

Plant Genome Research Program

*Collaborative Research and
Infrastructure Projects*

Program Announcement

DIRECTORATE FOR BIOLOGICAL SCIENCES

Deadlines: *February 2, 1998 (Letter of Intent)*
April 6, 1998 (Full Proposal)



NATIONAL SCIENCE FOUNDATION

Program Announcement National Science Foundation Plant Genome Research Program *Collaborative Research and Infrastructure Projects*

The National Science Foundation (NSF) announces an opportunity for research in basic plant genomic science. The goals of the program are to support research on the structure, organization and function of plant genomes, and to accelerate the acquisition and utilization of new knowledge and innovative technologies that will aid in developing a more complete elucidation of basic biological processes in plants. An integrated understanding of plant genome structure and function is essential for the development of improved economically significant plants and of novel plant based products. This program represents the initial NSF component of an anticipated National Plant Genome Research Initiative.

I. Background

Rapid, automated sequencing technologies, with related computational advances in analysis and informatics, have transformed the nature of biological research. Complete DNA sequences already exist for several bacteria and for brewer's yeast, and within a few years, the entire genome of the flowering plant *Arabidopsis thaliana* will be known. These huge amounts of data challenge the research and development community to understand and utilize this new knowledge effectively. One challenge, among many, is the revelation from complete sequencing of bacteria and yeast that nearly one-third of all the putative genes have no known function. Much about the structure, organization, and function of genomes remains uncharted.

In recognition of this unprecedented scientific opportunity, the National Science and Technology Council, at the request of Congress, established an Interagency Working Group on Plant Genomes (IWGPG) in May 1997. Representatives from the NSF, the Department of Energy (DOE), the United States Department of Agriculture (USDA) and the National Institutes of Health (NIH) were charged with developing a long-range, science-based plan for U.S. plant genome research. Subsequently, Congress appropriated funds to the NSF for Fiscal Year (FY) 1998 for "a comprehensive, peer-reviewed plant genome research program." It was further specified that the new NSF program should support research consistent with the IWGPG recommendations. In a preliminary report issued in June 1997, the IWGPG identified the following genome-based goals for advancing plant science with relevance to economically important plants: to support research and technology development in functional genomics; to develop the necessary physical and educational infrastructure to meet the needs of plant genomic research, including informatics tools and publicly available databases for Expressed Sequence Tags [ESTs] for major classes of economically important plants; in coordination with on-going international efforts, to initiate genomic studies of rice as a model plant for crop species in the grass family, such as corn, wheat and sorghum; and to accelerate efforts to

complete the sequencing of the genome of the model flowering plant, *Arabidopsis*.

The new Plant Genome Research Program is distinct in its scope and complexity from existing NSF programs that support plant genome research. The new Program is not intended to duplicate the ongoing activities of the human and microbial genome programs at NIH and DOE, nor those supported by the USDA plant genome program. However, it is expected that NSF-supported researchers will incorporate the conceptual and technical advances resulting from these other genome research programs. Submission of the same proposal under this program announcement to both NSF and another agency for simultaneous consideration will be permissible only with prior written approval of the agencies involved.

This program announcement provides information and procedures for submitting collaborative research and infrastructure proposals. Proposals for accelerated sequencing of the *Arabidopsis* genome will be solicited under a separate announcement.

II. Program Description

The Plant Genome Research Program will support projects that contribute to our understanding of the genome structure and organization of economically important plants, and that link genome information to function at the cellular, organismal or evolutionary levels. Included as an important element are projects to develop shared resources and research tools that will enable plant genome research to advance efficiently, rapidly, and in a cost-effective manner.

Given the intellectual and logistical complexity of the research projects envisioned, it is anticipated that most projects will involve multiple investigators including those from disciplines outside of biology, and many will involve multi-institutional networks organized as "virtual centers" or "centers without walls." NSF expects applicants to organize each proposed project in a manner that will best accomplish its scientific goals, in order to facilitate the most rapid progress, efficient use of resources, and effective integration of new advances as they occur.

Examples of relevant activities are given below. This list is not all-inclusive. Other projects will be considered as long as they meet the goals of this announcement.

- Multi-investigator research, using genomics approaches, on specific biological processes or biochemical pathways that are critical to our understanding of the biology of plants, especially those relevant to economically important plants. The proposal must represent a coherently developed scientific research project, not simply a compilation of individual projects. The specific aims must justify the inclusion of all investigators who will bring different expertise and/or perspectives to answer the questions that have been posed. The proposed activities are expected to be multi-faceted includ-

ing strong biology, robust information management strategies, and the development of new genomic research technologies.

- Development of shared resources and research tools. Technological advances are needed in such areas as: informatics tools for integrating and analyzing complex plant genomic data; novel methods for analysis of plant genome organization and its effect on biological function; and analysis of the global expression patterns of plant genes under specific conditions. Examples of useful shared resources include: publicly available database of ESTs for major classes of economically important plants; DNA libraries or molecular probes necessary for the international rice genome sequencing project; and plant genome information databases.

It is anticipated that approximately \$30-\$35 million will be available for proposals funded through this announcement. (Proposals for accelerated sequencing of the *Arabidopsis* genome will be solicited under a separate announcement.) Collaborative Research and Infrastructure Projects will be supported at award sizes ranging up to \$3 million per year for one to five years. Funds for facility construction or renovation may not be requested.

Other Considerations:

The project must contribute to our understanding of the structure, organization and function of genomes relevant to economically important plants.

Activities supported by this Program will provide an ideal environment to train young scientists in cutting-edge research technologies and expose them to new paradigms in plant biology. In addition, these activities will promote increased participation by members of under-represented groups. Applicants should take advantage of these training opportunities whenever feasible.

International networks of scientists exist for research on corn, rice, grasses, triticeae, poplar, and other plant species of economic importance. When applicable, the proposed research should either be coordinated with or made complementary to these international activities in order to avoid unnecessary duplication of effort. Primary support for any foreign participants/activities must be secured through their own national programs.

If the proposed project has a community service component (e.g., multi-user facility, distribution of DNA libraries), this program may help support the establishment of such a service center if it is well justified in terms of its potential demand, efficiency and cost-effectiveness. Plans for continued maintenance and operation beyond the initial award should include a cost-recovery plan, which does not anticipate long-term support from NSF.

Private industry has already made a significant investment in some plant genomic research. The NSF encourages applicants to collaborate with industry in ways that will advance the goals of the Plant Genome Research Program.

NSF policy expects that principal investigators agree to complete and open sharing of data and material in an expeditious manner. By submitting a proposal, it is understood that the submitting institution and all participants agree to these guidelines (see the *NSF Grant Proposal Guide (GPG)*, NSF 98-2, Chapter VII, Section H). The GPG is available on the NSF web site at the URL <http://www.nsf.gov/cgi-bin/getpub?nsf982/>.

III. Who May Submit

Proposals are invited from U.S. academic institutions, non-profit research institutions, and consortia of such institutions with appropriate research and educational facilities, under guidelines described in the *GPG* (NSF 98-2, Chapter I, Section D). When consortia of eligible individuals or organizations submit a proposal, a single principal investigator must be designated as the project director or coordinator, and a single organization must accept overall management responsibility.

IV. Proposal Submission

Potential applicants are strongly encouraged to contact one of the NSF program officers listed in Section VIII below, prior to proposal preparation.

Letter of Intent: Applicants are encouraged to submit a letter of intent. The letter of intent should be brief, including the name(s) of the principal investigator and co-principal investigator(s), a descriptive title of the proposed project, a statement of the major scientific goals, and identification of the organization(s) involved. This information will not be part of the material that will be peer reviewed, but will assist NSF staff in planning the review process.

Full Proposals: Submission of proposals must follow guidelines as described in the NSF publication *Grant Proposal Guide (GPG)*, NSF 98-2, with the following exceptions/additions for this Program:

- Multi-institutional proposals must identify a lead institution and be submitted as a single proposal, following the regular guidelines, not “Special Guidelines” as noted in Chapter II, Section D, 12(b) of the GPG.
- On the cover page, refer to this program announcement NSF (98-30).
- Results from prior support for principal and co-principal investigators need not be described in the Project Description; instead, see item A-1 below.
- Within the 15 page **Project Description**, the following information should be included:
 1. Include a statement of relevance of the proposed research to crop species and other plants of economic importance.
 2. If the proposed activity represents a part of an international or national collaborative project, describe the relationship of the proposed activity to the overall collaborative project and how the components will be coordinated.
 3. For a multi-investigator project, each investigator’s role must be clearly indicated at the appropriate points in the project description.
 4. When the proposed project involves undergraduate and/or graduate students, describe how they will be trained in a broad spectrum of plant genomic research.
 5. Describe efforts to promote involvement of members of under-represented groups.

6. If the proposal involves service to the scientific community, such as a multi-user facility or a distribution center for biological resources, describe how the activities will be managed. This plan should describe how quality will be controlled, how community input will be solicited, and what methods will be used to make the community aware of the service to be rendered. The plan should also address user fees and other sources of support for long-term maintenance of the service and should include documentation of institutional commitment to the project.

- In addition to the 15 page *Project Description*, include the following materials as an *Appendix* (If you are submitting a proposal via FastLane, see Instructions to FastLane Submission below.):

- A-1 Each PI and Co-PI must provide a description of the relationship between the proposed activity and current research activities in his/her laboratory (1 additional page for each PI/Co-PI). This will replace the “progress under prior support” section normally required in NSF proposals.
- A-2 Describe the management (up to 2 pages) of intellectual property rights as related to the proposed project, including plans for sharing data, information and materials resulting from the award. This plan should be specific about the nature of the results to be shared, the timing of the release, the means of release, and any constraints on release.
- A-3 Each project involving multi-investigators must provide an additional description of the project management plan (no more than 4 pages per project). Describe plans for coordinating the activities of the scientific collaborators (including international collaborators if applicable) and for allocating funds.

No other appendices are allowed.

V. When and Where to Submit

The letter of intent must be received by NSF by **February 2, 1998**. The letter should be faxed to (703) 306-0339 or mailed to Plant Genome Research Program, Division of Biological Infrastructure, National Science Foundation, 4201 Wilson Boulevard, Room 615, Arlington, VA 22230.

Full proposals must be received by NSF by April 6, 1998. You are encouraged to use NSF FastLane to prepare and submit your full Plant Genome Research Program proposal. Instructions for Preparing and Submitting a Plant Genome Research Program proposal via FastLane is located at (<http://www.fastlane.nsf.gov/al/genome.htm>). To access FastLane, go to the NSF Web Site at <http://www.nsf.gov>, then select “FastLane” or go directly to the FastLane Home Page located at <http://www.fastlane.nsf.gov/>.

For full FastLane proposal submissions, the proposal must be submitted via FastLane by April 6, 1998. **No copies should be mailed separately to NSF.** The signed cover sheet must arrive by April 13, 1997. Signed cover sheets should be mailed to:

Program Announcement Number: NSF 98-30
 Plant Genome Research Program
 Division of Biological Infrastructure
 National Science Foundation
 4201 Wilson Boulevard, Room 615
 Arlington, VA 22230

NOTE: If you are using FastLane, the Appendix should be included within the same PDF file as the 15 page Project Description, but it should be after the 15 page Project Description and clearly labeled.

If you are submitting your Plant Genome Research Program proposal using hard copies rather than electronically, you are required to submit the proposal cover sheet to NSF using FastLane.

For hard copy submissions, the original and 15 copies must be received at NSF by 5 p.m. Eastern time, April 6, 1998. Proposals must be mailed and addressed exactly as follows to:

Announcement/Solicitation No. NSF 98-30
 NATIONAL SCIENCE FOUNDATION PPU
 NSF PLANT GENOME RESEARCH PROGRAM
 4201 WILSON BOULEVARD ROOM P60
 ARLINGTON, VA 22230

Instructions for Submission of Cover Sheets of Plant Genome Research Program proposals using NSF Fastlane:

Instructions for the Principal Investigator (PI) for Cover-Sheet only FastLane submissions:

- Begin your FastLane Plant Genome Research Program proposal cover sheet and budget information as early as possible.
- Contact your Sponsored Research Office (SRO) for a PIN number to gain access to the FastLane “Proposal Preparation” application. If you have not submitted a proposal to NSF in the past, you must contact your SRO to be added to the NSF PI database. Please do this as soon as you decide to prepare a proposal.
- As early as possible, enter your cover sheet and budget information using the FastLane “Proposal Preparation” application. In the field labeled “Program Announcement,” type in “NSF 98-30” exactly as shown, with no additional spaces or characters. In order to enter the requested amount you will need to select “Budgets” on the “Form Selector” screen and then “Go To Form” and then click on the “Requested Amount” button.
- Click on the “Allow SRO Access” button. Allow time for your SRO to approve, copy and mail the proposal to meet the deadline. Contact your SRO to inform them of the proposal ID.
- Print the cover sheet (and budget, if desired) and insert into the printed copy of the proposal.

Instructions for the Sponsored Research Office:

- Print the second page of the cover sheet in time to obtain the required institutional signatures.
- Before assembling the proposal for copying, submit the cover sheet to NSF via FastLane using the “Submit Proposal” function within the “Institutional Management of FastLane” application.
- Print a copy of the cover sheet; it will have the proposal number on it.
- Substitute the first page of the cover sheet for the one produced by the PI.
- Make copies of the proposal and submit to NSF according to the usual procedures for a paper proposal addressed as noted above. Reference the GPG, Chapter I, Section F, “Paper Submission.” The hard copies of the proposal **MUST** be received at NSF by 5 p.m. Eastern time, April 6, 1998.

Please direct your questions concerning FastLane to fastlane@nsf.gov.

VI. Evaluation of Proposals

Selection of awards will be based on merit review by scientific experts using both mail and panel reviews.

The general NSF merit review criteria as described in the GPG (NSF 98-2, Chapter III) are: (1) the intellectual merit of the proposed activity, and (2) the broader impacts of the proposed activity. These criteria will be interpreted by the peer reviewers within the context of this program announcement. In addition, reviewers will focus on the following issues:

- potential to advance plant genome research in the US;
- relevance or potential impact of the proposed project to the development of improved, economically significant plants;
- effectiveness of the project’s organizational and research plan to integrate technical advances and new scientific opportunities;
- soundness and openness of the information-sharing plan and management of intellectual property rights;
- quality of the training environment for junior scientists;
- commitment to promote participation of members of under-represented groups.

Where appropriate, reviewers will also consider:

- cohesiveness and soundness of the planned coordination for a multi-investigator project;
- efficiency and cost-effectiveness of the proposed approach for infrastructure development;
- management plan for service functions.

VII. Award Administration

It is anticipated that approximately \$30-\$35 million will be available for proposals funded through this announcement. (Proposals for accelerated sequencing of the *Arabidopsis* genome will be solicited under a separate announcement.) Collaborative Research and Infrastructure Projects will be supported at award sizes ranging up to \$3 million per year for one to five years. Funds for facility construction or renovation may not be requested.

Funding decisions are expected to be made by the end of July 1998 with awards expected to start in September 1998. Awards will be made as grants or cooperative agreements, as appropriate. Awards will be administered in accordance with the terms and conditions of NSF GC-1, “Grant General Conditions,” FDP-III, “Federal Demonstration Project General Terms and Conditions” depending on the grantee organization, or “Cooperative Agreement General Terms and Conditions.” This information can be obtained from the NSF Online document system (<http://www.nsf.gov/>). Copies of these documents are available at no cost from the NSF Clearinghouse, P.O. Box 218, Jessup, MD 20794-0218, phone (301) 947-2722, or via e-mail at (pubs@nsf.gov). More comprehensive information is contained in the NSF Grant Policy Manual (NSF 95-26), for sale through the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402. The telephone number at GPO is (202) 783-3238 for subscription information.

VIII. Other Information

Inquiries: Potential applicants are strongly encouraged to contact NSF to discuss their plans. Inquiries regarding the program announcement can be directed to the following individuals or to the e-mail address, dbipgr@nsf.gov:

Dr. Karen Kindle at (703)306-1441
 Dr. Elizabeth Lyons at (703)306-1481
 Dr. DeLill Nasser at (703)306-1439
 Dr. Judith Plesset at (703)306-1417

Other Opportunities: Information about other Federal programs that support research activities in plant genomics and related areas can be found at the following locations:

- Arabidopsis Genome Sequencing Project (NSF 95-159, under revision: (<http://www.nsf.gov/bio/>))
- National Science Foundation programs (<http://www.nsf.gov/>)
- National Human Genome Research Institute (<http://www.nhgri.nih.gov/>)
- DOE programs on human and microbial genomes, and plant biology research (<http://www.er.doe.gov/>)
- Plant genome research program area at USDA National Research Initiative Competitive Grants program (<http://www.reeusda.gov/>)

The Foundation provides awards for research and education in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research and education related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of; or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff; including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-S 1, 60 Federal Register 4449 (January 23, 1995), Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994).

Public Burden. Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

The public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Gail A. McHenry, Reports Clearance Officer, Information Dissemination Branch, National Science Foundation, 4201 Wilson Boulevard, Suite 245, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

The program described in this publication is in the Catalog of Federal Domestic Assistance: NSF-Number 47.074, Biological Sciences.

