance Characteristics are important for DUS examinations **INDEPENDENTLY OF THE CROPS**

- **40% of the surveyed breeders** indicated that the speed at which disease resistance characteristics are added to the relevant UPOV Test Guidelines or national test testing protocols **SHOULD NOT BE SLOWER**

Keep Pace With The New Emerging Plant Pathogens Globally

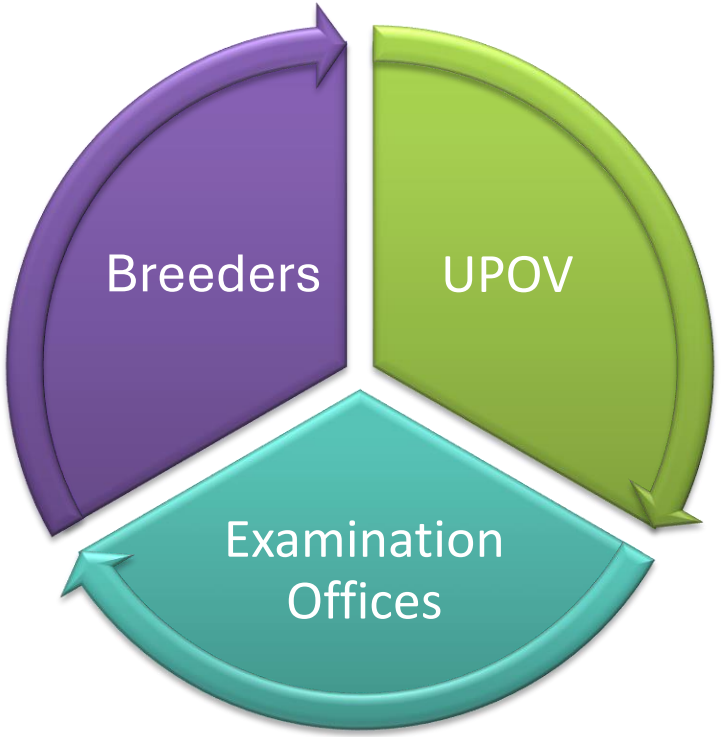
- Society can't afford to wait **"undefined X years"** for TGs changes after pathogen outbreaks

- **Need for a streamlined - agile effective system/process to :**
  - Include new or revise existing disease resistance characteristics in the scope of DUS examinations (*i.e.* UPOV TGs)
  - Fast track the procedure for partial revisions for vegetable crops in UPOV TGs (Primary need) **- for exchange DUS reports global alignment is needed**
  - Identify bottlenecks & technical challenges (at UPOV / EOs level)
  - **Encourage the use of disease resistance test results performed by other Examinations Offices**

It is Time To Act TOGETHER

- **A platform/system to be identified by ALL PARTIES** on how to overcome the delay in responding to outbreaks where **exchange of information** is allowed

- Over 90% of seed actors (ISF survey 2024) expect innovations that breed more resilient and productive varieties of key crops within 10-20 years (ISF Seed Sector Survey, 2024)



Key Take Aways

- Pathogens spread globally – “**No borders for Pathogens**”
- Disease resistance characteristics are increasingly becoming **vital for distinctness !**
- **Partial revisions are key** !
- Partial revision only needed in English – Examination Offices could perform their translation if needed
- **Encourage the use of disease resistance test results performed by other Examinations Offices**
- **For exchange of DUS reports global alignment is needed**
- **It’s time to Act Faster – It is time to Act Together**

GLOBAL ALIGNMENT IS CRUCIAL FOR THE BENEFIT OF SOCIETY

Seed is Life

International Seed Federation
Seed is Life

CropLife INTERNATIONAL

Euroseeds
Embracing Nature

AFSTA
The African Seed Trade Association
L'Association Africaine du Commerce des Semences

SAA Seed Association of the Americas

APSA