



# American Society of Plant Biologists

*Cultivating a better future through plant biology research*

## **Official Written Testimony in support of the National Science Foundation's Fiscal Year 2013 Budget**

Submitted to the Subcommittee on Commerce, Justice, Science, and  
Related Agencies  
Committee on Appropriations  
U.S. House of Representatives  
Washington, D.C.

Submitted by

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and  
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March 16, 2012

On behalf of the American Society of Plant Biologists (ASPB), we submit this testimony for the official record to support the requested level of \$7.373 billion for the National Science Foundation (NSF) for Fiscal Year (FY) 2013. ASPB and its members recognize the difficult fiscal environment our nation faces, but believe that investments in scientific research will be a critical step toward economic recovery and continued global competitiveness.

ASPB would like to thank the Subcommittee for its consideration of this testimony and for its strong support for the research mission of NSF.

Our testimony will discuss:

- Plant biology research as a foundation for addressing food, fuel, environment, and health concerns;
- The rationale for robust funding for NSF to maintain a well-proportioned science portfolio with support for all core science disciplines, including biology; and
- The rationale for continued funding of NSF education and workforce development programs that provide support for the future scientific and technical expertise critical to America's competitiveness.

ASPB is an organization of approximately 5,000 professional plant biology researchers, educators, graduate students, and postdoctoral scientists with members in all 50 states and throughout the world. A strong voice for the global plant science community, our mission—achieved through work in the realms of research, education, and public policy—is to promote the

growth and development of plant biology, to encourage and communicate research in plant biology, and to promote the interests and growth of plant scientists in general.

### **Food, Fuel, Environment, and Health: Plant Biology Research and America's Future**

Plants are vital to our very existence. They harvest sunlight, converting it to chemical energy for food and feed; they take up carbon dioxide and produce oxygen; and they are the primary producers on which all life depends. Indeed, plant biology research is making many fundamental contributions in the areas of energy security and environmental stewardship; the continued and sustainable development of better foods, fabrics, and building materials; and in the understanding of biological principles that underpin improvements in the health and nutrition of all Americans.

In particular, plant biology is at the interface of numerous scientific breakthroughs. For example, with high throughput experimental approaches facilitating extraordinary syntheses of information that are supported by the National Science Foundation, plant biologists are using computer science applications to make tremendous strides in our understanding of complex biological systems, ranging from single cells to entire ecosystems. Understanding how plants work will ultimately result in better and more productive crops, new sources of fuel, and the development of better medicines to treat diseases like cancer.

Despite the fact that foundational plant biology research—the kind of research funded by NSF—underpins vital advances in practical applications in agriculture, health, energy, and the environment, the amount of money invested in understanding the basic function and mechanisms of plants is surprisingly small. This is especially true considering the significant positive impact plants have on the nation's economy and in addressing some of our most urgent challenges, including food and energy security.

Understanding the importance of these areas and in order to address future challenges, ASPB organized the Plant Science Research Summit held in September 2011. With funding from the National Science Foundation, U.S. Department of Agriculture, Department of Energy, and the Howard Hughes Medical Institute, the Summit brought together representatives from across the full spectrum of plant science research to identify critical gaps in our understanding of plant biology that must be filled over the next ten years or more in order to address the grand challenges facing our nation and our planet. The grand challenges identified at the Summit include:

- 1) In order to feed everyone well, now and in the future, advances in plant science research will be needed for higher yielding, more nutritious varieties able to withstand a variable climate.
- 2) Innovations leading to improvements in water use, nutrient use, and disease and pest resistance that will reduce the burden on the environment are needed and will allow for increases in ecosystem services, such as cleaner air, cleaner water, fertile soil, and biodiversity benefits like pest suppression and improved pollination.
- 3) To fuel the future with clean energy, improvements in current biofuels technologies, including breeding, crop production methods, and processing that will help meet our nation's fuel requirements for the future are needed.

- 4) For all the benefits that advances in plant science bestow – in food and fiber production, ecosystem and landscape health, and energy subsistence – to have lasting, permanent benefit they must be economically, socially, and environmentally sustainable.

In spring 2012, a report from the Plant Science Research Summit will be published. This report will further detail priorities and needs to address the grand challenges.

### **Robust Funding for the National Science Foundation**

The FY 2013 NSF budget request would fund the NSF at \$7.373 billion. ***ASPB supports this request and encourages proportional funding increases across all scientific disciplines supported by the NSF.*** As scientific research becomes increasingly interdisciplinary with permeable boundaries, a diverse portfolio at the NSF is needed to maintain transformational research and innovation.

NSF funding for plant biology specifically enables the scientific community to address cross-cutting research questions that could ultimately solve grand challenges related to a sustainable food supply, energy security, and improved health. This idea is reflected in the National Research Council's report *A New Biology for the 21st Century* and will be addressed comprehensively in the Plant Science Research Summit's report.

The NSF Directorate for Biological Sciences (BIO) is a critical source of funding for scientific research, providing 62 percent of the federal support for non-medical basic life sciences research at U.S. academic institutions and beyond. BIO supports research ranging from the molecular and cellular levels to the organismal, ecosystem, and even biosphere levels. These investments continue to have significant pay offs, both in terms of the knowledge directly generated and in deepening collaborations and fostering innovation among communities of scientists.

The Biological Sciences Directorate's Plant Genome Research Program (PGRP) is an excellent example of a high impact program that has laid a strong scientific research foundation for understanding plant genomics as they relate to energy (biofuels), health (nutrition and functional foods), agriculture (impact of changing climates on agronomic ecosystems), and the environment (plants' roles as primary producers in ecosystems). ***The American Society of Plant Biologists asks that the PGRP be funded at the highest possible level and have sustained funding growth over multiple years to address 21st Century Challenges.***

Without significant and increased support for BIO and the NSF as a whole, promising fundamental research discoveries will be delayed and vital collaborations around the edges of scientific disciplines will be postponed, thus limiting the ability to respond to the pressing scientific problems that exist today and the new challenges on the horizon. Addressing these scientific priorities also helps improve the competitive position of the United States in a global marketplace.

## Continued Support for NSF Education and Workforce Development Programs

The National Science Foundation is a major source of funding for the education and training of the American scientific workforce and for understanding how educational innovations can be most effectively implemented. The NSF's education portfolio impacts students at all levels, including K–12, undergraduate, graduate, and postgraduate. Importantly, the Foundation also offers programs focused on outreach to and engagement of underrepresented groups and of the general public.

The Integrative Graduate Education and Research Traineeship (IGERT) program is just one example of NSF's commitment to education. IGERT is successful in fostering the development of novel programs that provide multidisciplinary graduate training. As discussed above, it is at the intersections of traditional disciplines that the greatest opportunities for scientific advancement can be found. *The American Society of Plant Biologists encourages expansion of the IGERT program in order to foster the development of a greater number of innovative science leaders for the future.*

Furthermore, *ASPB urges the Subcommittee to support the FY 2013 request to expand NSF's fellowship and career development programs—such as the Postdoctoral Research Fellowships in Biology, the Graduate Research Fellowship (GRF) and the Faculty Early Career Development (CAREER) programs—*thereby providing continuity in funding opportunities for the country's most promising early career scientists. Additionally, such continuity and the broader availability of prestigious and well-supported fellowships may help retain underrepresented groups in the science, technology, engineering, and mathematics (STEM) fields. *ASPB further encourages the NSF to develop "transition" awards that will support the most promising scientists in their transition from postdoctoral research to full-time, independent, tenure-track positions in America's universities.* The NSF might model such awards after those offered by the National Institutes of Health and initially championed by private philanthropies such as the Burroughs Wellcome Fund.

ASPB urges support for NSF to further develop programs aimed at increasing the diversity of the scientific workforce by leveraging professional scientific societies' commitment to provide a professional home for scientists throughout their education and careers and to help promote and sustain broad participation in the sciences. Discreet focused training and infrastructure support programs for Hispanic Serving Institutions, Historically Black Colleges and Universities, and Tribal Colleges and Universities remain vitally important, as they foster a scientific workforce that reflects the U.S. population.

ASPB urges support for education research that enhances our understanding of how educational innovations can be sustainably implemented most effectively in a variety of settings. NSF programs such as Transforming Undergraduate Education in STEM, Discovery Research K–12, and Widening Implementation and Demonstration of Evidence-based Reforms (WIDER) provide opportunities to expand NSF's research and evaluation efforts to address scale-up and sustainability. Additionally, investigating and supporting effective approaches toward rolling out across the K-16 continuum the new vision for undergraduate biology education articulated in the 2010 Vision and Change report are particularly valuable. Increasingly, the challenge is not only

to understand what works but to determine how it can be best put into practice. *ASPB encourages continued support for education research programs within NSF's Education and Human Resources portfolio with a focus on understanding how previous investments in educational strategies can be made most effective.*

Grand research challenges will not be resolved in a year, an administration, or a generation, but will take continued attention and investment at federal research agencies, such as the National Science Foundation, over decades.

Thank you for your consideration of our testimony on behalf of the American Society of Plant Biologists. Please do not hesitate to contact the American Society of Plant Biologists if we can be of any assistance in the future.

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