Will the Crop Production Systems in the United States Be Secure and Sustainable in the Future?

Overview of the Need For Support
Public Policy Board - The American Phytopathological Society

Plants from our production systems provide us food, feed, fiber and medicines and in so doing account for a considerable portion of the GDP and make a significant contribution to our balance of payments in foreign trade. Hence, growing plants in a sustainable and economically viable manner is required for the United States to be secure. Maintaining plant health from naturally occurring or purposefully introduced disease agents is the role of research, instruction and outreach programs in plant pathology. While there is a readily available and generally affordable breadth of options for food, clothing, and shelter; there are many voids in the security and sustainability of our crop production systems.

The Situation: One of America's largest domestic and export-import economic sectors is agriculture. Crops are produced on about 350 million acres in the U. S. and 12% of plant products we consume, such as fresh fruits, tree nuts, fresh vegetables, vegetable oils, and grains are imported. The security of this vast system and research to elucidate the basis to sustain this resource has been under supported for a long time. Consequences include:

- Arrival of key pathogens in commodities, cargo and luggage, resulting in huge epidemics:
  Examples: Chestnut blight, dutch elm disease, white pine blister rust.
- Unintended arrivals are occurring at an accelerating rate due to improved transportation systems, and poor ability to detect pathogens at ports of entry.
  Examples and estimated cost: citrus canker ($342 million annually), karnal bunt ($160 million to date), plum pox virus ($20 million to date), sudden oak death ($1000 to remove a single tree; currently limited to West coast; potential impact is uncertain)
- Inability to address the impact of outbreaks of disease except by destruction of diseased plants results in significant conflict between the science of plant pathology and the legal system (e.g. management of citrus canker) and large and the need for large and continual government payments for disaster relief to assure a viable production system.

The Problem and Resolution: Investment in research is needed to open new directions for research and application.

Expand investment in microbial genomics to include sequencing and functional genomics of a microbial pathogens that are potential threats to plant health. This is essential to understand virulence and survival genes, and identify sequences for rapid diagnosis.
Outcome: Understanding of virulence mechanisms and basic biology regarding the spread and survival of plant pathogens, especially threat agents. This will be the basis for new approaches to control. Discovery of novel genes, molecules, or sequences as the basis for the development of new tools for accurate and rapid diagnosis of plant diseases and for determining global relationships of plant pathogens of concern.

Annualize support for the National Plant Disease Network and begin the development of a national center for plant health.
Outcome: A coordinated infrastructure for effective diagnostics and rapid response to threats to plant health. A center for plant health would address needs in risk assessment and updates of database of threat agents, coordinate genomic and biological databases of plant pathogens and related organisms, oversee collections of pathogens and related organisms, and facilitate implementation of standardization of diagnostic techniques and certification of persons or labs to make diagnoses.

Invest in research to develop an understanding of sustainable agricultural production systems that will have greater buffering capacity to mitigate disease and stress.
Outcome: A better understanding of the plant environment, the development of new disease management chemistries, and improved methods for delivery, will lead to implementation of the best practices for a specific agricultural production system that are based upon sound scientific principles. Determining appropriate crop specific and production scale management tactics based on effectiveness, economic viability, practicality, and environmental stewardship will enhance the buffering capacity of our production systems to withstand environmental stress and mitigate the impact of naturally or purposefully introduced disease agents.