



# 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.*

► **Situation:** Recent funding in plant and microbial genomics has driven the development and application of tools for understanding their basic biological processes. These advances, primarily due to federal research funding, are gaining momentum, and increasing amounts of genomic information from important crop species and associated microbes are becoming available. However, while the previous projects have facilitated greatly 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. For example, 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 agriculture is trying to meet demands for human and animal nutrition, bioenergy, and industrial feedstocks. For agriculture to take advantage of the genomics revolution, we need (1) the primary sequence data 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 in place a genomics empowered foundation to spur the continued development of new crop varieties. *Continuing our investments in structural and functional 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 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 by:
- Ensuring that NSF restores its support at \$10 million for the joint NSF/USDA funded Microbial Genome Sequencing Program and that the USDA continues its funding support for the program
  - Ensuring that the integrity of the NSF Plant Genome Research Program (PGRP) as envisioned by Congress is maintained by restoring the requirement for funding to be only for research on economically important plants and by continuing to support the development of the fundamental resources necessary for advancing our understanding of agriculturally relevant plant species
  - Opposing any effort to modify the eligibility for the PGRP by allowing the use of model systems, such as *Arabidopsis thaliana*
  - Continuing to provide funding for the *Arabidopsis 2010* program and other genomics research on model systems out of the core funds for the Biological Directorate at NSF as Congress intended.
  - Increasing interagency funding on agriculturally relevant plant and microbial genomics programs (DOE, NSF, USDA-ARS, USDA-CRSEES, and NIH)

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