

PLANT GENOME AND BIOTECHNOLOGY DEVELOPMENT

APRIL 30, 2002.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BOEHLERT, from the Committee on Science, submitted the following

R E P O R T

[To accompany H.R. 2051]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, to whom was referred the bill (H.R. 2051) to provide for the establishment of regional plant genome and gene expression research and development centers, having considered the same, report favorably thereon with amendments and recommend that the bill as amended do pass.

CONTENTS

	Page
I. Amendment	2
II. Purpose of the Bill	3
III. Background and Need for the Legislation	3
IV. Summary of Hearings	5
V. Committee Actions	6
VI. Summary of Major Provisions of the Bill	6
VII. Section-By-Section Analysis (By Title and Section)	7
VIII. Committee Views	8
IX. Cost Estimate	10
X. Congressional Budget Office Cost Estimate	11
XI. Compliance with Public Law 104-4 (Unfunded Mandates)	12
XII. Committee Oversight Findings and Recommendations	13
XIII. Statement on General Performance Goals and Objectives	13
XIV. Constitutional Authority Statement	13
XV. Federal Advisory Committee Statement	13
XVI. Congressional Accountability Act	13
XVII. Statement on Preemption of State, Local, or Tribal Law	13
XVIII. Changes in Existing Law Made by the Bill, As Reported	13
XIX. Committee Recommendations	13
XX. Proceedings of Subcommittee Markup	14
XXI. Proceedings of Full Committee Markup	28

I. AMENDMENT

The amendments are as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. DEFINITIONS.

In this Act—

- (1) the term “Director” means the Director of the National Science Foundation;
- (2) the term “institution of higher education” has the meaning given such term in section 101 of the Higher Education Act of 1965 (20 U.S.C. 1001); and
- (3) the term “nonprofit organization” means a nonprofit research institute or a nonprofit association with experience and capability in plant biotechnology research as determined by the Director.

SEC. 2. MATCHING FUNDS.

The Director may establish matching fund requirements for grantees to receive grants under this Act.

SEC. 3. PLANT GENOME AND GENE EXPRESSION RESEARCH CENTERS.

(a) **IN GENERAL.**—The Director shall award grants to consortia of institutions of higher education or nonprofit organizations (or both) to establish regional plant genome and gene expression research centers. Grants shall be awarded under this section on a merit-reviewed, competitive basis. When making awards, the Director shall, to the extent practicable, ensure that the program created by this section examines as many different agricultural environments as possible.

(b) **PURPOSE.**—The purpose of the centers established pursuant to subsection (a) shall be to conduct research in plant genomics and plant gene expression. A center’s activities may include—

- (1) basic plant genomics research and genomics applications, including those related to cultivation of crops in extreme environments and to cultivation of crops with reduced reliance on fertilizer;
- (2) basic research that will contribute to the development or use of innovative plant-derived products;
- (3) basic research on alternative uses for plants and plant materials, including the use of plants as renewable feedstock for alternative energy production and nonpetroleum-based industrial chemicals and precursors; and
- (4) basic research and dissemination of information on the ecological and other consequences of genetically engineered plants.

SEC. 4. PARTNERSHIPS FOR PLANT BIOTECHNOLOGY IN THE DEVELOPING WORLD.

(a) **IN GENERAL.**—(1) The Director shall award grants to institutions of higher education, nonprofit organizations, or consortia of such entities to establish research partnerships for supporting the development of plant biotechnology targeted to the needs of the developing world. The Director, by means of outreach, shall encourage inclusion of Historically Black Colleges or Universities, Hispanic-serving institutions, or tribal colleges or universities in consortia that enter into such partnerships.

(2) In order to be eligible to receive a grant under this section, an institution of higher education or eligible nonprofit organization (or consortium thereof) shall enter into a partnership with one or more research institutions in one or more developing nations and may also include for-profit companies involved in plant biotechnology.

(3) Grants under this section shall be awarded on a merit-reviewed competitive basis.

(b) **PURPOSE.**—Grants awarded under this section shall be used for support of research in plant biotechnology targeted to the needs of the developing world. Such activities may include—

- (1) basic genomic research on crops grown in the developing world;
- (2) basic research in plant biotechnology that will advance and expedite the development of improved cultivars, including those that are pest-resistant, produce increased yield, reduce the need for fertilizers, or increase tolerance to stress;
- (3) basic research that could lead to the development of technologies to produce pharmaceutical compounds such as vaccines and medications in plants that can be grown in the developing world; and
- (4) research on the impact of plant biotechnology on the social, political, economic, and environmental conditions in countries in the developing world.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated to the National Science Foundation \$9,000,000 for fiscal year 2002, \$13,500,000 for fiscal year 2003, and \$13,500,000 for fiscal year 2004 to carry out this Act.

Amend the title so as to read:

A bill to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and international research partnerships for the advancement of plant biotechnology in the developing world.

II. PURPOSE of the BILL

The purpose of the bill is to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and to provide grants to establish international research partnerships for the advancement of plant biotechnology in the developing world.

III. BACKGROUND and NEED for the LEGISLATION

Basic research on plant biotechnology.—The National Science Foundation (NSF) has been at the forefront of research aimed at better understanding the molecular, genetic, and biochemical nature of plants. Developments based on this research have driven progress in the field of agricultural biotechnology—and thus are of tremendous interest to the agricultural community. NSF-funded research in this area, however, is in keeping with the agency’s mission of basic research and therefore has focused primarily on efforts to better understand the fundamental biology of plants.

One area of particular focus for NSF has been study of the plant *Arabidopsis thaliana*, which is a relative of plants such as broccoli and cauliflower. *Arabidopsis* has been used by scientists as a model organism for plant biology studies for many years, and an effort to sequence the entire *Arabidopsis* genome—analogous in many ways to the Human Genome Project—was completed in December 2000. That effort, part of NSF’s Plant Genome Research Program, involved the work of a consortium of scientists from six different countries. NSF led the effort for the United States with support from the Department of Agriculture (USDA) and the Department of Energy (DOE).

While having the complete DNA sequence of an organism is an important step in understanding how that organism functions, just knowing the sequence of all of an organism’s genes is not enough to gain a full understanding of the organism. Central to scientists’ efforts to better understand plants is a clearer understanding of what individual genes in the organism actually do—information that cannot be derived from DNA sequences alone. NSF recently launched a research program to determine the functions of all 25,000 *Arabidopsis* genes—the “2010 Project”, which began in FY 2001. Better understanding the specific roles of various plant genes and how they contribute to the overall function of the plant provides the foundation for all aspects of plant biotechnology.

The promise of a program such as NSF’s 2010 Project is in its ability to harness fundamental knowledge to solve additional research questions and, eventually, to help solve problems related to plant production and utilization. While understanding the biology of *Arabidopsis* will provide insight into the basic genetics and phys-

iology of all plants, additional research is required to better understand the unique features of more complex plants including commercially-valuable crop plants such as corn and wheat. H.R. 2051 would expand NSF's support of genomics research to include new agriculturally important species and applications of the knowledge derived from studies of genomics.

Food for the Developing World.—The “Green Revolution” of the 1960's is credited with saving a billion lives through the implementation of novel agricultural technologies—selective breeding and hybridization techniques, the introduction of inorganic fertilizers, and utilization of controlled irrigation procedures—in parts of the developing world. The Green Revolution, however, was not a permanent solution to feeding the ever-increasing world population. In his acceptance speech for the 1970 Nobel Peace Prize, Dr. Norman Borlaug cautioned that the Green Revolution had only “won a temporary success in man's war against hunger”, given the globe's burgeoning population. While the world's population has grown significantly over the past four decades, natural resources and cropland have not. In addition, subsistence farming has led to mineral depletion, erosion, and increased salinity or acidity of much of that land. While technological developments have resulted in improved crop yields, many people in the developing world still go hungry every day.

Biotechnology has already shown promise for producing plants that are more tolerant to drought or high soil salt levels, can resist insect, fungal, and viral infections, and improve the nutritional content of food. Also, since some staple crops of the African diet, such as the cassava tuber, have little or no nutritive value, enhancing the nutritional content of food could be a key weapon in the fight against malnutrition and disease. For example, the “golden rice” project, which involved the incorporation of genes able to lead to the production of vitamin A in rice, created a nutritionally-enhanced plant that could potentially reduce the effects—such as blindness—of endemic vitamin A deficiency in the developing world. Other nutritionally-enhanced food products, such as those with increased levels of cancer-fighting compounds, for example, could also potentially be produced. Beyond plant-based production of pharmaceuticals, researchers are also using biotechnology to develop foods that are a direct source of edible vaccines. These vaccines are genetically incorporated into food plants, need no refrigeration, and require no sterilization equipment or needles for delivery. Such a vaccine delivery system could overcome many of the health care and transportation infrastructure limitations in many parts of the developing world.

Federal funding for genomic research on developing world crops, or so called “orphan crops”, will play a important role in the development of agricultural biotechnology in the developing world. Private companies have contributed a great deal to the advancement of agricultural biotechnology, but their focus has been on commodities that are grown in temperate climates, such as corn and soybeans. Little research has been done on orphan crops because private companies have very little incentive to invest in products that will not bring a financial return. While not a solution in itself in combating many of the problems of the developing world, public funding for genomic and biotechnology research on developing

world crops will serve as a catalyst in helping the technology reach its potential in fighting hunger, malnutrition and disease.

Research on risks associated with agricultural biotechnology.—Balancing these promising technological developments, however, are concerns that the introduction of new compounds to a given plant could upset the biochemical balance of the plant in a way that renders the plant harmful for human consumption. Additional research, including that aimed at better understanding the underlying biology of plants and the effects of introducing new biochemical pathways, will continue to develop our ability to assess any risks to the environment or to human health that these new varieties may pose.

Other potential risks to the environment exist as well. Transmission of unwanted genetic traits from modified crop plants to nearby plant relatives, adverse impacts on insect populations that feed on modified plants, more rapid acquisition of resistance to pesticides by insect pests, and other ecological concerns will require additional assessment.

Beyond technological concerns, socioeconomic issues associated with the development and use of these new technologies in developing countries exist as well. For example, these countries typically do not have national regulatory bodies that review genetically altered crops to determine whether their introduction is appropriate.

The programs authorized by H.R. 2051 will enable researchers to build on our current knowledge base and accelerate the development of this promising technology while continuing to address concerns related to its safety.

IV. SUMMARY OF HEARINGS

During the 106th Congress, the Subcommittee on Basic Research of the Committee on Science held a series of hearings and briefings aimed at understanding agricultural biotechnology and its implications. The Subcommittee received testimony and information from leading scientists and other interested parties from around the world, on all sides of the issue. Hearings examined the wide range of benefits, potential risks, and the regulatory framework that oversees the development of new plant biotechnology products as they progress from the laboratory to the marketplace.

In the 107th Congress, the Subcommittee on Research of the Committee on Science held a June 6, 2001 hearing on NSF's Fiscal Year 2002 Research and Related Activities Budget Request. In addition to the budget overview, the Subcommittee received testimony on the process by which NSF establishes programmatic and budget priorities as exemplified by the Plant Genome Research Program and Project 2010.

On September 25, 2001, the Research Subcommittee held a hearing on H.R. 2051 and H.R. 2912. The Subcommittee heard from witnesses with expertise on the scientific, technical, political, and economic issues related to plant biotechnology and the application of transgenic crops in the developed and the developing world. The witnesses discussed current advances and concerns, as well as future needs, in plant genomics and related research. They also discussed the role that the National Science Foundation should play in plant biotechnology research and provided views and recommendations on H.R. 2051 and H.R. 2912. The witnesses empha-

sized the potential for biotechnology to raise living standards in third world countries through the development of drought tolerant, insect resistant, and higher yielding crop varieties, and to fight disease through the development of edible vaccines and medicines for afflictions such as enteric diseases.

V. COMMITTEE ACTION

On June 5, 2001, Science Subcommittee on Research Chairman Nick Smith introduced H.R. 2051, a bill to provide for the establishment of regional plant genome and gene expression research and development centers.

The Subcommittee on Research met on December 12, 2001, to consider the bill. Subcommittee Chairman Smith and the ranking member, Eddie Bernice Johnson, offered an en bloc amendment. In addition to making technical corrections to the bill, the amendment incorporated the major provisions of H.R. 2912, a bill to establish plant biotechnology partnerships with the developing world, introduced by Rep. Eddie Bernice Johnson. The amendment also (1) dropped the requirement that NSF could not contribute more than 50 percent of the funds needed to establish plant genome and gene expression centers; and (2) combined the authorization amounts of H.R. 2051 and H.R. 2912 into one authorization amount for carrying out the provisions of the bill. The amendment was adopted by voice vote. With a quorum present, Ms. Johnson moved that the Subcommittee favorably report the bill, H.R. 2051, as amended, to the Full Committee on Science with the recommendation that it be in order for the amendment, in the nature of a substitute adopted by the Subcommittee, to be considered as an original bill for the purpose of amendment at Full Committee, and that the staff be instructed to make technical and conforming changes to the bill as amended. The motion was agreed to by a voice vote.

On March 20, 2002, the Full Committee met to consider the bill, H.R. 2051, as reported by the Subcommittee on Research. With a quorum present, Ms. Johnson moved that the Committee report the bill, H.R. 2051, as amended, to the House, that the staff prepare the legislative report and make technical and conforming changes, and that the Chairman take all necessary steps to bring the bill before the House for consideration. The motion was agreed to by voice vote.

VI. SUMMARY OF MAJOR PROVISIONS OF THE BILL

H.R. 2051 authorizes NSF to award grants to institutions of higher education to establish regional plant genome and gene expression research centers. Research activities at the Centers may include basic research into (1) basic plant genomics or genomics applications; (2) the development or use of innovative plant derived products; (3) alternative uses for plants and plant materials; and (4) the ecological and other effects of genetically engineered plants.

The Act also authorizes NSF to award grants to institutions of higher education to establish research partnerships for supporting plant biotechnology targeted to the needs of the developing world. The plant biotechnology partnerships will be used to support basic research activities that may include basic research on (1) genomes of crops grown in the developing world; (2) the development of

pharmaceutical compounds such as plant vaccines and medications; and (4) the impact of plant biotechnology on the social, political, economic, and environmental conditions in countries in the developing world.

Both programs are authorized at \$9 million for FY 2002, \$13.5 million for FY 2003, and \$13.5 million for FY 2004.

VII. SECTION-BY-SECTION ANALYSIS

Sec. 1. Definitions

Defines “Director”, as the Director of the National Science Foundation (NSF). Uses the definition for ‘institution of higher education’ found in the Higher Education Act of 1965. Defines “non-profit organization” as a nonprofit research institute or a nonprofit association with experience and capability in plant biotechnology research as determined by the Director.

Sec. 2. Matching funds

Allows NSF to establish a matching funds requirement for grantees to receive grants.

Sec. 3. Plant genome and gene expression research centers

Establishes a merit-based, competitive program at NSF to provide grants to consortia of institutions of higher education or non-profit organizations, or both to develop regional plant genome and gene expression research centers. These centers would conduct research in plant genomics and plant gene expression. Research activities could include: (1) Basic plant genomics research and applications related to the development and testing of new varieties of enhanced crops, including those grown in extreme environments and those grown with reduced reliance on fertilizer; (2) basic research related to the development of innovative, plant-derived products; (3) basic research on alternative uses of plants or plant material including the use of plants as renewable feedstock for energy production; and (4) basic research and dissemination of information on the ecological and other consequences of genetically engineered plants.

Sec. 4. Partnerships for plant biotechnology in the developing world

Establishes a merit-based, competitive program at NSF to provide grants to institutions of higher education, non-profit organizations, or consortia thereof, to develop research partnerships supporting plant biotechnology targeted to the needs of the developing world. Consortia may also include for-profit companies. The Director is encourage, by means of outreach, the inclusion of Historically Black Colleges or Universities, Hispanic-Serving Institutions, or Tribal Colleges in the consortia. In order to receive grants, the grantee must have entered into a partnership with one or more research institutions in a developing nation. Research undertaken by the partnerships could include (1) basic genomic research on crops grown in the developing world; (2) basic research in plant biotechnology that improves plant tolerance, increases yield, or reduces the need for fertilizers; (3) basic research that could lead to the development of technologies to produce vaccine and pharmaceutical products in plants grown in the developing world; and (4)

research on the social, political, economic, and environmental impact of plant biotechnology in the developing world.

Sec. 5. Authorization of appropriations

Authorizes \$9 million for FY 2002, \$13.5 million for FY 2003, and \$13.5 million for FY 2004 to carry out the Act.

VIII. COMMITTEE VIEWS

The Committee on Science believes that advancements in plant biotechnology hold great promise as a tool to alleviate poverty and hunger, improve general health and well-being, protect the environment, and address a wide variety of problems both in the United States and around the world. However, the Committee also recognizes that, as a relatively new technology, many questions remain concerning the safety of genetically modified organisms. This Act is designed to utilize NSF's ability to harness the fundamental knowledge needed to address these challenges and concerns.

Building on NSF's proven capacity to engage the academic research community, the Act authorizes NSF to fund new centers for plant genomics and gene expression research and develop new plant biotechnology research partnerships with the developing world. Both programs will take advantage of NSF's standard competitive peer-review process.

PLANT GENOME AND GENE EXPRESSION CENTERS

NSF currently supports 23 Plant Genome Virtual Centers that allow researchers from multiple disciplines and from different institutions to work together to access data and study complex questions related to plant genomics. Virtual centers bring together researchers with diverse expertise, including traditional plant breeding research, molecular biology, information technology, and agronomy, among many others. It is the Committee's intention that the plant genome and gene expression centers will expand upon the same multidisciplinary, interactive approach exemplified by the Plant Genome Virtual Centers.

The Committee wishes to stress that the term "plant genomics and gene expression research" is meant to be interpreted broadly, and may encompass basic research in fields such as molecular biology, genetics, biochemistry, plant reproduction and pathology, bioinformatics, and many others, provided that the research is directly aimed at advancing plant biotechnology.

Regarding specific research activities to be conducted at the centers:

Section 3(b)(1): It is the Committee's intention that research activities relating to the development of crops with reduced reliance on fertilizers may include research into enhancing the nitrogen-fixing ability of legumes and developing commercial varieties of non-legumes that are able to fix nitrogen. The primary input required for nitrogen fertilizer production is natural gas; in fact, fertilizer manufacturing consumes about 6 percent of all U.S. natural gas production. The Committee believes that potential exists for plant biotechnology developments in this area to reduce agricultural input costs while also reducing energy dependence.

Section 3(b)(2): Early plant biotechnology development efforts were primarily focused on improving the production quantity and quality of plant-derived foods, and involved generation of pest-resistant and herbicide-tolerant plants, for example. Today, in addition to plant varieties with enhanced nutritional properties or other desirable characteristics, a growing sub-field of the science is focusing on innovative uses for plant products. For example, plants can be engineered to produce compounds such as enzymes used in food processing, vaccines and antibodies for the pharmaceutical industry, and compounds used to produce biodegradable plastics. The Committee encourages plant genome and gene expression centers to conduct fundamental research that may address questions related to these types of applications.

Section 3(b)(3): In future decades, worldwide energy demand will continue to increase significantly, primarily due to population growth and increases in per capita energy consumption that accompany higher living standards throughout the world. Alternative renewable energy sources hold promise to help meet this increased demand. For example, renewable feedstocks have received significant attention as an alternative to current hydrocarbon-based energy sources. While the technological process currently exists to manufacture feedstock-based fuel, biotechnology advancements in feedstock production, pretreatment, fermentation, and distillation could help to make this process more economically feasible. The Committee encourages plant genome and gene expression centers to conduct fundamental research into these areas, and expects that NSF would coordinate this biotechnology research with other government agencies, such as the U.S. Departments of Agriculture and Energy, that are also engaged in this type of research.

Section 3(b)(4): The Committee understands that plant biotechnology, since its inception, has been the subject of significant debate. It is clear that there are real and extensive risks and uncertainties associated with this technology. For instance, concerns exist that the introduction of new compounds to a given plant could upset the biochemical balance of the plant in a way that renders the plant harmful for human consumption. Others have expressed concern that genetically engineered “plant pesticides,” such as those carrying the Bt gene, which causes plants to release a toxin that defends it from insects and other pests, could be harmful to human health and/or the environment. Other uncertainties remain regarding the safety of biotechnology, including questions related to the long-term environmental and human health effects of consuming biotech foods, and the potential that new allergens may be introduced into the food chain.

The Committee believes that research on the ecological and other consequences of genetically engineered plants is an important component of the overall research effort, and encourages NSF to fund research on these important issues as part of the work of the centers authorized by this Act. The Committee also believes that the centers should, through outreach and other means of informal education, strive to communicate scientific information on these risks to the public.

PLANT BIOTECHNOLOGY PARTNERSHIPS WITH THE DEVELOPING WORLD

More people die worldwide each year from famine and diseases related to malnutrition than from all other diseases combined. In March of 2002, the World Health Organization and the United Nations Children's Fund reported that 8 million babies, more than half in the first month of life, die each year. Malnutrition is responsible for sixty percent of these deaths. In other words, 9 babies perish due to hunger each minute. Clearly, successfully combating hunger and malnutrition has significant potential to raise standards of living and increase life expectancy in developing countries. Through the development of new crops that produce increased yields, reduce the need for fertilizer inputs, and help plants withstand stress conditions such as drought and high salinity levels, plant biotechnology holds great promise as a tool to improve life in these countries. Understanding this, the committee intends that the Plant Biotechnology Partnerships for the Developing World program will provide the fundamental research needed to build on the current plant biotechnology knowledge base to address specific agricultural problems in the developing world.

In addition to the need for this technology, researchers in developing countries need technical assistance to fully understand the benefits and risks and be able to implement plant biotechnology. The Committee envisions that the partnership program will meet this need, supporting scientists at U.S. institutions working in concert with scientists from developing nations. Many developing nations have established agricultural research centers that focus on developing world crops and will make significant contributions to plant biotechnology research done in the U.S., while continuing to develop their own scientific capacity.

The Committee is aware that minority-serving institutions of higher education also have developed substantial research capabilities in the area of plant biotechnology. The Committee expects the Director to take active steps, including through workshops and symposia, to inform Historically Black Colleges and Universities, Hispanic-serving Institutions, and tribal colleges and universities about the opportunities for research awards under the program established by this legislation and to encourage the inclusion of such institutions in the research partnerships under section 4.

IX. COST ESTIMATE

Rule XIII, clause 3(d)(2) of the House of Representatives requires each committee report accompanying each bill or joint resolution of a public character to contain: (1) an estimate, made by such committee, of the costs which would be incurred in carrying out such bill or joint resolution in the fiscal year (or for the authorized duration of any program authorized by such bill or joint resolution, if less than five years); (2) a comparison of the estimate of costs described in subparagraph (1) of this paragraph made by such committee with an estimate of such costs made by any government agency and submitted to such committee; and (3) when practicable, a comparison of the total estimated funding level for the relevant program (or programs) with the appropriate levels under current law. However, House Rule XIII, clause 3(d)(3)(B) provides that this requirement does not apply when a cost estimate and comparison

prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted prior to the filing of the report and included in the report pursuant to House Rule XIII, clause 3(c)(3). A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted to the Committee on Science prior to the filing of this report and is included in Section X of this report pursuant to House Rule XIII, clause 3(c)(3).

Rule XIII, clause 3(c)(2) of the House of Representatives requires each committee report that accompanies a measure providing new budget authority (other than continuing appropriations), new spending authority, or new credit authority, or changes in revenues or tax expenditures to contain a cost estimate, as required by section 308(a)(1) of the Congressional Budget Act of 1974 and, when practicable with respect to estimates of new budget authority, a comparison of the total estimated funding level for the relevant program (or programs) to the appropriate levels under current law. H.R. 2051 does not contain any new budget authority, credit authority, or changes in revenues or tax expenditures. Assuming that the sums authorized under the bill are appropriated, H.R. 2051 does authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in Section X of this report.

X. CONGRESSIONAL BUDGET OFFICE COST ESTIMATE

U.S. CONGRESS,
CONGRESSIONAL BUDGET OFFICE,
Washington, DC, April 4, 2002.

Hon. SHERWOOD L. BOEHLERT,
*Chairman, Committee on Science,
House of Representatives, Washington, DC.*

DEAR MR. CHAIRMAN: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 2051, a bill to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and international research partnerships for the advancement of plant biotechnology in the developing world.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Kathleen Gramp.

Sincerely,

BARRY B. ANDERSON
(For Dan L. Crippen, Director).

Enclosure.

H.R. 2051—A bill to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and international research partnerships for the advancement of plant biotechnology in the developing world

SUMMARY: H.R. 2051 would expand the scope of the National Science Foundation's (NSF's) existing research on plant genetics and biotechnology by authorizing appropriations for research on special issues and for partnerships with institutions in developing

nations. The bill would authorize \$9 million for 2002 and \$13.5 million for each of fiscal years 2003 and 2004 for these new initiatives. These funds would be awarded competitively and would focus on such issues as crop cultivation in extreme climates, innovative plant products, feedstocks for alternative energy production, the ecological effects of genetically engineered plants, and biotechnology in developing countries.

CBO estimates that implementing H.R. 2051 would cost a total of \$34 million over the 2002–2007 period, assuming appropriation of the authorized amounts. The bill would not affect direct spending or receipts, so pay-as-you-go procedures would not apply.

H.R. 2051 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments.

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 2051 is shown in the following table. For this estimate, CBO assumes that the bill will be enacted by spring and that the funding authorized for 2002 will be provided in a supplemental appropriation act. Outlays are projected based on spending trends for similar NSF programs. The costs of this legislation fall within budget function 250 (general science, space, and technology).

	By fiscal year, in millions of dollars—					
	2002	2003	2004	2005	2006	2007
SPENDING SUBJECT TO APPROPRIATION						
Plant Genome Spending Under Current Law:						
Budget Authority ¹	115	0	0	0	0	0
Estimated Outlays	93	76	24	7	3	1
Proposed Changes:						
Authorization Level	9	14	14	0	0	0
Estimated Outlays	(²)	6	14	10	3	1
Spending Under H.R. 2051:						
Authorization Level ¹	124	14	14	0	0	0
Estimated Outlays	93	82	38	17	6	2

¹The 2002 level is the amount estimated to be appropriated for plant genome research for 2002.

²Less than \$500,000.

Pay-as-you-go considerations: None.

Intergovernmental and private-sector impact: H.R. 2051 contains no intergovernmental or private-sector mandates as defined in UMRA and would impose no costs on state, local, or tribal governments. The bill would benefit public universities by authorizing \$36 million in grants, between fiscal year 2002 and 2004, to establish research centers and to cultivate partnerships. Any costs incurred by public universities to participate in this program would be voluntary.

Estimate prepared by: Federal Costs: Kathleen Gramp; Impact on State, Local, and Tribal Governments: Elyse Goldman; and Impact on the Private Sector: Jean Talarico.

Estimate approved by: Peter H. Fontaine, Deputy Assistant Director for Budget Analysis.

XI. COMPLIANCE WITH PUBLIC LAW 104–4

H.R. 2051 contains no unfunded mandates.

XII. COMMITTEE OVERSIGHT FINDINGS AND RECOMMENDATIONS

Rule XIII, clause 3(c)(1) of the House of Representatives requires each committee report to include oversight findings and recommendations required pursuant to clause 2(b)(1) of rule X. The Committee on Science's oversight findings and recommendations are reflected in the body of this report.

XIII. STATEMENT ON GENERAL PERFORMANCE GOALS AND OBJECTIVES

Pursuant to clause (3)(c)(4) of House Rule XIII, the goal and objective of the bill is to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and to provide grants to establish international research partnerships for the advancement of plant biotechnology in the developing world.

XIV. CONSTITUTIONAL AUTHORITY STATEMENT

Rule XIII, clause 3(d)(1) of the House of Representatives requires each report of a committee on a bill or joint resolution of a public character to include a statement citing the specific powers granted to the Congress in the Constitution to enact the law proposed by the bill or joint resolution. Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 2051.

XV. FEDERAL ADVISORY COMMITTEE STATEMENT

H.R. 2051 does not establish nor authorize the establishment of any advisory committee.

XVI. CONGRESSIONAL ACCOUNTABILITY ACT

The Committee finds that H.R. 2051 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104-1).

XVII. STATEMENT ON PREEMPTION OF STATE, LOCAL, OR TRIBAL LAW

This bill is not intended to preempt any state, local, or tribal law.

XVIII. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

This legislation does not amend any existing Federal statute.

XIX. COMMITTEE RECOMMENDATIONS

On March 20, 2002, a quorum being present, the Committee on Science favorably reported H.R. 2051, by a voice vote, and recommends its enactment.

XX. PROCEEDINGS OF THE SUBCOMMITTEE MARKUP
**PROCEEDINGS OF THE MARKUP HELD BY
 THE SUBCOMMITTEE ON RESEARCH ON
 H.R. 2051, A BILL TO PROVIDE FOR THE ES-
 TABLISHMENT OF REGIONAL PLANT GE-
 NOME AND GENE EXPRESSION RESEARCH
 AND DEVELOPMENT CENTERS**

WEDNESDAY, DECEMBER 12, 2001

HOUSE OF REPRESENTATIVES,
 SUBCOMMITTEE ON RESEARCH,
 COMMITTEE ON SCIENCE,
Washington, DC.

The Subcommittee met, pursuant to call, at 10:30 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Nick Smith [Chairman of the Subcommittee] presiding.

Chairman SMITH. And now we are official. I would ask that my full statement be included in the record. And without objection, the full statement will be included in the record.

[The prepared statement of Mr. Smith of Michigan follows:]

PREPARED STATEMENT OF CHAIRMAN NICK SMITH

The legislation before the Subcommittee today will help to strengthen plant biotechnology research efforts at the National Science Foundation. The use of biotechnology to produce new varieties of plants—for food or other uses—has been of great interest to this Subcommittee in the past. In the past two years, we have held numerous hearings aimed at understanding this rapidly expanding area of science. We received testimony and information from scientists and other interested parties from around the world, on all sides of the issue, and learned a great deal about the incredible potential of plant biotechnology to make our world a better place to live.

At our most recent hearing on this issue in September, we heard specific comments from the scientific community on the legislation before us today. Witnesses shared their thoughts on how this proposed legislation could advance basic plant science research and fill funding gaps in the current genomics research portfolio. We also learned of the successful efforts of the NSF Plant Genome Research Program to completely sequence all 25,000 genes of *Arabidopsis*, a small mustard plant. This sequencing will one day serve as a tremendous resource to all areas of plant biology research, but will require continued efforts to identify and understand how these 25,000 genes are expressed.

A better understanding of gene expression will eventually allow researchers to develop an array of new beneficial plant varieties that will only be limited by the resourcefulness and imagination of our scientists. Some of these improvements that may be just around the corner include new drought tolerant and salt tolerant crop plants, plants that can resist insect, fungal, and viral infections, plants with improved nutritional content, and plants that can reduce our reliance on fertilizers and pesticides. Other new varieties may also serve as alternative energy sources, and provide inexpensive industrial precursors, or supply needed “edible vaccines.”

My bill, H.R. 2051, will help us to make these promising advancements a reality. It authorizes the establishment of Plant Genome Expression Centers—centers for basic research that will extend plant genomics research and accelerate the development of new beneficial plant varieties. The centers will be funded through a merit-based, competitive process, and will bring together some of the best researchers in the field to participate and work together.

We will proceed today by first considering a Manager’s amendment that combines Ms. Eddie Bernice Johnson’s plant biotechnology legislation focusing on the developing world, H.R. 2912, with my bill establishing Plant Genome Expression Centers. Several technical changes are included in the manager’s amendment to clean up the

language, but they do not alter the function or purpose of either bill. Additionally, the funding authorized in each bill is combined into one sum so that the NSF will have more flexibility to devote resources to these commitments as needed. This results in authorized appropriations of \$9 million for fiscal year 2002, \$13.5 million for fiscal year 2003, and \$13.5 million for fiscal year 2004.

These two bills share a common goal of strengthening plant biotechnology research at the National Science Foundation, and I think they complement each other well as a single piece of legislation. I am confident the benefits realized through these Plant Genome Expression Centers and Plant Biotechnology Partnerships in the developing world will allow us to harness fundamental knowledge and solve many difficult challenges. Again, this is a bipartisan effort we can be proud of and I'm pleased to extending my support the bills as combined.

Chairman SMITH. This legislation that the Ranking Member and I, Republicans, and Democrats, have worked on, I think moves us ahead in the area of biotechnology to probably increase the possibility, or the probability, that more of the world is going to support our biotech and genetic modification through the new technology.

We have been concentrating on the development of products to reduce the price to farmers a little bit, and it might result in a minimal reduction in price to consumers. But the greater challenge is to produce products that help people, that try to minimize environmental damage to help better protect the environment, and, certainly, the opportunities to feed a hungry world by producing the kind of products that can grow in those alkaline soils or grow under those climatic conditions, where the developing nations haven't been able to grow the kind of sufficient supply of food that they need.

Also, in this legislation, it—we move into the area of energy, both with the development of biofuels, through biotechnology, and also, an area that I have been particularly interested in, the fixation of nitrogen in soils. Of course, legumes, with their nodules, are able to fix nitrogen in the soil, and that becomes a substitute to chemical fertilizer, nitrogen fertilizer, that utilizes in the area of 10—of 5 to 10 percent of the total production of natural gas in this country.

So that there is a lot that we can do with this technology. It is only limited by the creativity of our scientists exploring it and the willingness of Congress to move ahead with encouraging this kind of research. And with that, I would turn to our Ranking Member, Ms. JOHNSON, for comments.

Ms. JOHNSON. Thank you very much, Mr. Chairman. I will start reading mine because we don't have a quorum. There is not much we can do.

Chairman SMITH. Read slowly.

Ms. JOHNSON. Mr. Chairman, I want to thank you for bringing this important legislation before the Subcommittee today. And I greatly appreciate your working with me in a bipartisan manner to incorporate H.R. 2912, the plant biotechnology bill I introduced into the substitute amendment that will be offered to H.R. 2051, your plant genome centers bill. I know we share a strong interest in seeing the promise of plant biotechnology realized in both the United States and the developing world, and I believe this legislation will make a valuable contribution to achieving that goal.

Each day, 800 million people are malnourished and go hungry, the majority of whom live in the developing world. Every 2.2 seconds, malnutrition claims another victim, half of whom are children. Within the next 25 years, the world population is projected

to grow by 2 to 8.2 billion. Unless food production is dramatically increased in the regions where it is most needed, persistent hunger will become more prevalent and malnutrition will claim even more victims than it does today.

In many regions of the developing world, the farming practices used today are the same as, or similar to, those practical—those practiced for centuries. Unfortunately, these practices often lead to low crop yields and soil destruction. Many farmers desperately need access to the best management practices. In addition, better seeds, fertilizer, and biotechnology would increase yields and, thus, help to reduce the epidemic of malnutrition now facing too many regions of the world. I believe that plant biotechnology has a potential to help the developing world, increase food security, and move towards self-sufficiency.

That is why I introduced H.R. 2912. This bill authorizes the NSF to establish a grant program of partnerships between the United States research organization and those in the developing countries for research on plant biotechnology targeted to the agricultural needs of the developing world. I believe that by working side by side with scientists from poor countries, crop varieties resistant to insects and viruses, crops that can be grown in drought, drought-stricken lands, with only minimal water, and crops that have improved nutritional content can be developed.

At the hearing on plant biotechnology held by this Subcommittee back in September, several witnesses gave examples showing where plant biotechnology is already having a positive impact in the developing world. Insect-resistant potatoes are reducing crop losses from potato tuber moth infections in Egypt. In Kenya, virus-resistant sweet potatoes have decreased crop loss by 25 percent. And in India, where 18 percent of the children suffer from some level of vitamin A deficiency, the development of golden mustard, which is high in vitamin A, has the potential to reduce suffering.

Investment in basic research in plant biotechnology targeted to the agricultural needs of the developing world will lead to a better understanding of many types of crops and strengthen the capacity to develop and produce new, enhanced—of ours.

NSF has already made important contributions to advance the knowledge base for plant biotechnology. I see this compromised bill as a way to build on that base and to see that plant biotechnology to address agricultural issues and problems worldwide.

Mr. Chairman, I thank you—and the only one—for working with me to develop this bipartisan legislation. I look forward to assisting you in any way I can to move this bill to the Full Committee and to the Floor. I commend the legislation to my colleagues and ask for their support. Thank you very much.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF THE HONORABLE EDDIE BERNICE JOHNSON

Mr. Chairman, I want to thank you for bringing this important legislation before the Subcommittee today. I greatly appreciate your working with me in a bipartisan manner to incorporate H.R. 2912, the plant biotechnology bill I introduced, into the substitute amendment that will be offered to H.R. 2051, your plant genome centers bill. I know we share a strong interest in seeing the promise of plant biotechnology realized in both the U.S. and the developing world, and I believe this legislation will make a valuable contribution to achieving that goal.

Each day, 800 million people are malnourished and go hungry, the majority of whom live in the developing world. Every 2.2 seconds, malnutrition claims another

victim, half of whom are children. Within the next 25 years, the world population is projected to grow by 2 billion to 8.2 billion. Unless food production is dramatically increased in the regions where it is most needed, persistent hunger will become more prevalent and malnutrition will claim even more victims than it does today.

In many regions of the developing world, the farming practices used today are the same as or similar to those practiced for centuries. Unfortunately, these practices often lead to low crop yields and soil destruction. Many farmers desperately need access to best management practices. In addition, better seeds, fertilizer, and biotechnology would increase yields and thus help to reduce the epidemic of malnutrition now facing too many regions of the world.

I believe that plant biotechnology has the potential to help the developing world increase food security and move towards self-sufficiency. That is why I introduced H.R. 2912. This bill authorizes NSF to establish a grant program for partnerships between U.S. research organizations and those in developing countries for research on plant biotechnology targeted to the agricultural needs of the developing world. I believe that by working side-by-side with scientists from poor countries, crop varieties resistant to insects and viruses, crops that can be grown in drought stricken lands with only minimal water, and crops that have improved nutritional content can be developed.

At the hearing on plant biotechnology held by this Subcommittee back in September, several witnesses gave examples showing where plant biotechnology is already having a positive impact in the developing world. Insect resistant potatoes are reducing crop losses from Potato Tuber Moth infestations in Egypt; in Kenya, virus resistant sweet potatoes have decreased crop loss by 25 percent; and in India, where 18 percent of the children suffer from some level of vitamin A deficiency, the development of "golden mustard," which is high in vitamin A, has the potential to reduce suffering. Investment in basic research on plant biotechnology targeted to the agricultural needs of the developing world will lead to a better understanding of many types of crops and strengthen the capacity to develop and produce new and enhanced cultivars.

NSF has already made important contributions to advance the knowledge base for plant biotechnology. I see this compromise bill as a way to build on that base and to use plant biotechnology to address agricultural issues and problems *worldwide*.

Mr. Chairman, thank you for working with me to develop this bipartisan legislation. I look forward to assisting you in any way I can to move the bill through Committee and to the Floor.

I commend the legislation to my colleagues and ask for their support.

Chairman SMITH. The—without objection, the Chair will allow any other Members' comments to be entered into the record unless Representative Rivers you would like to make a comment at this time. Without objection, that is so ordered.

H.R. 2051

10:40 a.m.

We will now consider H.R. 2051, To Provide for the Establishment of Regional Plant Genome and Gene Expression Research and Development Centers. And the first reading of the bill. As soon as you start, I am going to stop you. So—

The CLERK. H.R. 2051, a bill to Provide For the Establishment of Regional Plant Genome and Gene Expression Research and Development Centers. Be it enacted by the Senate and the House of Representatives of the United States of America in Congress assembled, Section 1, Centers. The National Science Foundation is authorized to make grants for the establishment of—

Chairman SMITH. Without objection, the bill will be considered read.

[H.R. 2051 follows:]

107TH CONGRESS
1ST SESSION

H. R. 2051

To provide for the establishment of regional plant genome and gene expression research and development centers.

IN THE HOUSE OF REPRESENTATIVES

JUNE 5, 2001

Mr. SMITH of Michigan introduced the following bill; which was referred to the Committee on Science

A BILL

To provide for the establishment of regional plant genome and gene expression research and development centers.

1 *Be it enacted by the Senate and House of Representa-*
2 *tives of the United States of America in Congress assembled,*

3 **SECTION 1. CENTERS.**

4 The National Science Foundation is authorized to
5 make grants for the establishment of regional plant ge-
6 nome and gene expression research and development cen-
7 ters, the purpose of which shall be to—

8 (1) develop capabilities in basic plant genome
9 research;

1 (2) extend basic plant genomics research
2 through plant breeding programs and accelerate its
3 application to the development and testing of new
4 varieties of enhanced food crops and crops that can
5 be used as alternative energy sources;

6 (3) develop alternative uses of agricultural
7 crops; and

8 (4) serve as centers for scientific and safety in-
9 formation on plant genomics.

10 **SEC. 2. GRANT AWARDS.**

11 Grant awards under this Act shall be made through
12 an open, peer-reviewed competition. When making awards,
13 the National Science Foundation shall ensure that as
14 many different agronomic environments as possible are
15 represented.

16 **SEC. 3. MATCHING FUNDS.**

17 The National Science Foundation shall not provide
18 under this Act more than 50 percent of the cost of estab-
19 lishing any research and development center.

20 **SEC. 4. AUTHORIZATION OF APPROPRIATIONS.**

21 There are authorized to be appropriated to the Na-
22 tional Science Foundation \$3,000,000 for fiscal year 2002
23 and \$4,500,000 for fiscal year 2003 to carry out this Act.

○

H.R. 2051
Introduced by Mr. Smith (MI)

SECTION-BY-SECTION SUMMARY

SEC. 1. CENTERS

Establishes a grant program at the National Science Foundation (NSF) to provide funds for plant genome and gene expression research and development centers. Centers would be established to 1) develop capabilities in basic plant genome research, 2) extend the scope of basic plant genomics research in order to contribute to the development of enhanced food crops and crops for use as alternative energy sources, 3) develop alternative uses of crops, and 4) serve as centers for scientific and safety information on plant genomics.

SEC. 2. GRANT AWARDS

Establishes that grant awards will be made through open, peer reviewed competition.

SEC. 3. MATCHING FUNDS

Establishes that the National Science Foundation shall not provide more than 50 percent of the cost of a center.

SEC. 4. AUTHORIZATION OF APPROPRIATIONS

Authorizes \$3,000,000 for fiscal year 2002, and \$4,500,000 for fiscal year 2003.

Chairman SMITH. And we have an amendment to the bill. And the Manager's Amendment incorporates Ms. Johnson's legislation that has the—that is, plant biotechnology legislation—but her provisions focus on the developing world—H.R. 2912, with my bill establishing plant genome expression centers, H.R. 2051. And I think it is a good addition to this overall effort to accomplish some great goals that we might, with the National Science Foundation, and in gene expression. I would like to yield to Ms. Johnson for any comments she may have on the amendment.

Ms. JOHNSON. Thank you very much, Mr. Chairman. And I want to express my appreciation for you adding this amendment and I would urge the members of the Committee to support it.

[Amendment to H.R. 2051, offered by Mr. Smith of Michigan and Ms. Johnson]

**AMENDMENT IN THE NATURE OF A SUBSTITUTE
TO H.R. 2051
OFFERED BY MR. SMITH OF MICHIGAN AND
MS. EDDIE BERNICE JOHNSON OF TEXAS**

Strike all after the enacting clause and insert the following:

1 **SECTION 1. DEFINITIONS.**

2 In this Act—

3 (1) the term “Director” means the Director of
4 the National Science Foundation;

5 (2) the term “institution of higher education”
6 has the meaning given such term in section 101 of
7 the Higher Education Act of 1965 (20 U.S.C.
8 1001); and

9 (3) the term “nonprofit organization” means a
10 nonprofit research institute or a nonprofit associa-
11 tion with experience and capability in plant bio-
12 technology research as determined by the Director.

13 **SEC. 2. MATCHING FUNDS.**

14 The Director may establish matching fund require-
15 ments for grantees to receive grants under this Act.

1 **SEC. 3. PLANT GENOME AND GENE EXPRESSION RESEARCH**
2 **CENTERS.**

3 (a) IN GENERAL.—The Director shall award grants
4 to consortia of institutions of higher education or non-
5 profit organizations (or both) to establish regional plant
6 genome and gene expression research centers. Grants shall
7 be awarded under this section on a merit-reviewed, com-
8 petitive basis. When making awards, the Director shall,
9 to the extent practicable, ensure that the program created
10 by this section examines as many different agricultural en-
11 vironments as possible.

12 (b) PURPOSE.—The purpose of the centers estab-
13 lished pursuant to subsection (a) shall be to conduct re-
14 search in plant genomics and plant gene expression. A cen-
15 ter's activities may include—

16 (1) basic plant genomics research and genomics
17 applications, including those related to cultivation of
18 crops in extreme environments and to cultivation of
19 crops with reduced reliance on fertilizer;

20 (2) basic research that will contribute to the de-
21 velopment or use of innovative plant-derived prod-
22 ucts;

23 (3) basic research on alternative uses for plants
24 and plant materials, including the use of plants as
25 renewable feedstock for alternative energy produc-

1 tion and nonpetroleum-based industrial chemicals
2 and precursors; and

3 (4) basic research and dissemination of infor-
4 mation on the ecological and other consequences of
5 genetically engineered plants.

6 **SEC. 4. PARTNERSHIPS FOR PLANT BIOTECHNOLOGY IN**
7 **THE DEVELOPING WORLD.**

8 (a) IN GENERAL.—(1) The Director shall award
9 grants to institutions of higher education, nonprofit orga-
10 nizations, or consortia of such entities to establish re-
11 search partnerships for supporting the development of
12 plant biotechnology targeted to the needs of the developing
13 world. The Director, by means of outreach, shall encour-
14 age inclusion of Historically Black Colleges or Univer-
15 sities, Hispanic-serving institutions, or tribal colleges or
16 universities in consortia that enter into such partnerships.

17 (2) In order to be eligible to receive a grant under
18 this section, an institution of higher education or eligible
19 nonprofit organization (or consortium thereof) shall enter
20 into a partnership with one or more research institutions
21 in one or more developing nations and may also include
22 for-profit companies involved in plant biotechnology.

23 (3) Grants under this section shall be awarded on a
24 merit-reviewed competitive basis.

1 (b) PURPOSE.—Grants awarded under this section
2 shall be used for support of research in plant bio-
3 technology targeted to the needs of the developing world.
4 Such activities may include—

5 (1) basic genomic research on crops grown in
6 the developing world;

7 (2) basic research in plant biotechnology that
8 will advance and expedite the development of im-
9 proved cultivars, including those that are pest-resist-
10 ant, produce increased yield, reduce the need for fer-
11 tilizers, or increase tolerance to stress;

12 (3) basic research that could lead to the devel-
13 opment of technologies to produce pharmaceutical
14 compounds such as vaccines and medications in
15 plants that can be grown in the developing world;
16 and

17 (4) research on the impact of plant bio-
18 technology on the social, political, economic, and en-
19 vironmental conditions in countries in the developing
20 world.

21 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

22 There are authorized to be appropriated to the Na-
23 tional Science Foundation \$9,000,000 for fiscal year
24 2002, \$13,500,000 for fiscal year 2003, and \$13,500,000
25 for fiscal year 2004 to carry out this Act.

Amend the title so as to read: To authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and international research partnerships for the advancement of plant biotechnology in the developing world.

Chairman SMITH. For the record, the results in authorized appropriations will be \$9 million for fiscal year 2002; \$13.5 million for 2003; and \$13.5 million for fiscal year 2004. And our legal counsel, Barry—Barry is not here. So we will turn—

Unidentified SPEAKER. He is out there.

Chairman SMITH. I think we can just turn to you for authority to move on and report the bill if Barry is not here. Barry, he was about to let us go on without objection. And we could hold the roll open for the required $\frac{1}{3}$ quorum. What is your—what is your—without objection, we will sort of stand at ease—that is, just short of recess.

And I would ask Sharon Hays to maybe give us an outline of what is coming up next year in this Subcommittee, if you can give us some of your thoughts. Of course, we are going to have the NSF authorization bill. The prospects for this legislation probably will be marked up in Full Committee when we return in February. Is that your understanding, Sharon?

Ms. HAYS. That is. We haven't set any time—

Chairman SMITH. Any other legislation that—any other Committee sessions that you think should be considered by this Committee for next year? Have we—do we have an outline? If we don't, maybe we would request an outline from you and the democrat staff people to give us a proposed outline of what we might look forward to, to schedule and plan for next year.

Ms. RIVERS. Two sets of staff, the Democratic staff and then the Democrat staff. Can you just tell me the difference between them?

Chairman SMITH. Well, the Democrat staff would be more partisan than the Democratic staff, I think. So if we can put that request in, Sharon. I am not sure where we are. I—my understanding is, is we are going to have the NSF authorization bill that we are going to be working on pretty diligently with several hearings next year. And so simply request that staff maybe review the possibilities and present them to the Ranking Member and myself.

Ms. HAYS. Mr. Chairman, we will be having a staff meeting in early January where we will be doing exactly that kind of planning for the next year. So we will get back to you shortly thereafter.

Chairman SMITH. Would like to formally introduce, for the Committee and for the record, Dan Byers, who is our new designee on the Science Committee staff. And Dan is—has—was an AAAS Representative in my office two years ago, and last year became my Legislative Assistant for agricultural affairs. And so, Dan, welcome aboard. And we will wait another five minutes and then, if there is no objection, we will proceed with unanimous consent that we move these bills to Full Committee.

[Recess.]

Chairman SMITH. [continuing]. Mikes on? Thank you. All in favor of the amendment say, aye. Opposed, no. The ayes have it. And with—it says quick gavel. Without—ask for other amendments. Hearing no other amendments, the question is on passage of the bill—and the H.R. 2051, as amended. All those in favor will say aye. All those opposed, say no. Again, a quick gavel. The ayes have it. I now recognize Ms. Johnson for a motion.

Ms. JOHNSON. Thank you. Mr. Chairman. I move that the Subcommittee favorably report the bill, H.R. 2051, as amended, to the Full Committee with the recommendation that it has been in order

for—that it be in order for the bill, as amended, by the Subcommittee to be considered as an original bill for the purpose of amendment under the five-minute rule at Full Committee. Further, I ask unanimous consent that the staff be instructed to make all necessary technical and conforming changes to the bill, as amended, in accordance with the recommendations of the Subcommittee.

Chairman SMITH. The Committee has heard the motion. Those in favor will say aye. Those opposed, say no. The ayes have it and the motion is agreed to. Without objection, the motion to reconsider is laid upon the table and the Chairman will note the presence of many Members of this Committee in attendance.

[Whereupon, at 10:54 a.m., the Subcommittee was adjourned.]

XXI. PROCEEDINGS OF THE FULL COMMITTEE MARKUP
**PROCEEDINGS OF THE FULL COMMITTEE
 MARKUP ON H.R. 2051, TO PROVIDE FOR
 THE ESTABLISHMENT OF REGIONAL PLANT
 GENOME AND GENE EXPRESSION RE-
 SEARCH AND DEVELOPMENT CENTERS**

WEDNESDAY, MARCH 20, 2002

HOUSE OF REPRESENTATIVES,
 COMMITTEE ON SCIENCE,
Washington, DC.

The Committee met, pursuant to call, at 10:40 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Sherwood L. Boehlert [Chairman of the Committee] presiding.

Chairman BOEHLERT. The Committee on Science will be in order. First of all, I would like to advise all members that there is a sign-up sheet before each individual place, reflecting the views and estimates, and we would like you to read the Committee's views and estimates, and hopefully, you will be inspired to sign the sheet indicating your approval. With that, let us get moving.

The Committee on Science will be in order. Pursuant to notice, the Committee on Science is meeting today to consider the following measures. H.R. 2051, A Bill to Provide for the Establishment of Regional Plant Genome and Gene Expression Research and Development Centers. Thank you, Mr. Smith. H.R. 3389, the National Sea Grant Program Act Amendments of 2002, and H.R. 3929, the Energy Pipeline Research Development and Demonstration Act.

I ask unanimous consent for the authority to recess the Committee at any point, and without objection it is so ordered. Mr. Hall will be making his way here to present his opening remarks. Let me do mine.

The three bills we have before us this morning deal with very different topics and come from three different subcommittees, but they do have a few key aspects in common. First, all three are bipartisan consensus bills. Once again, the Committee's majority and minority staffs have worked in tandem to draft the bills that advance proposals from members on both sides of the aisle. This

Committee continues to set an example of working together that others would do well to follow. Also, all three bills are designed to promote research and development, especially, long-term research and development that will help address critical societal problems.

H.R. 2051 was designed to help strengthen American agriculture and alleviate malnutrition in the developing world. H.R. 3389 will help protect the nation's coastal areas and fisheries and combat invasive species. And H.R. 3929 will help prevent pollution and pipeline explosions. These bills are not funding research for the sake of research whether they deal with abstruse matters of no concern to the rest of Congress or to the rest of the country. The research advances that will result from these measures will help improve the daily lives of people here and around the world. Let me say just a little bit more about each of these bills and then they will be described more fully by their sponsors as we mark up each one.

H.R. 2051, offered by Chairman Nick Smith and Ranking Minority Member Eddie Bernice Johnson, will create two new programs on plant biotechnology at the National Science Foundation. The bill offers a balanced approach to biotech authorizing research not only to develop new genetic engineering techniques and products, but also, to examine the ecological and social consequences of bio-engineered plants.

H.R. 3389, offered by Chairman Vernon Ehlers and Ranking Minority Member Jim Barcia, will reauthorize and reform the Sea Grant Program, while keeping it within the National Oceanographic and Atmospheric Administration. We will have to negotiate a final version of the bill with the Resources Committee before it can come to the Floor, and we plan to push in a strong and unified fashion for our version of this bill. However, we will, as Dr. Ehlers has committed, find a way to address the concerns Mr. Underwood has raised about the way the Sea Grant Program deals with the Pacific Islands.

Finally, we will take up H.R. 3929, offered by Ranking Minority Member Ralph Hall and Lamar Smith, which will ensure that all the federal agencies with expertise in pipeline safety are engaged in research in that important area. We will work with the Energy and Commerce, and Transportation and Infrastructure Committees to move our bill as part of a comprehensive pipeline safety measure.

So we have much to accomplish today and we will do it in the bipartisan fashion that has become the Committee's hallmark. With that, the Chair recognizes Mr. Hall.

Mr. HALL. Mr. Chairman, as usual, you have covered the waterfront pretty well. I just want to say that I support these three bills. We will have an amendment for the third bill, but on H.R. 2051, I want to congratulate Nick Smith and Ranking Democratic Member Eddie Bernice Johnson for their efforts on it. And of course, on the Sea Grant Program, your bill, I certainly support that and look forward to working with you, and you have recognized Chairman Ehlers and Representative Barcia. And on my bill, I will have an amendment of 3929 that we will discuss when we have a little more time. With that, thank you for doing a good job, and I yield back the balance of my time.

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Mr. Chairman, I am pleased to support H.R. 2051, which authorizes programs at the National Science Foundation on plant biotechnology research.

I want to congratulate Research Subcommittee Chairman Nick Smith and Ranking Democratic Member Eddie Bernice Johnson for their efforts to develop this important bill. They worked together in a remarkable spirit of cooperation and bipartisanship.

The bill will further strengthen NSF's ongoing research to advance knowledge in the field of plant biotechnology. Moreover, it will support research collaborations between U.S. scientists and scientists from abroad to help bring the benefits of this emerging technology to the developing world.

I would like to yield now to the co-author of the bill, Congresswoman Eddie Bernice Johnson for a further explanation of the legislation.

Chairman BOEHLERT. Thank you very much. And let me tell you, it is the Chair's intent to move with dispatch. These bills have been looked at with the respective committee staffs. They are very able and very professional staffs, so we don't envision a long markup here. We have a hearing immediately after with some very distinguished guests, and I know a number of our colleagues have conflicting commitments. So without objection, all members' opening statements will be placed in the record at this point.

**THE HONORABLE JERRY F. COSTELLO
COMMITTEE ON SCIENCE
MARKUP
H.R. 2051
To Provide for the Establishment of
Regional Plant Genome and Gene Expression
Research and Development Centers**

March 20, 2002

Good morning. I would like to thank Congressman Nick Smith for sponsoring HR 2051. This legislation would authorize the National Science Foundation to make grants for the establishment of regional plant genome and gene expression research and development centers. The centers would develop and test new varieties of enhanced food crops as well as crops that could be used as alternative energy sources. The centers also would examine alternative uses of agricultural crops and would serve as clearinghouses for scientific and safety information on plant genomics.

Southern Illinois University-Carbondale (SIU-C) in my congressional district, the basketball powerhouse, is involved in genome research and these grants would assist SIU-C in its capacity to research plant biotechnology. This initiative is important, not only to my congressional district, but the entire science community. For this reason, I support HR 2051 and urge my colleagues to do the same.

H.R. 2051

10:47 a.m.

Chairman BOEHLERT. We will now consider H.R. 2051, A Bill to Provide for the Establishment of Regional Plant Genome and Gene Expression Research and Development Centers. I now recognize for five minutes the Chair of the Subcommittee on Research, the gentleman from Michigan, Mr. Smith, to briefly explain the bill.

Mr. SMITH. Mr. Chairman, I will briefly explain the bill and ask that my complete statement be entered into the record without objection.

Chairman BOEHLERT. So ordered.

Mr. SMITH. And I thank you, Mr. Chairman and Mr. Hall, for bringing this bill before Congress. During the Subcommittee mark-up on this issue, we heard specific comments from the scientific community on the legislation that is before us today on the potential not only to feed a hungry world, but to better protect the environment and, actually, to allow plants, food plants, to grow in areas of the Third World where we haven't been able to grow those food products before and, also, the potential to increase the health aspects of certain food products.

Plant Genome Research Program is becoming a new era for our technology in the United States, not only for health of individuals, but for the health of the environment. I think a better understanding of gene expression will eventually allow researchers to develop, really, a new array of new beneficial plant varieties that will be limited only by the resourcefulness and the imagination of our scientists. And some of these improvements may be just around the corner as rapidly as we are moving ahead on this technology. H.R. 2051 is going to help make these promising achievements a reality in the near future. It authorizes the establishment of plant genome expression centers, centers for basic research that will take us to the next phase of plant genomic research and accelerate the development of beneficial new plant varieties.

Mr. Chairman, and Mr. Hall, and Committee Members, colleagues, one aspect of this bill is to reduce our demand for energy as we expand our efforts to increase the availability of bio fuels, as we increase the fixation of nitrogen in our soil. We now have legumes that can fix nitrogen. We use about six percent of the natural gas to accommodate the production of nitrogen fertilizer in this country. We are on the—we are almost at the point where we now can reduce our need for that product. And with that, I yield back, Mr. Chairman.

[The prepared statement of Mr. Smith follows:]

PREPARED STATEMENT OF REPRESENTATIVE NICK SMITH

I want to thank you, Mr. Chairman, for bringing before the Committee today my bill, H.R. 2051, strengthening plant biotechnology research efforts at the National Science Foundation. The use of biotechnology to produce new varieties of plants—for food, medicine, or other uses—has been of great interest to the Research Subcommittee that I chair with Ranking Member Eddie Bernice Johnson. Over the past three years, our Subcommittee held numerous hearings aimed at understanding this rapidly expanding area of science. We received testimony and information from scientists and other interested parties from around the world, on all sides of the issue, and heard about the incredible potential of plant biotechnology to feed a hungry world, protect our environment, reduce energy demand, and advance other critical needs.

At our most recent hearing on this issue last September, we heard specific comments from the scientific community on the legislation before us today. Witnesses shared their thoughts on how this proposed legislation could advance basic plant science research and fill funding gaps in the current genomics research portfolio. We also learned of the successful efforts of the NSF Plant Genome Research Program to completely sequence all 25,000 genes of *Arabidopsis*, a small mustard plant. This sequencing is a tremendous resource to all areas of plant biology research, but will require continued efforts to identify and understand how these 25,000 genes are expressed. A better understanding of gene expression will eventually allow researchers to develop an array of new beneficial plant varieties that will be limited only by the resourcefulness and imagination of our scientists. Some of these improvements may be just around the corner, including: new drought tolerant and salt tolerant crop plants, plants that can resist insect, fungal, and viral infections; plants with improved nutritional content; and plants that can reduce our reliance on fertilizers and pesticides. Other new varieties may also serve as alternative energy sources, and provide inexpensive industrial precursors, or supply needed “edible vaccines.”

My bill, H.R. 2051, will help us to make these promising advancements a reality. It authorizes the establishment of Plant Genome Expression Centers—centers for basic research that will take us to the next phase in plant genomics research and accelerate the development of beneficial new plant varieties. The centers will take advantage of the National Science Foundation’s merit-based, competitive process, and will bring together some of the best researchers in the field to participate and work together.

H.R. 2051 also authorizes a program creating Plant Biotechnology Partnerships for the Developing World. This program is based on the provisions of H.R. 2912, introduced by Ms. Johnson. The plant biotechnology partnerships will provide the fundamental research needed to build on the current plant biotechnology knowledge base to address specific agricultural problems in the developing world. The Partnerships program will also provide researchers in developing countries with much needed technical assistance to better understand and implement plant biotechnology.

The benefits of biotechnology are great, and the scientific evidence confirming the safety of plant biotech products developed within our strong regulatory framework continues to mount. I believe that this Committee can play a critical role in the development of the technology by continuing to insist that the debate surrounding it remain firmly grounded in science, and I thank the Chairman for his efforts in this area. I urge members to support this legislation strengthening our research efforts to foster new innovations in plant biotechnology. Thank you, Mr. Chairman.

Chairman BOEHLERT. Thank you very much, Mr. Smith. Ms. Johnson.

Ms. JOHNSON. Thank you very much, Mr. Chairman. Let me express my appreciation for you bringing this important legislation before the Committee today, and I would like to ask unanimous consent to place my entire statement in the record.

Chairman BOEHLERT. Without objection, so ordered.

Ms. JOHNSON. Last week, the World Health Organization and the United Nations Children’s Fund released a very troubling report on health conditions in the developing world. According to the report, 8 million babies, more than half, in the first month of life die each year. Malnutrition is responsible for 60 percent of these deaths. So in other words, every minute nine babies perish due to hunger. Within the next 25 years, the world’s population is projected to grow by 2 billion people, to 8.2 billion. To meet this challenge, developing countries need to dramatically improve their food security, and this is what the original bill of 2912 intended, and I am delighted that Mr. Smith and I worked together, and it is incorporated into 2051.

And if there are no other questions, Mr. Chairman, I am ready to make a motion.

[The prepared statement of Ms. Johnson follows:]

PREPARED STATEMENT OF REPRESENTATIVE EDDIE BERNICE JOHNSON

Mr. Chairman, I want to thank you for bringing this important legislation before the Committee today.

The bill before us, as reported by the Research Subcommittee, was developed in a cooperative manner between Chairman Smith and myself. I want to thank Mr. Smith for working with me in a bipartisan manner to incorporate H.R. 2912, the plant biotechnology bill I introduced, into H.R. 2051, his plant genome centers bill.

Subcommittee Chairman Smith and I share a strong interest in seeing the promise of plant biotechnology realized in both the U.S. and the developing world, and I believe this legislation will make a valuable contribution to achieving that goal.

Last week, the World Health Organization and the United Nations Children's Fund released a very troubling report on health conditions in the developing world. According to the report, eight million babies, more than half in the first month of life, die each year. Malnutrition is responsible for 60 percent of these deaths. In other words, every *minute*, 9 babies perish due to hunger. If you consider other age groups, the statistics are even worse. Within the next 25 years, the world's population is projected to grow by 2 billion to 8.2 billion people. To meet this challenge, developing countries need to dramatically increase food production in the regions where it is most needed in addition to improving food distribution networks. If this is not done, persistent hunger will become more prevalent and malnutrition will claim even more victims than it does today.

Bilateral and multilateral assistance institutions are working with developing countries to improve agricultural practices throughout the world. In addition to better management techniques, soil conservation, better seeds and fertilizer, biotechnology has a very important role to play in increasing crop yields and thus reducing the epidemic of malnutrition now facing too many regions of the world. The beauty of biotechnology is that the entire technology can be transferred in a single seed.

Because I believe that plant biotechnology has the potential to help the developing world increase food security and move towards self-sufficiency, I introduced H.R. 2912. This bill authorizes NSF to establish a grant program for partnerships between U.S. research organizations and those in developing countries for research on plant biotechnology targeted to the agricultural needs of the developing world. Federal funding for crops that can be grown in the developing world is essential because private companies have little financial incentive to invest in so-called "orphan" crops. The partnership aspect of this legislation is particularly important because in addition to creating new crop varieties to combat hunger and malnutrition, it helps develop the scientific capacity of developing countries. Many of these countries already have established agricultural research institutions and will be able to make valuable contributions to plant research along with U.S. scientists.

At the hearing on plant biotechnology held by this Subcommittee back in September, several witnesses gave examples on how plant biotechnology is already having a positive impact in the developing world. Insect resistant potatoes are reducing crop losses from Potato Tuber Moth infestations in Egypt; in Kenya, virus resistant sweet potatoes have decreased crop losses by 25 percent; and in India, where 18 percent of the children suffer from some level of vitamin A deficiency, which can lead to blindness, the development of "golden mustard," which is high in vitamin A, has the potential to reduce suffering. Investment in basic research on plant biotechnology targeted to the agricultural needs of the developing world will lead to a better understanding of many types of crops and strengthen the capacity to develop and produce new and enhanced cultivars.

NSF has already made important contributions to advance the knowledge base for plant biotechnology. I see this compromise bill as a way to build on that base and to use plant biotechnology to address agricultural issues and problems *worldwide*.

Mr. Chairman, I thank you and Ranking Democratic Member Mr. Hall, my colleague from Texas, for bringing this bipartisan bill before the Committee.

I commend the legislation to my colleagues and ask for their support.

Chairman BOEHLERT. Let me first ask unanimous consent that the bill as amended by the Subcommittee on Research and Development on December 12, 2001 be considered as original text for the purpose of amendment and the bill be considered as read and open to amendment at any point. Without objection, so ordered.

[H.R. 2051 follows:]

H.R. 2051
AS AMENDED BY THE SUBCOMMITTEE ON
RESEARCH
ON DECEMBER 12, 2001

Strike all after the enacting clause and insert the following:

1 **SECTION 1. DEFINITIONS.**

2 In this Act—

3 (1) the term “Director” means the Director of
4 the National Science Foundation;

5 (2) the term “institution of higher education”
6 has the meaning given such term in section 101 of
7 the Higher Education Act of 1965 (20 U.S.C.
8 1001); and

9 (3) the term “nonprofit organization” means a
10 nonprofit research institute or a nonprofit associa-
11 tion with experience and capability in plant bio-
12 technology research as determined by the Director.

13 **SEC. 2. MATCHING FUNDS.**

14 The Director may establish matching fund require-
15 ments for grantees to receive grants under this Act.

1 **SEC. 3. PLANT GENOME AND GENE EXPRESSION RESEARCH**
2 **CENTERS.**

3 (a) IN GENERAL.—The Director shall award grants
4 to consortia of institutions of higher education or non-
5 profit organizations (or both) to establish regional plant
6 genome and gene expression research centers. Grants shall
7 be awarded under this section on a merit-reviewed, com-
8 petitive basis. When making awards, the Director shall,
9 to the extent practicable, ensure that the program created
10 by this section examines as many different agricultural en-
11 vironments as possible.

12 (b) PURPOSE.—The purpose of the centers estab-
13 lished pursuant to subsection (a) shall be to conduct re-
14 search in plant genomics and plant gene expression. A cen-
15 ter's activities may include—

16 (1) basic plant genomics research and genomics
17 applications, including those related to cultivation of
18 crops in extreme environments and to cultivation of
19 crops with reduced reliance on fertilizer;

20 (2) basic research that will contribute to the de-
21 velopment or use of innovative plant-derived prod-
22 ucts;

23 (3) basic research on alternative uses for plants
24 and plant materials, including the use of plants as
25 renewable feedstock for alternative energy produc-

1 tion and nonpetroleum-based industrial chemicals
2 and precursors; and

3 (4) basic research and dissemination of infor-
4 mation on the ecological and other consequences of
5 genetically engineered plants.

6 **SEC. 4. PARTNERSHIPS FOR PLANT BIOTECHNOLOGY IN**
7 **THE DEVELOPING WORLD.**

8 (a) **IN GENERAL.**—(1) The Director shall award
9 grants to institutions of higher education, nonprofit orga-
10 nizations, or consortia of such entities to establish re-
11 search partnerships for supporting the development of
12 plant biotechnology targeted to the needs of the develop-
13 ing world. The Director, by means of outreach, shall encour-
14 age inclusion of Historically Black Colleges or Univer-
15 sities, Hispanic-serving institutions, or tribal colleges or
16 universities in consortia that enter into such partnerships.

17 (2) In order to be eligible to receive a grant under
18 this section, an institution of higher education or eligible
19 nonprofit organization (or consortium thereof) shall enter
20 into a partnership with one or more research institutions
21 in one or more developing nations and may also include
22 for-profit companies involved in plant biotechnology.

23 (3) Grants under this section shall be awarded on a
24 merit-reviewed competitive basis.

4

1 (b) PURPOSE.—Grants awarded under this section
2 shall be used for support of research in plant bio-
3 technology targeted to the needs of the developing world.
4 Such activities may include—

5 (1) basic genomic research on crops grown in
6 the developing world;

7 (2) basic research in plant biotechnology that
8 will advance and expedite the development of im-
9 proved cultivars, including those that are pest-resist-
10 ant, produce increased yield, reduce the need for fer-
11 tilizers, or increase tolerance to stress;

12 (3) basic research that could lead to the devel-
13 opment of technologies to produce pharmaceutical
14 compounds such as vaccines and medications in
15 plants that can be grown in the developing world;
16 and

17 (4) research on the impact of plant bio-
18 technology on the social, political, economic, and en-
19 vironmental conditions in countries in the developing
20 world.

21 **SEC. 5. AUTHORIZATION OF APPROPRIATIONS.**

22 There are authorized to be appropriated to the Na-
23 tional Science Foundation \$9,000,000 for fiscal year
24 2002, \$13,500,000 for fiscal year 2003, and \$13,500,000
25 for fiscal year 2004 to carry out this Act.

Amend the title so as to read: "A bill to authorize the National Science Foundation to establish regional centers for the purpose of plant genome and gene expression research and development and international research partnerships for the advancement of plant biotechnology in the developing world."

H.R. 2051 as amended by the Subcommittee on Research**SECTION-BY-SECTION SUMMARY****SEC. 1. DEFINITIONS**

Defines "Director", as the Director of the National Science Foundation (NSF). Uses the definition for 'institution of higher education' found in the Higher Education Act of 1965. Defines "nonprofit organization" as a nonprofit research institute or a nonprofit association with experience and capability in plant biotechnology research as determined by the Director.

SEC. 2. MATCHING FUNDS

Allows NSF to establish a matching funds requirement for grantees to receive grants.

SEC. 3. PLANT GENOME AND GENE EXPRESSION RESEARCH CENTERS

Establishes a merit-based, competitive program at NSF to provide grants to consortia of institutions of higher education and/or non-profit organizations to develop regional plant genome and gene expression research centers. These centers would conduct research in plant genomics and plant gene expression. Research activities could include: 1) basic plant genomics research and applications related to the development and testing of new varieties of enhanced crops, including those grown in extreme environments and those grown with reduced reliance on fertilizer, 2) basic research related to the development of innovative, plant-derived products, 3) basic research on alternative uses of plants or plant material including the use of plants as renewable feedstock for energy production, and 4) basic research and dissemination of information on the ecological and other consequences of genetically engineered plants.

SEC. 4. PARTNERSHIPS FOR PLANT BIOTECHNOLOGY IN THE DEVELOPING WORLD

Establishes a merit-based, competitive program at NSF to provide grants to institutions of higher education, non-profit organizations, or consortia thereof, to develop research partnerships supporting plant biotechnology targeted to the needs of the developing world. Consortia may also include for-profit companies. The Director is to encourage, by means of outreach, the inclusion of Historically Black Colleges or Universities, Hispanic-Serving Institutions, or Tribal Colleges in the consortia. In order to receive grants, the grantee must have entered into a partnership with one or more research institutions in a developing nation. Research undertaken by the partnerships could include 1) basic genomic research on crops grown in the developing world, 2) basic research in plant biotechnology that improves plant tolerance, increases yield, or reduces the need for fertilizers, 3) basic research that could lead to the development of technologies to produce vaccine and pharmaceutical products in plants grown in the developing world, and 4) research on the social, political, economic, and environmental impact of plant biotechnology in the developing world.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

Authorizes \$9 million for FY 2002, \$13.5 million for FY 2003, and \$13.5 million for FY 2004 to carry out the Act.

Chairman BOEHLERT. Are there any amendments? Hearing none, the question is on the bill, H.R. 2051, A Bill to Provide for the Establishment of Regional Plant Genome and Gene Expression Research and Development Centers. All those in favor will say aye. All those opposed, no. The ayes have it. I now recognize Ms. Johnson for a motion.

Ms. JOHNSON. Thank you, Mr. Chairman. I move that the Committee favorably report H.R. 2051 as amended to the House with the recommendation that the bill as amended do pass. Furthermore, I move that the staff be instructed to prepare the legislative report and make necessary technical and conforming changes, and that the Chairman take all necessary steps to bring the bill before the House for consideration.

Chairman BOEHLERT. The question is now the motion to report the bill favorably. Those in favor of the motion will signify by saying aye. Opposed, no. The ayes appear to have it and the bill is favorably reported. Without objection, the motion to reconsider is laid upon the table. I move that the members have two subsequent calendar days in which to submit supplemental minority or additional views on the measure. Without objection, so ordered. I move pursuant to Clause 1 of Rule 22 of the Rules of the House of Representatives that the Committee authorize the Chairman to offer such motions as may be necessary in the House to go to conference with the Senate on H.R. 2051 or a similar Senate bill. Without objection, so ordered.

