

The Plant Pathogen Confirmatory Diagnostics Laboratory: Safeguarding U.S. agriculture and natural resources

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Animal and Plant Health Inspection Service (APHIS)
Plant Protection and Quarantine (PPQ)
Science and Technology (S&T)

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Plant Pathogen Confirmatory Diagnostics Laboratory

Our mission is to develop, adapt, validate, and implement advanced biochemical and molecular methods for the detection of high consequence plant pathogens, including the USDA Select Agents and plant pathogens in foreign germplasm.



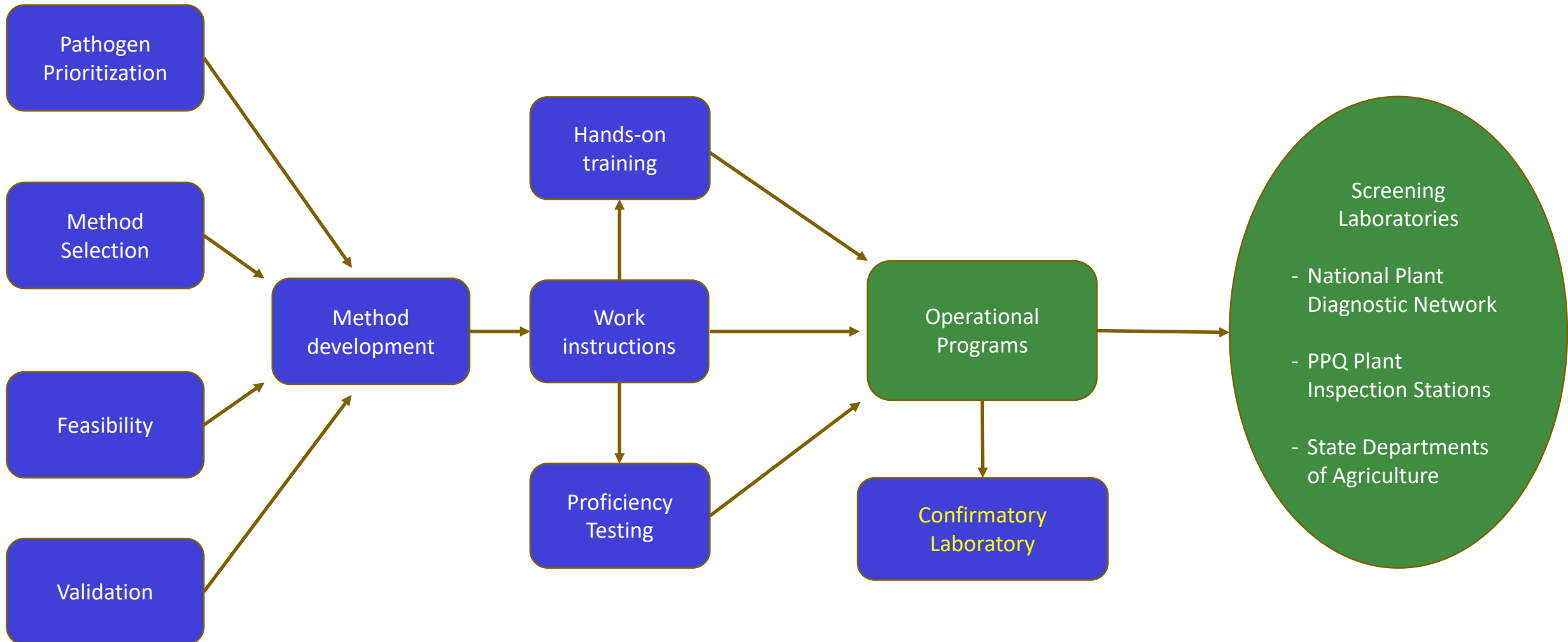
USDA APHIS PPQ S&T PPCDL in Laurel, Maryland

Quality Management System

- ISO/IEC 17025 Accredited for Plant Pathogen Diagnostics
 - Specifies general requirements for the competence to carry out tests and/or calibrations, including sampling
- Integral part of the Confirmatory Diagnostics Program
 - Measurable Confidence in Results
 - Reliability of Tests
 - Defensible
- Part of the APHIS Strategic Plan



Diagnostic Method Development, Validation, & Implementation



Pest Exclusion and Domestic Program Pathogens



Citrus Greening



Citrus Canker



Phytophthora ramorum



Plum Pox Virus



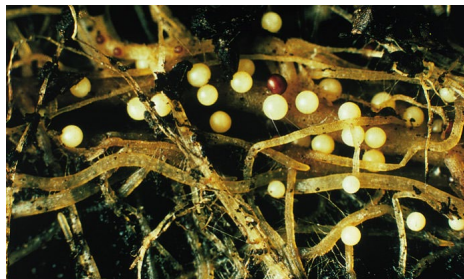
Phytoplasma



Sweet Orange Scab



Citrus Black Spot



Potato Cyst Nematode



Cucumber Green Mottle Mosaic Virus



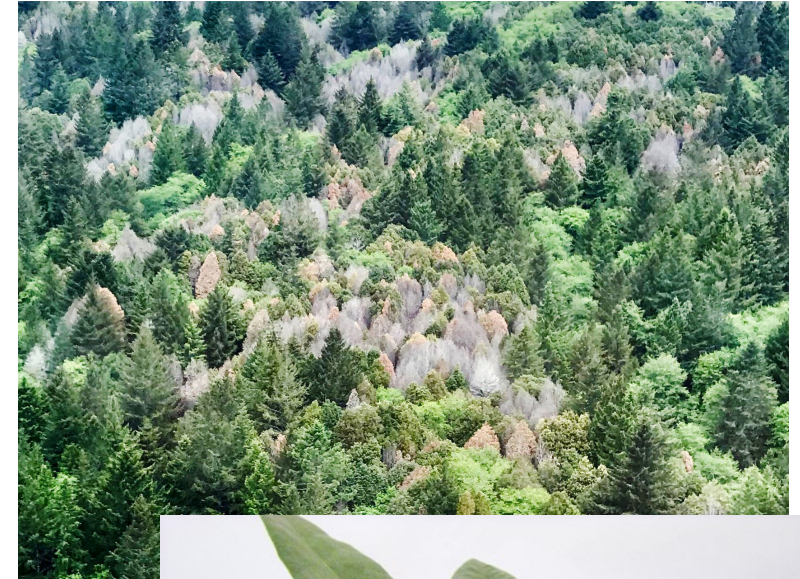
Tomato Brown Rugose Fruit Virus



Pospiviroids

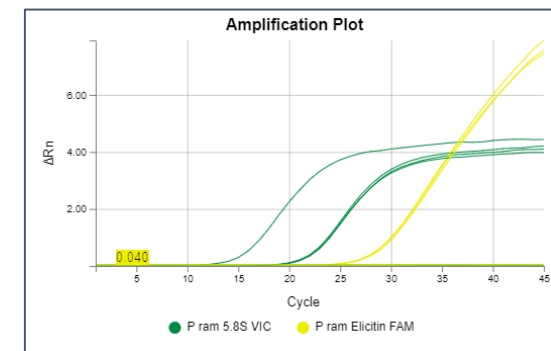
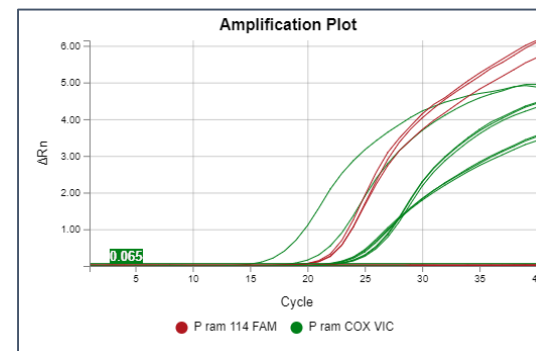
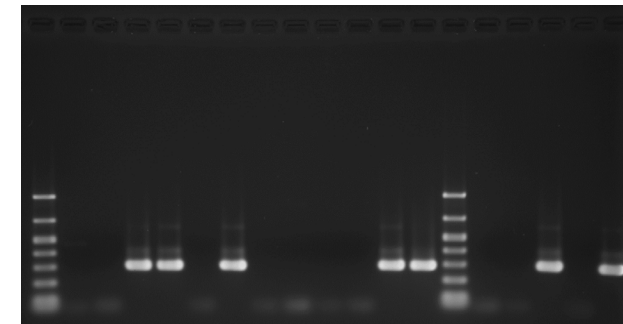
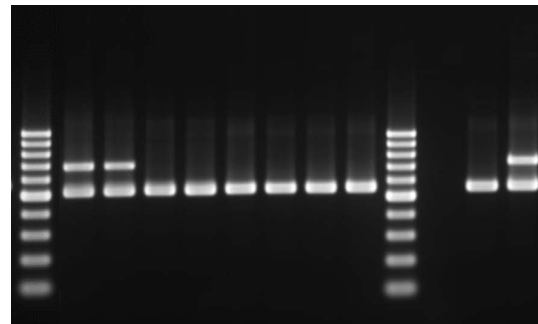
Phytophthora ramorum – once an emerging new pathogen

- Introduced plant pathogen that was killing tanoaks and coast live oaks during the 1990s
- Causal agent determined in 2000 (Sudden Oak Death)
- In 2001, *P. ramorum* was isolated from rhododendron plants in a California nursery
- Additional finds were reported in West Coast nurseries
- How can we rapidly detect this pathogen to prevent new introductions?



Phytophthora ramorum – building diagnostic capacity

- Initial collaborations with researchers to evaluate PCR-based methods and implement them for diagnostic testing
- Training for diagnosticians began in 2003
- Additional development, evaluation, and validation of real-time PCR methods for diagnostic testing
- Maintain laboratory capacity through trainings on diagnostic methods and proficiency testing



USDA PPQ Select Agent Plant Pathogens



Ralstonia solanacearum
(Bacterial wilt)



Rathayibacter toxicus
(Annual ryegrass toxicity)



Sclerophthora rayssiae
(Brown Stripe Downy Mildew)



Xanthomonas oryzae
(Bacterial blight of rice)



Coniothyrium glycines
(Soybean Red Leaf Blotch)



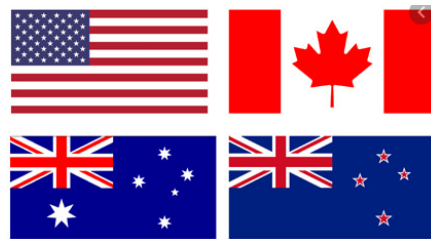
Synchytrium endobioticum
(Potato Wart)



Peronosclerospora philippinensis
(Philippine Downy Mildew)

Select Agents – how do we prepare for these pathogens?

- These are exotic pathogens and materials may not be readily available for developing molecular diagnostic methods
- This requires international collaborations and knowledge sharing for:
 - Development of protocols
 - Obtaining reference materials and diagnostic samples
 - Inter-laboratory validation
 - Ring testing and performance studies
 - Harmonization of processes and methods



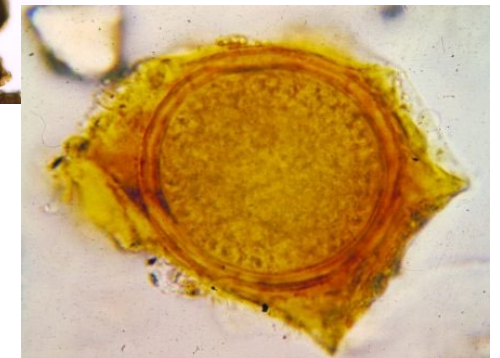
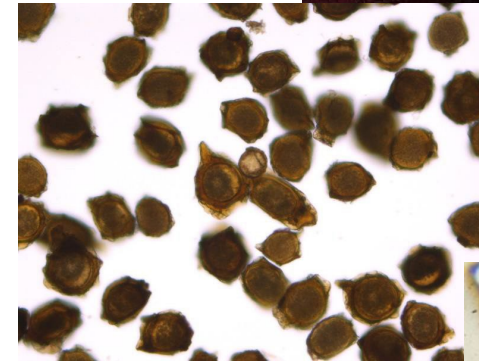
Plant Health Quadrilaterals (QUADS)



International Plant Protection Convention

Potato Wart – a significant threat

- *S. endobioticum* is a soilborne fungal plant pathogen
- It produces wart-like growths on potato that contain winter sporangia (i.e. winter spores)
- Winter spores can survive for 40 years or more in soil
- The pathogen was detected in small garden plots from three states, but declared eradicated in 1994
- How do we prepare for potential new incursions and detect this pathogen?



Potato Wart – preparedness

- Knowledge sharing visit to Canadian Food Inspection Agency (CFIA) Charlottetown Lab to learn soil testing protocols
- Knowledge sharing visit by CFIA Charlottetown Lab Diagnostic Coordinator to PPCDL
- Participation in international Potato Wart meeting (62 participants from 23 countries)
- Development of diagnostic protocols and procedures at the PPCDL, as well as approved Work Instructions



Thank you!



Questions?