



Food Safety

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Plant Pathology's Role in the Safety of the American Fresh Produce Supply

► **Background:** Since 1996, over 80 foodborne illness outbreaks were associated with fresh fruits and vegetables consumed raw or minimally-processed. Many were traced to domestic farms or shippers and implicated to be contaminated by human pathogens (i.e. *Salmonella*, *E. coli*). In a few outbreaks, strains from consumer or foodservice packages genetically matched those of victims. Public warnings of health risks and media coverage of *E. coli* O157-H7 outbreaks on spinach and lettuce led to a crisis of confidence in the safety of our fresh produce. In addition to the concern for human health, recalls and litigation have cost the California leafy vegetable industry alone more than \$ 100 million and has impacted every sector of the industry. Uncertainties about our ability to prevent future contamination throughout the supply chain continue to haunt U.S. producers, processors, retailers, and regulators. There have been increasing calls for the government, produce associations, and food retailers to institute improved, science-based food safety standards and audit compliance programs. Public health regulators must develop, with industry and the scientific community, enhanced food supply chain protection programs to ensure early incidence detections, rapid identification of possible sources of contamination, and responsive communication with the public during an outbreak.

► **Problem:** Optimizing food safety with meaningful guidance, sound policy, and balanced enforcement criteria requires cooperative and coordinated interactions among all components of the food system. New fundamental and practical research is needed to identify best management practices and to investigate contamination routes, environmental survival, and interactions of human pathogens with plants.. Most studies have focused on postharvest elements, such as disinfection of fresh produce and produce handling systems. The effectiveness of potential risk reduction and prevention strategies remains unclear and largely empirical since we have insufficient knowledge about the interactions of food borne pathogens with one another, with plants, and with nonpathogenic microflora. While governmental regulations and guidelines have improved recently, evolving industry standards will rely increasingly on specific, relevant research. Regulatory decisions directed towards minimizing the contamination of fresh produce will integrate broad factors and needs but must be fundamentally science-based. Public education efforts also are needed to ensure food safety without sacrificing environmental stewardship or the sustainability of U.S. agricultural productivity.

► **Solution:** The 5,000-member American Phytopathological Society (APS), with 100 years of expertise on the complex relationships between microbes and plants and a professional focus on communication and knowledge dissemination, is a valuable scientific resource for governmental agencies (USDA, FDA, CDC, NSF), produce associations, and professional societies to address and design solutions to microbial contamination of food plants and to establish research and technology priorities. APS encourages the use of sound science and high quality data to ensure food safety.

The training and experience routinely applied by plant pathologists to understand the mechanisms of pathogen colonization and translocation within hosts, mechanisms of environmental dispersal, plant responses and strategies to defend themselves, and possible intervention strategies will be critical elements of a **balanced** program to minimize foodborne illnesses. Already, plant pathologists are contributing to needed research on human pathogen-plant interactions by applying modern plant pathology strategies for understanding host-pathogen interactions. However, more effective solutions will require the application of emerging research tools and strategies, as well as creative cross-disciplinary research efforts.

Recognizing that plant pathologists must work closely with those in the food industry, medical personnel, producers, policy-makers, and others to achieve our food safety goals, **we propose a national workshop** to bring these scientific and agricultural communities together to (1) identify the state of the art of plant-microbe interactions as it relates to food borne diseases; (2) delineate concrete scientific research priorities to address gaps in our knowledge of the interaction between food borne disease and plant-microbial relationships; (3) identify scientific resources needed to accelerate our understanding of biological underpinnings of the relationships between human pathogens and plants; and (4) identify strategies, including collaborative teams, to accomplish these research needs.

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