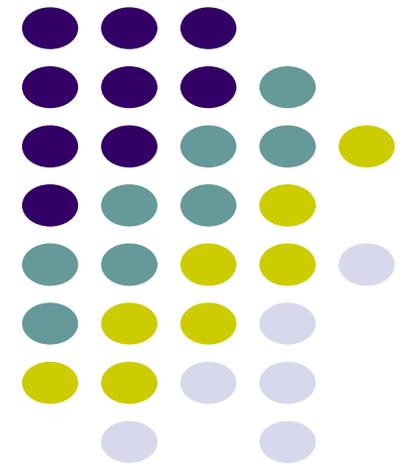
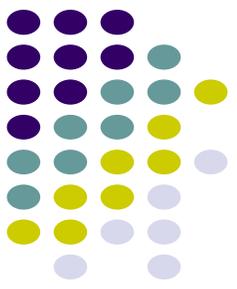


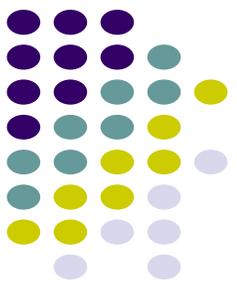
Virtual diagnostics network



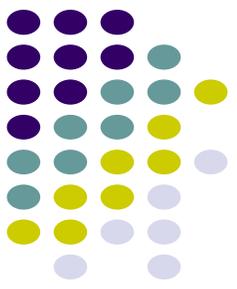


Plant Health Risk

- The containment and mitigation of exotic plant pathogens are dependent upon early detection and accurate diagnoses also in a timeframe to enable effective response.
- Increase dependency on international trade to address global economic and food security challenges pathogen incursion will also continue.
- Do we have a rational plant biosecurity strategy and adequate plant biosecurity infrastructure to protect plant systems from the pathogens that threaten plant health?



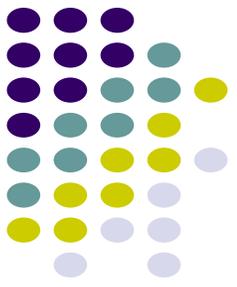
- The emergence of hybrid *Phytophthora* species has been reported as a consequence of the global trade in nursery and landscape plants. Of great concern is that the host range and aggressiveness of the hybrid *Phytophthora* species were not predicted based on the parental phenotypes.
- Similarly, novel virulence patterns in plant pathogenic bacteria have been attributed to horizontal gene transfer (HGT). The global movement of plants may provide more opportunity for HGT among plant pathogenic bacteria creating challenges for plant health in general, and plant diagnostics, in particular.
- The ability of cryptic satellites to alter the host range of Gemini viruses may present new challenges to plant health and confound our ability to diagnose and mitigate these new virus diseases.



The Need for Robust Plant Diagnostic Systems

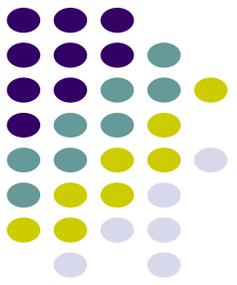
- With respect to trade, the mere presence of a pathogen can stop shipments whether or not disease was manifest. Being able to accurately identify a pathogen and diagnose a disease is essential to ensure proper disease mitigation measures are implemented and to ensure that correct trade decisions are made.
- With respect to sensitivity, specificity, and robustness, the stringency of diagnostic technologies and protocols vary across the continuum from pre-infection detection to post-outbreak monitoring.
 - Prevention
 - Early Detection and Accurate Diagnoses
 - Response and Recovery

Virtual Plant Diagnostic Networks

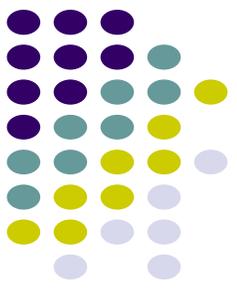


- A global network of plant diagnostic infrastructure is needed to facilitate the detection, diagnosis, and management of recurrent, emergent, and introduced plant pathogens.
- Trade increases the risk to plant health as a direct result of the movement of unwanted plant pathogens and pests. The International Plant Protection Convention (IPPC) requires that signatory nations abide by strict Sanitary and Phytosanitary (SPS) standards to minimize the movement of plant pathogens and pests across national boundaries.
- However, the systems to ensure that only pathogen-free plants are put into global distribution chains are overwhelmed by the massive volume of plants that are shipped over great distances in short periods of time.

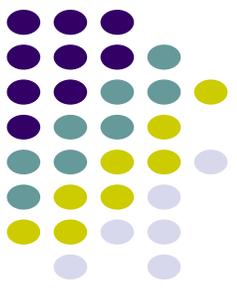
Plant Diagnostic Networks



- In 2002, the Land Grant University (LGU) system in the U.S. partnered with the United States Department of Agriculture to create the National Plant Diagnostic Network (NPDN) to increase the capability and capacity of plant diagnostics throughout the U.S.
- The mission of NPDN is to promote the early detection of plant pathogens and pests by training first detectors and ensuring accurate and rapid diagnosis.
- The U.S. Agency for International Development partnered with a few LGUs to create the International Plant Diagnostic Network (IPDN) to extend this concept to nations with very limited diagnostic resources

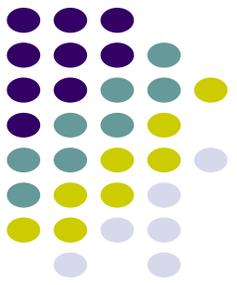


- The Global Plant Clinic (now called PlantWise) was created by CABI to bring plant diagnostic support to rural communities in low income nations.
- PlantWise has offered on-site clinics in rural settings in South America, Asia, and Africa and where internet connectivity exists, PlantWise offers on-line digital diagnostic support from the United Kingdom.



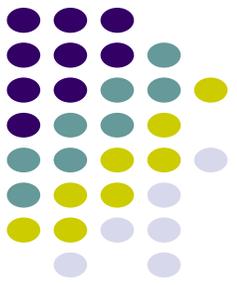
- The European Union Framework programs funded multinational efforts to create a virtual biosecurity research and diagnostic network for Europe. The concept is to link researchers and diagnosticians across Europe into a mutually beneficial network to enhance plant diagnostic capabilities and providing first detectors in the field with access to information necessary to ensure early detection of emerging or introduced plant pathogens.
- Plant Health Australia is working to establish a national plant diagnostic network with many of the same goals as the other networks. Scientists in Australia have created an on-line plant biosecurity toolbox (<http://old.padil.gov.au/pbt/>) to provide access to diagnostic resources and have already deployed a digital diagnostics system (<http://www.padil.gov.au/Rmd>) for Australia that now extends that capability into Southern Asia.

Magnitude of the Challenge for Plant Diagnostics



- Plant diagnosticians have responsibility for a vast diversity of host plant species often spanning four levels of taxonomic complexity (e.g., varieties, species, genera, families). Each one of these plant species has a vast diversity of pathogens that cause an array of diseases, each with its own set of host specificity and ever-changing systematics of the pathogens.
- Plant diagnostic laboratories at air and sea ports have enormous challenges with respect to the number of shipments, the number of samples to be processed, and the very short timeframes within which diagnoses must be rendered.
- Some plants and plant products have short shelf lives and consequently, any delays can decrease the value of the plants.

Concept for a Virtual International Plant Diagnostic Network (VIPDN)



- Few national and regional plant diagnostic networks are functioning well. Connecting those national and regional networks through a virtual international plant diagnostic network (VIPDN) is proposed. The mission and function of a VIPDN would be:
 - to provide a mechanism to facilitate the exchange of non-trade sensitive diagnostic information and resources,
 - to provide a vehicle for cooperation among plant diagnosticians around the world, and
 - to provide a directory of plant diagnostic laboratories to facilitate interaction with the global research community.
- Sharing of plant diagnostic information and expertise around the world would be of great value to the international plant diagnostic community. A VIPDN could be the platform for sharing diagnostic resources such as images of symptoms, primer and probe sequences, the advantages and limitations of specific diagnostic protocols, technological expertise, etc.