Genomics

Genomics of Agriculturally-Related Plants and Microbes: Ensuring Safe and Secure Food, Fiber and Natural Resources

A principal responsibility of government is to promote and ensure the availability of safe and secure food, fiber, feed, and natural resources. US agriculture is highly productive and the envy of the world due to scientific advances that resulted from past investments in agricultural research. *To ensure continued safety and security of our agricultural resources, novel solutions to new challenges must be explored and developed.* ***Investment in genomic analyses of agriculturally-related plants and microbes is needed to achieve these solutions.***

Situation: Recent funding in plant and microbial genomics has driven the development and application of tools for understanding basic biological processes. These advances, primarily due to federal research funding, are gaining momentum as increasing amounts of genomic information from important crop species and associated microbes are becoming available. However, while the previous research facilitated the development of resources that will allow us to begin to address basic processes relevant to crop production, the available genome information is not sufficient to allow full elucidation of key processes relevant to the biology of agriculturally important crops. Examples of these are key processes that control yield stability under biotic and abiotic stresses or that control the fixation and efficient use of nitrogen by economically important plants. Funding for structural and functional genomics of economically important plants is more important than ever as we try to meet demands for human and animal nutrition, bioenergy, and industrial feedstocks. For agriculture to take advantage of the genomics revolution, we need (1) high quality reference genome sequences of our major agriculturally-relevant plants and associated microbial species, (2) characterization of sequence variation from multiple varieties or isolates of these species, (3) continued efforts to determine the functions of genes specific to these species, and (4) mechanisms to educate consumers on how this information can be accessed and applied.

Solution: To ensure the sustainable production of healthy and safe crops, we must have a genomics-empowered foundation to spur the continued development of new crop varieties. *Continuing our investments in structural, functional and comparative genomic research of economically important plants and their associated microbes will allow us to create this critical foundation.*

Outcome: Genomics empowered understanding of the basic biology of plant and microbe survival and reproduction, and their interactions in agricultural environments that benefit or reduce plant yield or value. This foundation will advance the discovery of novel genes, molecules, or sequences and enable the development of new tools for the diagnosis and control of plant diseases. These insights will accelerate crop improvement and allow for continuing benefits to growers, consumers, and the US economy.

Specific Requests:
Maintain funding for genomics research on agriculturally related plants and microbes:
- Increase funding for the USDA funded Microbial Genome Sequencing Program
- Utilize NSF stimulus funding to reinstate the $5 million annual NSF contribution to the joint Microbial Genome Sequencing Program
- Increase funding for functional genomics and comparative analysis of plant-associated microbes through NSF programs
- Increase funding applied genomics through AFRI Applied Plant Genomics, Coordinated Agricultural Projects (CAP) and Plant Genome, Genetics, and Breeding programs
- Increase interagency funding for high quality sequences of agriculturally relevant plant and microbial genomics programs (DOE, NSF, USDA-ARS, USDA-CRSEES, and NIH)

Contacts: APS PPB members **Jan Leach** (jeleach@lamar.colostate.edu), **Scot Hulbert** (scot_hulbert@wsu.edu) and APS PPB Chair **Jacque Fletcher** (jacqueline.fletcher@okstate.edu) are available to answer any additional questions.

APS
PUBLIC POLICY
BOARD