



# Genomics

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

One of the principal responsibilities 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 the 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.*

**The Situation:** Recent funding in plant and microbial genomics has driven the development and application of tools for understanding the functions and regulation of genes. These advances, primarily due to federal research funding, are gaining traction, and increasing numbers of genome sequences of important crop species and associated microbes are becoming available. However, while these sequences have facilitated greatly the development of resources that will allow us to begin to address biological function and some basic processes relevant to crop production, the available genome information is not sufficient to allow full elucidation of key processes relevant to US agriculture, such as resistance to biotic and abiotic stresses and nitrogen fixation, or to capture, understand, and use the diversity that is inherent in plant and microbial genomes. Current funding in genomics of economically important plants is not sufficient to understand the biological contexts in which expression of these genes or groups of genes is relevant to agriculture, particularly in intimate interactions between the plants and microbes. To leverage the tools of the genomics revolution in agriculture, we need (1) the primary sequence data of additional agriculturally-relevant plant and microbial species, including multiple isolates of a species, (2) continued funding for functional genomics of agriculturally relevant species, (3) education, and (4) the development of readily accessible data repositories and tools for data analyses.

**The Solution:** To ensure the sustainable production of healthy and safe crops, we must have in place a genomics empowered foundation to spur the continued development of new crop varieties. *Expanding our investments in plant and microbial genomics to include sequencing and functional genomics of agriculturally-important plants and 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 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:

- **Increase funding for genomics research on agriculturally related plants and microbes.**  
Some means to accomplish this are to:
  - Ensure that USDA and NSF continue to provide funding for the Microbial Genome Program
  - Increase interagency funding on agriculturally relevant plant and microbial genomics programs (DOE, NSF, USDA-ARS, USDA-CRSEES, and NIH)
  - Support increased funding for agriculturally relevant plant and microbial genomics programs in the NSF and USDA annual appropriations bills
  - Include agriculturally relevant plant and microbial genomics programs as a priority in any mandatory funding research programs included in farm bill or disaster assistance legislation.
- **Ensure the status of the NRI as the premiere USDA program for competitive agricultural research funding to address our needs and voids in agricultural knowledge.**
  - Increase NRI funding to enable the NRI to expand funding opportunities for critical research initiatives such as plant and microbial genomics, sustainable agriculture, and crop biosecurity
- **Support increased funding for the NSF Plant Genome Research Program (PGRP)**
- **Retain the requirement for the NSF PGRP to be for economically important plants by opposing any effort to (1) remove this requirement; (2) merge the Arabidopsis 2010 program with the NSF PGRP; or (3) use funding from the PGRP for the Arabidopsis 2010 program.**
  - Continue to provide funding for the Arabidopsis 2010 program out of the core funds for the Biological Directorate at NSF as Congress intended.
- **Provide funding for a workshop to provide recommendations to DOE, NSF, and USDA on current and anticipated needs for agriculturally relevant microbial genomics programs.**

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