

Plant Genome Research Program (PGRP)

Program Solicitation

NSF 05-603

Replaces Document NSF 04-510



National Science Foundation
Directorate for Biological Sciences
Division of Biological Infrastructure

Full Proposal Target Date(s):

November 01, 2005

REVISIONS AND UPDATES

This Program Solicitation replaces [NSF 04-510](#). Four significant changes have been made in this solicitation: (1) The proposal submission deadline has been changed to a target date; (2) There is now a limit on the number of proposals an investigator can be included in -- only one proposal as a principal investigator or a co-principal investigator will be accepted in response to this Program Solicitation; (3) There are new proposal categories designed to encourage individual and small groups of investigators to apply; and (4) A "Checklist for Proposal Preparation" has been added to the "Proposal Preparation" section.

SUMMARY OF PROGRAM REQUIREMENTS

General Information

Program Title:

Plant Genome Research Program (PGRP)

Synopsis of Program:

This program is a continuation of the Plant Genome Research Program (PGRP) that began in FY1998 as part of the National Plant Genome Initiative (NPGI). The current five-year plan for the NPGI was published in January 2003 (<http://www.ostp.gov/NSTC/html/npgi2003/index.htm>). The overall goals of this program are to support basic research in plant genomics and to accelerate the acquisition and utilization of new knowledge and innovative approaches to elucidating fundamental biological processes in plants. The focus is on plants of economic importance and plant processes of potential economic value.

In the past eight years of the PGRP, there has been a tremendous increase in the tools available for genomics in key crop plants and their models, including but not limited to, expressed sequence tags (ESTs), genome survey sequences, mutant collections, expression profiling resources, and tools for studying gene expression *in situ*. High quality whole genome sequences and downstream tools are available for model dicots (*Arabidopsis*, poplar) and a model monocot (rice), and the sequencing of the gene-rich portions of tomato and *Medicago* is under way. This wealth of genomic resources now makes it possible for researchers to begin to address some of the major unanswered questions in plant biology that have been intractable using traditional approaches as well as translate findings from model systems into plants of economic importance. At same time, there is a continued need for novel and creative tools to allow development of new experimental approaches or new ways of analyzing genomic data. Proposals that present conceptually new and different ideas are encouraged, especially from investigators and institutions that have not participated in the PGRP before. In addition, proposals that provide strong and novel training opportunities integral to the research plan, and particularly across disciplines are especially encouraged.

Three kinds of activity will be supported in FY2006: (1) Genome-Enabled Plant Research (GEPR) awards to tackle major unanswered questions in plant biology on a genome-wide scale, (2) Translational Research from Model Systems (TRMS) to transfer findings made using model systems to plants of economic importance, and (3) Tools and Resources for Plant Genome Research (TRPGR) awards to support development of novel technologies and analysis to enable discovery in plant genomics. While young investigators can apply for any of these opportunities, eligible researchers are strongly encouraged to apply to the CAREER Program (NSF 05-579: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5262&org=BIO&from=home).

Cognizant Program Officer(s):

- Dr. Jane Silverthorne, Program Director, Plant Genome Research Program, telephone: (703) 292-8470, email: dbipgr@nsf.gov
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Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.074 --- Biological Sciences

Eligibility Information

- **Organization Limit:**

Proposals may only be submitted by U.S. academic institutions, U.S. non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the U.S. that are directly associated with educational or research activities, and consortia of only the eligible organizations listed here. When a consortium of eligible organizations submits a proposal, it must be submitted as a single proposal with one organization serving as the lead and all other organizations as subawardees. Organizations ineligible to submit to this program solicitation may not receive subawards.

- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** There is a limit on the number of proposals an investigator can be included in -- only one proposal as a principal investigator or a co-principal investigator will be accepted in response to this Program Solicitation.

Award Information

- **Anticipated Type of Award:** Standard or Continuing Grant or Cooperative Agreement
- **Estimated Number of Awards:** 30 Approximately 30 new awards, pending availability of funds
- **Anticipated Funding Amount:** \$35,000,000 Approximately \$35 million in FY 2006 for new awards, pending availability of funds.

Proposal Preparation and Submission Instructions

A. Proposal Preparation Instructions

- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required by NSF.
- **Indirect Cost (F&A) Limitations:** Not Applicable.
- **Other Budgetary Limitations:** Not Applicable.

C. Due Dates

- **Full Proposal Target Date(s):**

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria apply.

Award Administration Information

- **Award Conditions:** Standard NSF award conditions apply.
- **Reporting Requirements:** Standard NSF reporting requirements apply.

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I. INTRODUCTION

The National Science Foundation (NSF) announces its intention to continue to support plant genome research that began in 1998 as part of the National Plant Genome Initiative (NPGI; <http://www.ostp.gov/NSTC/html/npgireport.html>). The long-term goals of this program are to support research on plant genomics and to accelerate the acquisition and utilization of new knowledge and innovative approaches to the analysis of fundamental biological processes in plants. The program focuses on plants of economic importance and plant processes of potential economic value.

For the past eight years, the NSF Plant Genome Research Program has followed the long-range plans for the NPGI and, working closely with the US Department of Agriculture (USDA), Department of Energy (DOE), National Institutes of Health (NIH) and more recently the US Agency for International Development (USAID) and the National Aeronautic and Space Agency (NASA), the NSF Program has contributed to tremendous advances in plant genomics and plant sciences. The program is currently following the second five-year plan (National Plant Genome Initiative: 2003-2008; <http://www.ostp.gov/NSTC/html/npgi2003/index.htm>) published in January 2003 by the Interagency Working Group on Plant Genomes, the group that oversees the NPGI. This plan builds on the significant advances made since the start of the NPGI and charts a course for advancing the frontiers of plant science through genomics research. Following the goals set out in this plan, the NSF

PGRP encourages new, innovative ideas in the form of basic research and tool development projects that will move the whole field of plant biology forward. High-risk proposals or proposals that present unconventional ideas are welcomed. The list of ongoing projects available at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5338&org=BIO should be consulted to ensure that a planned proposal would make a significantly new contribution to the field.

Proposals that focus on individual genes or small gene families should be sent to other BIO programs (see web pages available through <http://www.nsf.gov/dir/index.jsp?org=BIO> for listing of programs and funding opportunities). Proposals with a focus on *Arabidopsis* functional genomics should be sent to the 2010 Project (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5337&org=BIO). Proposals to sequence plant-associated microbes should be sent to the NSF/USDA Joint Program on Microbial Sequencing (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5688). You are strongly encouraged to contact a Plant Genome Program Director to determine the suitability of your proposal for the PGRP prior to submission.

Simultaneous submission of proposals to this program and another federal agency (for example, the USDA National Research Initiative Competitive Grants Program) is permissible with prior written approval of the agencies involved. A proposal from the same submitter that is a duplicate of, or substantially similar to, a proposal already under consideration by NSF will be returned without review.

II. PROGRAM DESCRIPTION

The goals of this program are to support basic research in plant genomics and to accelerate the acquisition and utilization of new knowledge and innovative approaches to the elucidation of fundamental biological processes in plants. The Program focuses on plants of economic importance and plant processes of potential economic value.

In the eight years since the NPGI began, a wealth of genomic resources have been developed for plant biology. Given these resources and the advances that have been made in technology development and bioinformatics, it should now be possible to begin addressing major unanswered questions in plant biology. In addition, advances made using model systems can now be translated into plants of agronomic importance. New tools and methodologies are also needed to advance the field of plant biology as well as to tackle questions that are intractable using current approaches. This Program Solicitation has been developed taking those objectives and the NSF's mission and strengths into consideration.

The PGRP is committed to broadening participation. NSF believes that research tools and resources developed over the past eight years should enable any institution to take part in plant genome research. New investigators, investigators that have not participated in the PGRP in the past or from small institutions, are strongly encouraged to submit a proposal. Proposals from individuals and small groups are especially encouraged. Eligible young researchers are encouraged to apply for the Faculty Early Career Development (CAREER) Program or Research Initiation Grants and Career Advancement Awards to Broaden Participation in the Biological Sciences (see below).

Proposers are encouraged to consider inclusion of activities described in the Dear Colleague Letter for Developing Country Collaborations in Plant Genome Research (NSF 04-563: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04563). Proposed collaborative activities should focus on research problems important to developing countries that include scientist-to-scientist interactions potentially leading to long-term partnerships among participating laboratories. The exchange of ideas and people should be reciprocal and should be built on equal partnerships between U.S. scientists and scientists of developing nations. Examples of activities to be supported would include, but not be limited to, joint research projects and long-term (one year) or short-term (between one and three months) reciprocal exchange visits. Collaborations should be developed that bring complementary sets of expertise to bear on problems of importance to the participants from developing countries and that meet their identified needs. The described activities should meet the budgetary and organizational guidelines described in the Dear Colleague Letter.

Three areas of opportunity will be offered as components of the Plant Genome Research Program in fiscal year 2006: (1) Genome-Enabled Plant Research (GEPR) awards to tackle major unanswered questions in plant biology on a genome-wide scale, (2) Translational Research from Model Systems (TRMS) to transfer findings made using model systems to plants of economic importance, and (3) Tools and Resources for Plant Genome Research (TRPGR) awards to support development of novel tools to enable discovery in plant biology. This change in Program focus recognizes the utility of genomics tools in addressing major unanswered questions in plant biology, the power of using model systems as an entree to understanding key plant pathways and processes, as well the continued need for new methodologies to tackle problems that remain intractable using existing approaches. Proposers are strongly encouraged to review the guidelines for each opportunity carefully and to contact a PGRP Program Director if there are any questions about the programmatic fit.

Genome-Enabled Plant Research (GEPR):

The NSF PGRP is evolving by increasing use of the new tools and resources that have become available through the NPGI. While there still remain some large community resources to be built, those available now are sufficient to begin to address

major unanswered questions in plant biology, some of which have not been tractable using traditional approaches alone. To be eligible, projects should be developed on a whole genome, whole organelle or whole network scale. Proposals are solicited from single investigators, small groups and multi-institution “virtual centers”. The scale of the project in terms of personnel and budget should be developed in the context of the proposed activities. The management plan should be appropriate for the proposed activities and a carefully developed plan and timetable will strengthen a proposal.

Proposers are encouraged to think outside the box and to put forward imaginative and creative ideas, selecting experimental systems best suited to the research focus and taking advantage of the available genomics tools and resources. Proposals should clearly justify the relevance of the research activities to the goals of the NSF PGRP.

Translational Research from Model Systems (TRMS):

Model systems, whether non-plant (for example, yeast) or plant (for example, *Arabidopsis* and rice) are a powerful way to access complex biological pathways that may not be readily accessible in many plants of economic importance. Substantial investments have been made in model systems, including whole genome sequences, expressed sequence collections, mutant collections, whole genome microarrays and proteome resources. These resources have already enabled considerable progress in understanding the genomic basis of a range of complex biological processes, including traits of economic importance. For example, regulatory networks controlling complex traits such as plant size and cold tolerance have been identified in *Arabidopsis*. The time has come to transfer the knowledge gained in a model system to uncover basic mechanisms underlying important traits in plants of economic importance.

Proposers are encouraged to choose important problems and traits of economic importance that combine the strengths of the chosen model system or systems with the importance of the work in the chosen target plant. Proposals should clearly justify the relevance of the research activities to the goals of the NSF PGRP as well their potential downstream impacts.

To be eligible, projects should be developed on a whole genome, whole organelle or whole network scale. Proposals are solicited from single investigators, small groups and multi-institution “virtual centers”. The scale of the project in terms of personnel and budget should be consistent with the proposed activities. The management plan should be appropriate for the proposed activities and a carefully developed plan and timetable will strengthen a proposal.

Tools and Resources for Plant Genome Research (TRPGR):

While tremendous advances have been made in the development of tools and technologies for plant genome research, there is still a demand for additional resources to tackle unmet needs. Proposers are encouraged to develop novel approaches focused on a specific problem or need. Risky proposals are welcome. Priority will be given to new or novel tools that are likely to contribute broadly to the advancement of the field of plant genomics. Proposals are solicited from single investigators, small groups, and multi-institution “virtual centers”. The scale of the project in terms of personnel and budget should be consistent with the proposed activities. The management plan should be appropriate for the proposed activities and a carefully developed plan and timetable will strengthen a proposal.

Projects that focus on development of community resources, either through production of research resources or novel tools or establishment of a service, must be justified in terms of potential demand, efficiency and cost-effectiveness. If appropriate, plans for continued maintenance or operation of such a service after the award should be described without assuming long-term NSF support.

Additional Considerations as Appropriate

- *Integration of Research and Education and Broadening Participation Activities* supported by the PGRP should provide an ideal environment for training young scientists in modern research technologies, introducing them to new paradigms in plant biology, and promoting increased participation by members of under-represented groups. Informatics skills are critical to making the maximum use of genome resources. Accordingly, proposers are expected to integrate this training into their projects at all levels, wherever appropriate. NSF expects proposers to take advantage of the unique opportunities the proposed project provides in terms of education and incorporate these into the plan at a scale that is commensurate with the scale of the proposed activity. Focused activities that fit well with the specific opportunities offered by the project would be viewed as a strength. Proposers are encouraged to take advantage of existing programs and networks where appropriate, building opportunities unique to the project research goals.
- *Data Sharing* A massive amount of data continue to be generated through PGRP activities. Proposers are encouraged to consider their project outcomes in the context of the whole field of plant biology and ensure maximal accessibility and visibility. Outcomes are expected to meet current community standards for genomic data and be deposited into the existing long-lived community databases where appropriate.
- *Societal Impact* When appropriate, issues related to the societal impact of plant genome research should be addressed as an integral part of a proposal. These issues could be integrated into research (e.g., studies on horizontal gene transmission at a genomic scale, the genome-wide basis of pesticide resistance, development of selectable markers for transformation studies), or into an education and/or outreach activity designed to

communicate the significance of the outcomes of plant genome research to society.

- *International Collaboration* Plant genome research is actively pursued all over the world. NSF encourages international research collaborations, particularly with investigators from developing countries, and especially where there is a common research focus or system. When applicable, proposed research activities should be coordinated with similar efforts in other countries to maximize efficiency and avoid unnecessary duplication of effort. However, foreign participants should secure support for their component of the collaboration from their own national programs. The PI is encouraged to contact a PGRP Program Director for guidance regarding allowable costs.
- *Industrial Collaboration* Private industry has already made a significant investment in plant genomic research. Innovative collaborations with industry are encouraged when they advance the goals of the PGRP. However, NSF funds may not be used to support the industrial collaborators. Participation of a company as a provider of a service should be managed according to the submitting institution's procurement policy. When private industry is involved, the proposer is responsible for ensuring that any intellectual property issues are handled according to NSF Policy (see section A-1 under Special Information and Supplementary Documentation below).

Other Funding Opportunities in Plant Genome Research at NSF

The PGRP is participating in the following NSF-wide Programs in FY2006:

Faculty Early Career Development (CAREER) Program

Young Investigator Awards in Plant Genome Research (YIA-PGR), for scientists with recently awarded Ph.D.s who hold an independent position, is no longer offered. Instead, qualified researchers are encouraged to apply to the CAREER Program. Please note that these proposals should be submitted directly to CAREER following the guidelines set out in NSF 05-579: (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5262&org=BIO&from=home). The next deadline for CAREER is July 18, 2006. CAREER proposals will be reviewed according to the CAREER program's guidelines. The minimum award amount for BIO CAREER is \$100,000 per year for up to five years. It is expected that the PGRP CAREER project requests will range up to \$225,000 per year. NSF expects that PGRP CAREER projects will take full advantage of data, materials, information, expertise, and facilities available through prior PGRP funded projects. Whenever appropriate, the proposer should network with existing PGRP-supported activities. Funds may be requested to visit existing PGRP laboratories, to participate in training opportunities offered by the existing PGRP projects, or to use genome research facilities not available at the proposer's institution. In addition to young investigators trained in plant biology, investigators trained in genomics of non-plant systems, informatics, and other disciplines that are critical to advancing the field of plant genome research are strongly encouraged to apply.

Integrative Graduate Education and Research Traineeship (IGERT) Program

An institution or a group of investigators wishing to establish a graduate research training program with a focus on plant genomics should apply to the Integrative Graduate Education and Research Traineeship (IGERT) Program at NSF. The IGERT program has been developed to meet the challenges of educating U.S. Ph.D. scientists, engineers, and educators with the interdisciplinary backgrounds, deep knowledge in chosen disciplines, and technical, professional, and personal skills to become the leaders and creative agents for change. The program is intended to catalyze a cultural change in graduate education, for students, faculty, and institutions, by establishing innovative models for graduate education and training in a fertile environment for collaborative research that transcends traditional disciplinary boundaries. The program solicitation for the FY2006 IGERT competitions will be posted at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12759&org=NSF. Please note that IGERT proposals should be prepared and submitted in accordance with the IGERT guidelines, not the PGRP guidelines.

Research Initiation Grants and Career Advancement Awards to Broaden Participation in the Biological Sciences

The Directorate for Biological Sciences (BIO) at NSF offers two funding opportunities under this solicitation: (1) Research Initiation Grants [RIG] and (2) Career Advancement Awards [CAA], with the goal of broadening the participation of scientists from groups underrepresented in the biological sciences in the US (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf05581). These activities seek to promote the development and retention of scientists from underrepresented groups and to increase the numbers of such individuals that serve as role models for the scientific workforce of the future. A specific goal is to increase the number of research proposals submitted to NSF by individuals from groups currently underrepresented in the biological sciences as well as from scientists at minority serving institutions so that they can become actively and competitively engaged in research as independent investigators and, by doing so, create new research opportunities for students from underrepresented groups. Inquiries about proposals that would meet the goals of this program in the context of the PGRP goals are welcome. Prospective applicants are strongly encouraged to contact the cognizant Program Director of this program for further guidance.

Small Grants for Exploratory Research (SGER)

Proposals for small-scale, exploratory, high-risk research in the fields of science, engineering and education may be

submitted to PGRP. Such research is characterized as preliminary work on untested and novel ideas, ventures into emerging and potentially transformative research ideas, application of new expertise or new approaches to "established" research topics, having a severe urgency with regard to availability of, or access to data, facilities or specialized equipment and likely to catalyze rapid and innovative advances. The PGRP is especially interested in proposals that test new and unconventional ideas. Proposals should meet the overall goals of the Plant Genome Research Program as described in this program solicitation and the current Five Year Plan for the NPGI.

Investigators should contact a PGRP Program Director prior to submitting an SGER proposal. This will facilitate determining whether the proposed work meets the guidelines described above and the appropriateness for SGER funding. The guidelines for SGER proposals are available at http://www.nsf.gov/pubs/gpg/nsf04_23/2.jsp#IID1.

Conferences, Workshops and Symposia

The PGRP supports conferences, symposia and workshops in plant genomics that bring experts together to discuss current research, to expose other researchers or students to new research methods, and to discuss future directions of major research activities in plant genomics and bioinformatics. Conferences will be supported only if equivalent results cannot be obtained at regular meetings of professional societies or the established conference series. More information about submission of these proposals can be found at http://www.nsf.gov/pubs/gpg/nsf04_23/2.jsp#IID7. Proposers are encouraged to contact a Program Director prior to about the suitability of the proposed activity for PGRP support prior to submission.

III. ELIGIBILITY INFORMATION

- **Organization Limit:** Proposals may only be submitted by U.S. academic institutions, U.S. non-profit research organizations including museums, research laboratories, professional societies and similar organizations in the U.S. that are directly associated with educational or research activities, and consortia of only the eligible organizations listed here. When a consortium of eligible organizations submits a proposal, it must be submitted as a single proposal with one organization serving as the lead and all other organizations as subawardees. Organizations ineligible to submit to this program solicitation may not receive subawards.
- **PI Eligibility Limit:** None Specified.
- **Limit on Number of Proposals:** There is a limit on the number of proposals an investigator can be included in -- only one proposal as a principal investigator or a co-principal investigator will be accepted in response to this Program Solicitation.

IV. AWARD INFORMATION

Depending on the nature of the proposed activity, projects will be supported either as grants or cooperative agreements. The award size will be determined based on the nature of activities and at a level that would be enabling, as well as the availability of funds.

The estimated number of awards will be 30, pending availability of funds. The anticipated award date is June 2006. The anticipated funding amount is \$35,000,000. Approximately \$35 million in FY 2006 for new awards, pending availability of funds.

Proposals submitted to GEPR, TRMS and TRPGR will be generally supported at award levels of up to \$2 million per year for up to five years depending on the scale and scope of the proposed research. If the requested levels are higher, it is incumbent upon the proposer to provide sufficient justification of need.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Full Proposal Instructions:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Website at: http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

Potential proposers are strongly encouraged to carefully read the program solicitation prior to preparation of proposals and to contact the PGRP Program Directors if there are any questions. Proposals that do not meet the guidelines may be returned without review.

Proposals must be submitted by FastLane (see "FastLane Requirements" section below) and must follow the guidelines described in the GPG. The following exceptions and additions apply to proposals submitted to this Program:

Proposal Cover Sheet: In the NSF FastLane system, follow the instructions on proposal preparation. The Project Title must start with "GEPR:...", "TRMS:...", or "TRPGR:...", depending on the program the proposal is targeting. When completing the Cover Sheet, click on the GO button at "Program Announcement/Solicitation/ Program Description No." Highlight Plant Genome Research Project and click on the Select button. Your proposal will automatically be assigned to DBI--Plant Genome Research Project. Be sure to complete the remainder of the cover sheet information. Please note that a maximum of 4 Co-PIs can be listed on the cover page. Additional Senior Personnel should be included in the complete list provided in the Project Summary.

BIO Proposal Classification Form (PCF): Complete the BIO PCF, available on the NSF FastLane system. The PCF is an on-line coding system that allows the Principal Investigator to characterize his/her project when submitting proposals to the Directorate for Biological Sciences. Once a PI begins preparation of his/her proposal in the NSF FastLane system, selects any program within the Directorate for Biological Sciences as the first or only organizational unit to review the proposal, and saves the cover sheet, the PCF will be generated and available through the Form Preparation screen. Additional information about the BIO PCF is available in FastLane at <http://www.fastlane.nsf.gov/a1/Biolnstr.htm>.

Project Summary (maximum 1 page): The project summary should consist of **three separate parts** in the following order:

- (1) a list of senior personnel (PI, Co-PIs, key-collaborators) along with their home institutions;
- (2) a summary of the scientific objectives and approaches; and
- (3) expected broader impacts of the proposed research.

Both the scientific aspects and the anticipated broader impacts must be addressed or the proposal will be returned without review. See Section VI. of this solicitation for additional information. Please read the Important Notice from the Director/ NSF which can be found at <http://www.nsf.gov/pubs/2002/iin127/imptnot.pdf>.

Project Description (maximum 15 pages, including figures and tables, for GEPR, TRMS and TRPGR proposals): In addition to the standard description in the GPG, the guidelines below should be followed, noting that the page allowances listed are part of the overall 15-page maximum:

- **Results from prior NSF support** (maximum 5 pages): **Only the most relevant** prior awards (PGRP or non-PGRP) should be listed in this section for the PIs and Co-PIs listed in the "Project Summary." In addition to results from relevant NSF awards, results from any other closely related awards from the Federal government should be described if applicable.
- **Relevance and justification:** Briefly, but explicitly, explain the relevance of the proposed research to the stated goals of the PGRP.
- **Research plan:** Describe the goals of the project, scientific and technical approaches, including informatics where appropriate, with expected outcomes. Descriptions must be sufficiently detailed to allow adequate review.
- **Plan to integrate research and education:** It is expected that all proposals will include activities that integrate research and education. NSF expects that each proposal will include a thoughtful training and/or educational component that takes advantage of unique and specific opportunities the proposed project would provide. The scale of the training and educational activities should be commensurate with the scale and scope of the proposed research and integrated well into the overall project plan. The following items must be included: (1) a well designed plan to increase participation of members of under-represented groups that is specific to the proposed project, (2) an education plan, which can be (but is not limited to) a training plan for students at all levels, or an outreach activity for secondary school teachers and students, or a workshop to train other researchers in new concepts or techniques being developed by the project, and (3) a description of how these plans are integrated with the proposed research plan. A clear and realistic discussion of how the plan will be implemented should be included in the proposal. Simply describing general policies and ongoing efforts at the investigators' institutions will not be sufficient.

References Cited: Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI, or Co-PI when following the GPG guidelines for all references cited.

Biographical Sketches (2 pages each): Biographical sketches following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel listed on the Project Summary page.

Proposal Budget: Provide a summary budget and a yearly budget for the duration of the proposed project. When subawards are involved, summary and yearly budgets are required for each subaward. A Budget Justification should be provided. A careful and realistic budget will add to the overall strength of a proposal. Funds for facility construction or renovation may not be requested. Funds to cover the cost of attendance of the PI and one co-PI (the informatics co-PI, where appropriate) at each year's annual awardee meeting in Arlington, VA should be requested.

Current and Pending Support: Current and Pending Support following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel listed on the Project Summary page.

Facilities, Equipment and Other Resources: Provide a description of available facilities and priorities for its use. For GEPR, TRMS and TRPGR projects requiring additional equipment, justify the need for these resources in the context of the innovative work proposed.

Special Information and Supplementary Documentation:

Include the following materials in addition to Project Description. These materials should be labeled clearly and included in the **Supplementary Documents** section of FastLane.

(A-1) Sharing of Results and Management of Intellectual Property (maximum 3 pages): Describe the management of intellectual property rights related to the proposed project, including plans for sharing data, information, and materials resulting from the award. This plan must be specific about the nature of the results to be shared, the timing and means of release, and any constraints on release. The proposed plan must take into consideration the following conditions where applicable:

- Sequences resulting from high-throughput large-scale sequencing projects (low pass whole genome sequencing, BAC end sequencing, ESTs, full-length cDNA sequencing, etc.) must be released according to the currently accepted community standard (e.g. Bermuda/Ft. Lauderdale agreement) to public databases (GenBank if applicable), as soon as they are assembled and the quality checked against a stated, pre-determined quality standard.
- Proposals that would develop genome-scale expression data through approaches such as microarrays should meet community standards for these data (for example, Minimum Information About a Microarray Experiment or MIAME standards). The community databases (e.g. Gene Expression Omnibus) into which the data would be deposited, in addition to any project database(s) should be indicated.
- If the proposed project would produce community resources (biological materials, software, etc.), NSF encourages that they be made available as soon as their quality is checked to satisfy the specifications approved prior to funding. The timing of release should be stated clearly in the proposal. The resources produced must be available to all segments of the scientific community, including industry. A reasonable charge is permissible, but the fee structure must be outlined clearly in the proposal. If accessibility differs between industry and the academic community, the differences must be clearly spelled out. If a Material Transfer Agreement is required for release of project outcomes, the terms must be described in detail.
- When the project involves the use of proprietary data or materials from other sources, the data or materials resulting from NSF funded research must be readily available without any restrictions to the users of such data or materials (no reach-through rights). The terms of any usage agreements should be stated clearly in the proposal.
- Budgeting and planning for short-term and long-term distribution of the project outcomes must be described in the proposal. If a fee is to be charged for distribution of project outcomes, the details should be described clearly in the proposal. Letters of support should be provided from databases or stock centers that would distribute project outcomes, including an indication of what activities would be undertaken and funds needed for these activities (if any).
- In case of a multi-institutional proposal, the lead institution is responsible for coordinating and managing the intellectual property resulting from the PGRP award. Institutions participating in multi-institutional projects should formulate a coherent plan for the project prior to submission of the proposal.

(A-2) Management Plan (maximum 5 pages): GEPR, TRMS and TRPGR projects involving multiple investigators and multiple institutions, or that include a community service component, must provide a description of the management plan for coordinating the activities of the group, or management of the service aspect.

- This description should include plans for internal means of communication, coordination of data and information management, evaluation and assessment of progress, allocation of funds and personnel, interaction with the customers in a service project, and other specific issues relevant to the proposed activities.
- For multi-investigator proposals, a table summarizing the role of each investigator is required. The exact time commitment of each key project member should be indicated in the management plan, regardless of any request for his/her salary from NSF. For community resource projects, a timetable with yearly goals should be provided that includes benchmarks for the major anticipated outcomes and expected dates for their release.
- If the proposal includes a service component such as a multi-user facility or production and distribution of community

research resources, a description of how activities within the facility will be managed, how quality will be controlled, how community input will be solicited, what methods will be used to make the community aware of the service to be rendered, and how the community will access resources to be produced, should be provided. The plan should also document institutional commitment to the facility, user fees if anticipated, and plans for long-term support after the end of the project. For a complex project, appointment of a project manager and/or administrator is strongly encouraged.

- The NSF encourages appointment of an outreach/education coordinator where appropriate. A postdoctoral fellow or a senior graduate student interested in education and outreach activities may be appointed to this role.

(A-3) Coordination with Outside Groups (maximum 2 pages): If the proposed activity is part of a national or international collaborative project, describe the relationship of the proposed activity to the overall collaborative project and how the components will be coordinated. General letters of support are not allowed.

Provide only the allowable and applicable items as noted in the GPG and this section. Include the materials in the FastLane submission by transferring them as .PDF files through the "Supplementary Docs" module of the FastLane system.

Color Images (if applicable): Be advised that NSF cannot accommodate the printing of color images as part of proposal submission through the FastLane system, and submitted proposals that require the use of color or of very high resolution photographic images will necessitate additional steps. Further instructions will be provided after the proposal has been received.

Any material not specifically requested or in excess of the page allowances will be discarded prior to review. It is the submitting institution's responsibility to ensure that the proposal is compliant with the guidelines. Non-compliant proposals may be returned without review.

Single Copy Documents:

Conflict of Interest Document A single integrated document (in table or spreadsheet form only) should be uploaded into the **Single Copy Documents (not Supplementary Documents)** section of FastLane at the time of proposal submission. Hard copies or e-mail copies will not be accepted. The document should consist of a list in the form of a single alphabetized table, with the full names (Last name, first name, middle initial) of all people having a conflict of interest with any senior personnel and any named personnel member whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, including postdoctoral advisors and advisees and (3) any other individuals or institutions with which the investigator has financial ties (please specify type). Members of current Advisory Committees who receive reimbursement for travel or honoraria should be included in this last category.

In addition to the Conflict of Interest Document, other correspondence to the program not intended to be sent to reviewers such as a list of potential reviewers can be sent through the Single Copy Document section of FastLane. Please note that key project personnel may be required, prior to an award decision, to submit copies of any intellectual property agreements or material transfer agreements they have signed, or are planning to sign, that would impact the unrestricted and timely distribution of the outcomes of the NSF funded research. Submission of a Single Copy Document will allow these documents to be reviewed by the NSF officials only, and they will remain confidential.

Checklist for Proposal Preparation

- Title begins "GEPR:...", "TRMS:..." or "TRPGR:..."
- Project Summary contains all requested information, including broader impacts of the proposed work
- Project Description is 15 pages or less in length, including figures and tables
- References Cited includes publications resulting from prior research funded by NSF (marked*)
- Biographical Sketches (2 pages each) included for PI, Co-PIs and Senior Personnel listed in the Project Summary
- Current and Pending Support Statements included for PI, Co-PIs and Senior Personnel listed in the Project Summary
- Appendices (A-1), (A-2) and (A-3) uploaded in Supplementary Documents
- Appendix (A-3) includes letters of support from databases or stock centers that would distribute project outcomes, if applicable
- No general letters of support are included in Appendix (A-3)
- Conflict of Interest list uploaded as a single integrated table or spreadsheet into Single Copy Documents

This checklist is not intended to be an all-inclusive repetition of the required proposal contents and associated proposal preparation guidelines. It is, however, meant to highlight certain critical items so they will not be overlooked when the proposal is prepared.

Proposers are reminded to identify the program announcement/solicitation number (05-603) in the program announcement/solicitation block on the proposal Cover Sheet. Compliance with this requirement is critical to determining the relevant

proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost Sharing:

Cost sharing is not required by NSF in proposals submitted under this Program Solicitation.

C. Due Dates

Proposals must be submitted by the following date(s):

Full Proposal Target Date(s):

November 01, 2005

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this announcement/solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail fastlane@nsf.gov. The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program announcement/solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this announcement/solicitation.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Proposers are no longer required to provide a paper copy of the signed Proposal Cover Sheet to NSF. Further instructions regarding this process are available on the FastLane Website at: <http://www.fastlane.nsf.gov>

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

The National Science Board approved revised criteria for evaluating proposals at its meeting on March 28, 1997 ([NSB 97-72](#)). All NSF proposals are evaluated through use of the two merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

On July 8, 2002, the NSF Director issued [Important Notice 127](#), Implementation of new Grant Proposal Guide Requirements Related to the Broader Impacts Criterion. This Important Notice reinforces the importance of addressing both criteria in the preparation and review of all proposals submitted to NSF. NSF continues to strengthen its internal processes to ensure that both of the merit review criteria are addressed when making funding decisions.

In an effort to increase compliance with these requirements, the January 2002 issuance of the GPG incorporated revised proposal preparation guidelines relating to the development of the Project Summary and Project Description. Chapter II of the GPG specifies that Principal Investigators (PIs) must address both merit review criteria in separate statements within the one-page Project Summary. This chapter also reiterates that broader impacts resulting from the proposed project must be addressed in the Project Description and described as an integral part of the narrative.

Effective October 1, 2002, NSF will return without review proposals that do not separately address both merit review criteria

within the Project Summary. It is believed that these changes to NSF proposal preparation and processing guidelines will more clearly articulate the importance of broader impacts to NSF-funded projects.

The two National Science Board approved merit review criteria are listed below (see the [Grant Proposal Guide](#) Chapter III.A for further information). The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which he/she is qualified to make judgments.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

NSF staff will give careful consideration to the following in making funding decisions:

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Ad Hoc and Panel review. Site visits may be conducted if necessary .

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

NSF is striving to be able to tell proposers whether their proposals have been declined or recommended for funding within six months. The time interval begins on the closing date of an announcement/solicitation, or the date of proposal receipt, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1); * or Federal Demonstration Partnership (FDP) Terms and Conditions * and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Website at <http://www.nsf.gov/awards/managing/>. Paper copies of these documents may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Website at http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Website at <http://www.gpo.gov>.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for the PI and all Co-PIs. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project reporting system, available through FastLane, for preparation and submission of annual and final project reports. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding this program should be made to:

- Dr. Jane Silverthorne, Program Director, Plant Genome Research Program, telephone: (703) 292-8470, email: dbipgr@nsf.gov
- Dr. Diane Jofuku Okamuro, Program Director, Plant Genome Research Program, telephone: (703) 292-8470, email: dbipgr@nsf.gov
- Dr. Anita S Klein, Program Director, Plant Genome Research Program, telephone: (703) 292-8470, email: dbipgr@nsf.gov

For questions related to the use of FastLane, contact:

- email: biofl@nsf.gov

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF *E-Bulletin*, which is updated daily on the NSF Website at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's *MyNSF News Service* (<http://www.nsf.gov/mynsf/>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. 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 subjected to discrimination under any program or activity receiving financial assistance from NSF, although some programs may have special requirements that limit eligibility.

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-supported projects. See the GPG Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**

Send an e-mail to: pubs@nsf.gov

or telephone: (703) 292-7827

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. 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 and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Division of Administrative Services, National Science Foundation, Arlington, VA 22230.

OMB control number: 3145-0058.

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