

## **The Persistent Threat of Emerging Plant Disease to Global Food Security**

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Plant disease outbreaks are increasing and threaten food security for the vulnerable in many areas of the world. Recently a global human pandemic threatened the health and killed millions of people on our planet. A stable, nutritious food supply will be needed to lift people out of poverty and improve health outcomes. Emerging plant diseases threaten many food crops including those we eat for breakfast such as coffee, oranges, banana and potatoes. Plant pathogens cause global losses estimated to be as high as \$33 billion per year. Plant diseases, both endemic and recently emerging, are spreading and exacerbated by climate change, transmission with global food trade networks, pathogen spillover, and evolution of new pathogen lineages. The risk of introduction of pathogens into the US with trade requires continued monitoring and improved diagnostic capabilities at our borders. In order to tackle these grand challenges, a new set of tools that include disease surveillance and improved detection technologies including pathogen sensors and predictive modeling and data analytics are needed to prevent future outbreaks. New genetic tools are enabling us to piece together the evolution of emerging plant pathogens and track their spread. Disease surveillance systems have been deployed for *Phytophthora infestans*, the pathogen that caused the Irish famine. The pathogen affects potato production globally and food security. Genomic sequencing tools can be used to track outbreaks and produce maps of disease and pathogen strains. Faster and more reliable methods of detection could greatly reduce time for detection and thus time to action. We have developed field-compatible molecular assays to speed identification of plant pathogens in fields. This will allow growers to respond more rapidly with appropriate fungicide treatments and will allow regulatory agencies to mitigate new outbreaks more effectively. Novel detection technologies combined with disease surveillance, geospatial and bioinformatics tools will help mitigate outbreaks improve deployment of host resistance and inform policy.