APS Research Priority Areas

The American Phytopathological Society (APS), founded in 1908, is the premier educational, professional, and scientific society dedicated to the promotion of plant health and plant disease management for the global good. The Society represents the interests of nearly 5,000 scientists whose research advances the understanding of the science of plant diseases and its application to plant health. We appreciate the opportunity to propose research and related areas of national interest that should be given priority. The APS will provide science-based information to stimulate an increase in funding to support research and education objectives.

Threatening/emerging plant diseases and crop biosecurity. The U.S. food and agriculture system, while highly efficient, is a 'soft target' and vulnerable to both the deliberate and unintentional introductions of plant pathogens capable of causing significant economic damage. Numerous plant pathogens and pests have been introduced into the U.S. over time by natural means, and in recent years, the threat of an intentional attack on our food, feed and fiber crops has increased significantly. In response, various governmental initiatives have enhanced our capabilities in detecting, monitoring, responding to and recovering from significant plant disease events. Federal funding has been instrumental in the development of these programs but continued funding well into the future is critical to the overall success in securing our food, feed and fiber production. APS supports the recent increases in research funding for the NRI program; however, increased funding in areas of plant disease diagnostics, forensics, epidemiology, identification and utilization of new disease resistance genes and discovery of novel pesticide chemistries and target sites is critical. This sector of federally funded research lags far behind its animal and human counterparts. APS applauds recent changes to the plant biosecurity program to broaden its scope and recommends increased funding in this crucial program.

Increased understanding of relationships between food-borne human pathogens and agricultural crops. In the last 10 years, the U.S. has experienced approximately 76 serious outbreaks of food-borne illness that resulted from contamination of fresh vegetables or produce with human pathogens (i.e. *Salmonella, E. coli*). The 2006 outbreak led to three human deaths, sickened over 200, caused approximately $74 million in economic losses, and resulted in reduced public confidence in the safety of fresh fruits and vegetables. Produce contamination is generally attributed to direct or indirect contact with pathogens during harvest or processing. However, growing evidence suggests that there may be a more intimate relationship between the human pathogens and plants in the field. Several food-borne bacteria are closely related to plant pathogenic bacteria and they may share some plant colonization characteristics and capabilities creating new pathways for survival, spread and disease. To ensure the safety of our food, research is needed to elucidate interactions between human pathogens and plants, develop new detection and identification techniques, and determine best management practices.

Genomics of crop plants and plant-associated microorganisms. The science of genomics is maturing as genome sequencing is becoming more rapid and economical; however, a paucity of agriculturally important plant and pathogen species has been sequenced to date. Understanding the molecular interaction between plants and the pathogens that attack them is paramount to elucidating mechanisms of pathogenesis and resistance and to the identification of new resistance genes and development of novel control strategies. The currently available genome information is not sufficient to allow full elucidation of key processes relevant to U.S. agriculture, such as resistance to biotic and abiotic stresses (i.e. drought, salinity) and nitrogen fixation, or to capture, understand and exploit the diversity that is inherent in plant and microbial genomes. Additionally, agriculture is vulnerable to genotype-specific attacks and more research into durable resistance is needed. To leverage the tools of the genomic revolution in agriculture, we need (1) primary sequence data of additional agriculturally-relevant plant and microbe species, (2) continued funding for functional genomics of relevant species, and (3) development of readily accessible data repositories and bioinformatic tools for data analysis. Continued support for the Microbial Genome Sequencing Program and the Microbial Observatories Program is critical to realizing the full potential of microbial genomics.

Education. In the next decade, the U.S. will face a critical shortage of broadly trained, Ph.D.-level agricultural scientists that will pose a serious threat to our nation's food production capabilities. Increased funding for graduate student and post-doctoral fellowships and novel approaches to curricula development are critical needs in order to train the next generation of plant pathologists. APS supports a new paradigm for graduate education in the agricultural sciences targeting the education of plant pathologists and related plant pest disciplines to ensure that the U.S. is able to adequately protect its domestic food production.

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