

**Response to Recommendations from the Committee of Visitors  
for the  
Plant Genome Program  
Division of Biological Infrastructure  
August 11-13, 2004**

On behalf of the personnel in the Plant Genome Program and the Division of Biological Infrastructure, I would like to thank the COV for their thoughtful analyses and hard work, which resulted in an informative report and useful set of recommendations. The COV commended the Program Officers and Division Director for the well-balanced portfolio of activities that has benefited the plant biology community while also effectively targeting NSF strategic goals. Further, the COV indicated that, "NSF has done an excellent job of creating a plant genome research pipeline that involves communities in establishing priorities, identifying model organisms, developing research tools such as databases and informatics tools and fostering workable approaches to improvement of crops of economic importance."

**Quality and Effectiveness of merit review procedures and Implementations of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers.**

**Recommendation:**

"External reviewers need additional training and instruction in the range of issues that can be included in the "broader impacts" category. Particularly in the plant genome program, community contributions are appropriate and very easy to address under this category."

**Response:**

The PGRP agrees with this recommendation. The extent to which reviewers commented on multiple topics for criterion 2, "broader Impacts", was variable during the period under review. However, there is some evidence that the number of reviewers addressing "broader impacts" increased and that the quality of the response improved as well. The PGRP will continue to take advantage of opportunities afforded at meetings, outreach visits and the like to emphasize to the scientific community the range of topics that may be addressed under "broader impacts" in proposal reviews.

**Selection of reviewers**

**Recommendation:**

"COV recommends proactive measures to increase the number of underrepresented groups amongst reviewers. This may in time contribute to an increase in proposals from this group. At the same time, the gender balance among reviewers and underrepresented groups probably as an undesired outcome. These reviewers may have an undo burden of "community service," particularly younger reviewers who are at a critical point in developing their careers. Some service in the form of reviews is helpful in career development, especially improving grantsmanship, but too much service can be a detriment to developing productive research careers."

**Response:**

The PRGP concurs with the COV recommendation and shares its concern. . There is a serious need to increase underrepresented minorities in our pool of reviewers and panelists. We consider efforts in this area to be an essential component of program activities. Several approaches have been taken, and increasing these efforts is anticipated.

The program will continue to actively recruit program officers from these groups to help expand the pool of talented reviewers known to us. This year the program successfully recruited a woman of color as a program officer. She enhanced the diversity of the reviewer pool by bringing new minority scientists into the review process as ad hoc reviewers. It is the goal of the PGRP to have these newly identified ad hoc reviewers participate as panelists within a time frame that will allow them to serve without jeopardizing their research efforts with overwhelming service. Within the coming year the program will participate in outreach activities in collaboration with the American Society of Plant Biologists to recruit more ad hoc reviewers and panelists from underrepresented groups.

The PGRP initiates outreach activities to the plant biologists across the country, which exposes us to PIs, postdocs and students who have not participated in PGRP funded research. In addition, the PGRP participates in BIO and NSF-wide outreach visits in an effort to get to know the broader scientific community, make NSF's funding opportunities in all areas of biology known, and to provide helpful advice on preparation of competitive proposals.

**Recommendation:**

“A possible concern arises concerning the melding of recommendations from two or possibly more panels. Internal panel dynamics can be distinctive. It could be valuable for panel chairs to meet jointly with the POs to provide an opportunity for cross-checking during formulation of the award recommendation.”

**Response:**

The PGRP does not use a panel chair mechanism; instead the PGRP program officers chair the panel meeting as part of their responsibility for the review process. As a consequence, the program officers are able to integrate reviewer and panel recommendations across panels and with programmatic and foundation priorities.

**Resulting Portfolio of Awards****Recommendation:**

“It would be helpful to have a better understanding of what characteristics of a proposal place it in the high risk category.”

**Response:**

While the term “high risk” can have many definitions, the PGRP considers a proposal “high risk” if it proposes an untested approach or where the likelihood of success is quite uncertain. PGRP considers a variety of factors in making decisions regarding high risk and high reward projects. The overarching question asked is: if this project succeeds, will the field be impacted in a more than incremental way? The program decides to support such projects if the review process indicates and the program agrees that the projects success will advance the field of plant biology in a significant way.

**Recommendation:**

“The COV is not cognizant of the total number of researchers from underrepresented groups that would have the expertise to apply to this program. The POs might consider offering a grants workshop at the SACNAS meetings to provide information to Hispanic and Native American researchers. The POs might consider working closely with the ARD, an association of 1890s institution research deans with a focus on agriculture.”

**Response:**

PGRP has begun outreach to 1890 institutions, having met recently with an ARD from Tuskegee and group of potential PIs. Program Officers will attend the 1890 ARD meeting in June 2005. Other outreach activities targeting tribal colleges and Hispanic serving institutions in particular are being developed and will be coordinated with other BIO and NSF outreach activities.

**Recommendation:**

“That the program monitor inclusive approaches to communities and continue to require documentation of substantial consensus and priority development from communities before funding new initiatives.”

**Response:**

The PGRP has and will continue to engage the broader plant biology community in developing its priorities and programmatic directions. For example, a new award made in FY04 (DBI-0421815) to develop tools for cotton genomics started with a coordination meeting that brought together all potential stakeholders to ensure that the resources to be developed will meet their needs and to avoid duplicated efforts. A wheat genome workshop and a tomato genome workshop supported jointly with USDA are other examples of past community planning activities. In fall 2004, new community-wide workshops will be focused on legumes and sorghum. In both cases, bioinformatics and database needs will be an integral part of the discussions.

**Recommendations:**

“Clearly we would like to increase and enhance the integration of research and education. If not already done so in the program announcement, it would be useful to point prospective PI's to the website describing Plant Genome Research Program outreach and training opportunities (<http://www.plantgdb.org/pgrop/pgrop.php>).”

“There is still room for improvement in the quality and impact of outreach programs associated with PGR awards, and the COV notes that investigators could use

professional support and mentoring that goes beyond availability of the PGR Outreach Portal (Brendel DBI-0110254), which nevertheless represents an important advance. In particular, it appears there is a need for fresh ideas for PGR public education programs, together with ways to measure their impact. PGR might be well served by drawing on sources of professional expertise in development of outreach programs.”

“However, more opportunities should be taken to promote educational aspects of this program and support research activities at smaller schools.”

**Response:**

The next new Program Solicitation (FY2006) will include language pointing prospective PIs to the PGRP Outreach and Training website. Further, the PGRP will develop with the PGR community and outreach/education professionals, ways to identify and promote the best educational and outreach practices developed through the program to more effectively engage a broader range of institutional types and potential PIs in all PGRP activities.

**Recommendation:**

“While database and biocyber infrastructure are much broader than this program, a tremendous amount of data is being generated by research funded by PGR. The COV believes a proportionate amount of PGR awards portfolio should directed to support the growth of biocyber infrastructure, under the guidance of the BIO Cyber Working Group.”

**Response:**

The PGRP enthusiastically agrees with the COV recommendation and will ensure that its future solicitations emphasize the need to develop cyber resources and encourage proposals in this area. PGRP cyber activities will be developed as an integral part of the BIO Cyber Strategic Plan.

**Recommendation:**

“The COV recommends here, as elsewhere in this report (see Sect. C.4), that efforts be made to include more agronomically important crops from Africa and other underdeveloped portions of the globe as these crops will be critical to global health and well-being. “

**Response:**

In FY04, a Dear Colleague Letter (NSF04-563) was sent to PGRP PIs that solicited supplement requests to support research collaborations with investigators from developing countries. The focus of these collaborative research activities was to be on topics and plants of importance to the developing country partner and complementary to the focus of the original PGRP project. In FY05, such supplement requests can also be submitted as part of new proposals. Proposals focusing on crops of importance to African countries are specifically encouraged in the annual PGRP solicitation.

## **Management of the Program**

### **Recommendation:**

“Proposers should be asked to provide an indication of the intended outcomes of their education and outreach programs, as well as associated indicators of success. As Criterion 2 objectives assume a larger part of the energy and resources devoted to PGR programs, it seems incumbent on PGR and the NSF to ensure that the associated projects are well-designed and that intended impacts are being achieved.”

### **Response:**

The PGRP concurs and will continue to monitor and evaluate the education and outreach activities as part of the annual project reports. The annual PGRP awardee meeting provides an opportunity for the community to share best practices regarding educational and outreach aspects of projects.

### **Recommendation:**

“The committee notes the excellent management of PGR, but concerns were expressed that as the program continues to achieve success and expand, delegation of key functions to junior POs will be necessary. Concrete plans for future management as the program grows and diversifies are important for protecting the gains that have been made to date.”

### **Response:**

All program officers have comparable responsibility in the PGRP, and the BIO directorate does not utilize a “junior” program officer configuration. The PGRP agrees with the need to address workload and management issues as programmatic activities expand, and will explore various mechanisms during the development of DBI’s annual staffing plan.

### **Recommendation:**

“There was some concern among the COV about the amount of responsibility for institutional memory that Jane Silverthorne carries. Everything possible should be done to anticipate PO openings (rotator), and allow for meaningful periods of overlap and training.”

### **Response:**

The Division will ensure that PGRP program officers overlap in tenure as much as possible. In addition, all DBI POs are instructed to document important issues, events and conversations in the proposal files so that anyone can reconstruct activities associated with each action taken by the Program for each proposal. One of the exceptional qualities of all PGRP program officers, including Dr. Silverthorne, is that succinct yet to-the-point documentation is included with every proposal action so that institutional memory can be traced and reconstructed by others in the program or Division.

**Recommendation:**

“The management of the Plant Genome Program has wisely emphasized development of database standards and bioinformatics tools from its very inception. However, the overwhelming success of the program is generating an avalanche of data that is increasing exponentially and catalyzing multidisciplinary projects. This has placed pressure on database development and capabilities. The COV recommends the Program Management ramp up the speed of developing commonly accepted standards for database design and bioinformatics tools. This is an extremely important activity because database cross-talk and user-friendly bioinformatics tools will only enhance the research enterprise if they can be applied by scientists from a wide variety of fields, such as systematists, morphologists, evolutionists, and agricultural crop scientists. Databases must be able to integrate and provide easy access to a wide variety of resources (from museum specimens to germ plasm banks to seed collections to geographic and climatic information) so that the data resulting from the Plant Genome Program can be fully exploited. The results of this effort will affect all databases in the biological sciences, so it is most appropriate if consensus development is carried out at the level of the BioCyberInfrastructure Working Group. Though it will be challenging to develop common standards that will be flexible enough to accommodate future innovations in science and in bioinformatics, this process is critical to maximizing the impact of the groundbreaking successes of the Plant Genome Program and therefore is a top COV priority.”

“An increase in creative proposals to develop bioinformatics tools and database design should result from such a shift in priorities, and this will influence the balance in the portfolio.”

**Response:**

The PGRP will continue to highlight the importance of these activities in the Program Solicitation and ensure that funded projects adhere to the current community standards. Acceleration of development of common standards for database design and bioinformatics tools will require engagement with the community in workshops and meetings. In the coming year, the PGRP plans to meet with the leaders of the major plant databases to discuss key issues, including coordination of activities, data standards, and inclusion of data from projects that have ended.

**Recommendation:**

“The program should continue to encourage grant applicants to include partnerships with primarily undergraduate institutions. For instance, projects developing large databases or bioinformatics tools could partner with faculty at minority-serving or other undergraduate colleges to evaluate accessibility and potential adaptation to student research projects. This will in turn increase the pool of students who are excited about potential careers in bioinformatics.”

**Response:**

Partnerships with primarily undergraduate institutions continue to be encouraged through discussions at the annual awardee meeting and individual discussion with PIs and potential PIs. This summer, the PGRP participated in three outreach workshops for faculty from primarily undergraduate institutions. In addition to giving talks on grantmanship, NSF funding opportunities in plant biology and support for training and information regarding potential Plant Genome partners was provided.

### **Specific Questions Posed by the PGR Program**

**What role should the program play with respect to data standards and databases as the community transitions from a project-specific to plant-wide model?**

#### **Recommendation:**

“High throughput data production by multiple investigators makes long-term preservation of data one of the highest priorities of the program. Ideally it should be in a format that is portable to other computer platforms (e.g., XML) from the long-term preservation viewpoint. The data in electronic form should survive beyond the existence of the program. The following suggestions are made.

- a. Promote use of existing standards (e.g., GO ontologies, Plant Genome Ontology, etc) in community-wide annotation
- b. Promote use of standard data exchange formats (e.g., MIAME for microarray) in data submission
- c. Promote and encourage submission of strictly bioinformatics proposals as long as database and tool development is relevant to the program
- d. Strongly encourage participation from the bioinformatics community that develops general purpose and advanced form of bioinformatics tools as long as the relevancy to the program is demonstrated.
- e. Consider creating a community wide bioinformatics core center who might play a neutral position amongst the plant genome communities. Use cooperative agreement as a way of enforcing data submission to the database core. Utilizing supplement mechanism could be another mechanism for encouraging data submission.”

#### **Response:**

These are all excellent recommendations. The PGRP has already begun and will continue to promote activities noted in a-d. For recommendation e, the PGRP is currently considering a “database summit” to bring together the leaders of the major plant databases with the goal of developing a steering group. The issue of a community-wide bioinformatics core center could be discussed at that meeting.

**How should the effectiveness of the outreach and educational activities of Plant Genome be evaluated? Are there any opportunities we are missing or communities we are not serving?**

#### **Recommendation:**

“The COV is pleased that the program is considering how to effectively evaluate these activities. It is curious that for an evidence-driven field like biology, there is so little data and effort devoted to evaluating the effectiveness of educational activities and outreach

activities. It would be very helpful for PIs to have access to studies demonstrating the effectiveness or lack of effectiveness of different activities in achieving specific goals (e.g., retention in science, cognitive gains in specific areas, and affective changes). At the program level a continued requirement for assessment of these activities and coordination and distribution of these study results on the PGROP site would be an important first step.

Fundamentally, however, this is a Foundation-wide challenge that should be approached at that level. . It is imperative that they have adequate information and resources to make evidence-based decisions about how to devote their precious time to outreach activities. It is inefficient and ineffective for each program to be struggling with these very important issues on their own in an institution with both the resources to address the issue and prevent the perpetual reinvention of a wheel with potentially broken spokes.”

“The COV believes that the best way to strengthen outreach and educational activities is to provide PIs in the Plant Genome program with examples that have been demonstrated to achieve specific goals successfully.”

**Response:**

The BIO Directorate has developed an Education Strategic Plan that includes evaluation and assessment of directorate educational activities in order to be able to provide PIs with a compendium of best practices. This effort will be coordinated with the evaluation and assessment resources in EHR. The PGRP will work with the BIO Education Strategic Plan working group in order to assess the outreach and education activities of this program. The PGRP also agrees with the COV that an NSF-wide assessment of all educational/outreach activities supported through research grants would be very worthwhile since it would allow a much larger suite of best practices to be identified and shared. The program will transmit this suggestion to the EHR directorate.

**Please comment on any program areas in need of improvement or gaps (if any) within program areas.**

**Recommendation:**

“Universal attention should be paid to fostering access to databases and bioinformatics tools to the larger community. Posting of data is already being handled very well, and this provides important resources to researchers. It is timely to begin a shift in emphasis from fast posting of raw data to broad tools for accessibility. This will in turn result in broadening the user base. To this end, grantees might query database users to monitor the success of such efforts.”

**Response:**

The PGRP will continue to facilitate communication in the larger community around database and bioinformatics issues. As noted earlier, PGRP is considering a “database summit” that will permit a full discussion of accessibility.

**Please provide comments as appropriate on the program’s performance in meeting program-specific goals and objectives that are not covered by the above questions.**



**Recommendation:**

An emerging challenge for the core programs is arising from the success of the Plant Genome program. As investigators (both new and established) take advantage of the new, but more costly approaches, core programs are seeing proposals with substantially larger budgets that are appropriate for their programs, not the Plant Genome program. This is an exciting indicator of the success of the Plant Genome program, but creates some substantial funding challenges for the BIO directorate that deserve careful consideration and planning. New investigators who did graduate work and postdoctoral work in large plant genome facilities appear to be coming to core programs with a set of expectations for how one does science that is both exciting and costly.

**Response:**

The PGRP and the BIO directorate recognize the opportunities and challenges that the success of the PGRP program is presenting for other BIO programs. Discussions of how to take advantage of the opportunities and minimize any negative impacts will occur as part of BIO's yearly programmatic and management planning activities.

**Please provide comments on any other issues the COV feels are relevant.**

**Recommendation:**

"Additional documentation of outreach and education is a critical issue. The current system does not provide adequate information for COV review, primarily because this information is not being requested from grantees in a systematic fashion. Every PI should be asked to gather, maintain, and report information to evaluate and track the impact of their program. This may mean that students will be tracked for several years. Privacy concerns must not be used as an excuse to avoid this responsibility because simple human subjects applications can make appropriate and ethical arrangements to gather this information. Without such data, the effectiveness of outreach and education efforts cannot be documented, and reliable information will not be available to inform future efforts. NSF must take the lead in ensuring that effective programs are documented and disseminated to the research and to the education community."

**Response:**

As noted earlier, the BIO Education Strategic Plan has the goal of evaluating and assessing educational activities in all BIO programs. The PGRP fully anticipates participating in this effort so that the effectiveness of individual PI activities can be fully documented and shared with others. Collecting longitudinal data from participants of PGRP-sponsored educational activities involves US government and NSF policy considerations and will be discussed with the appropriate NSF offices as part of implementing the BIO Education Strategic Plan.

**NSF would appreciate your comments on how to improve the COV review process, format and report template.**

**Recommendation:**

"COV reviewers should be given access to all grant files whenever possible, rather than a selection of files. This gives COV reviewers the maximum number of options to review comprehensively or to choose selected files on a flexible basis."

**Response:**

NSF is currently developing mechanisms to allow COVs remote and on-site access to all grant files. In the future, information on accessing any proposal within the unit of review will be made available to all members. Access to any proposal, for the period under review from the roster of proposals considered for action, was available to the COV by request.

**Recommendation:**

"Arrangements for evening access to the building would permit COV reviewers to have additional flexibility, especially in being able to access the many individual grant files that must be reviewed."

**Response:**

The PGRP sees this as a very useful suggestion and evening access will be provided to future COVs that request additional time and flexibility for their on site work.

**Recommendation:**

"Several COV members had queried individuals in the plant genomics community to become informed about current issues. This information was very helpful, but was based on networking, rather than comprehensive information. We strongly suggest that grant applicants (including those funded and declined) be surveyed prior to each upcoming COV. An anonymous questionnaire might include items on the review process, on project administration, on success of particular approaches, and on perceptions of community needs that are not being met and are thus impeding research progress."

**Response:**

The COV review process is constrained by issues of confidentiality and time, and thus the type of applicant survey suggested is not feasible. COV members are carefully selected to represent a broad cross-section of the plant biology community so that concerns of the community as well as grant applicants are represented and considered.

**Recommendation:**

"The key information for COV members was the table of grants awarded. The usability of this table could be increased by providing information on the plant or plants utilized (as requested by this COV). In addition, a sorting mechanism would be extremely helpful so

that reviewers could sort proposals according to any category. The color code was somewhat helpful, but the printer was black-and-white, requiring committee members to revisit the on-line color version to make notes. The color key was only available at the top of this multiple page document, so users had to scroll up and down several times to sort projects. Perhaps a different method (such as black-and white symbols or a code) to indicate the type of award could be instituted for the next COV.”

“A spreadsheet of declined applications would have been very helpful for the COV reviewers.”

**Response:**

These are helpful suggestions that will be implemented in the development of material for all future COVs.

**Recommendation:**

”The COV members would have appreciated clarification of the "innovative" category of proposals.”

**Response:**

The PGRP is reluctant to define such terms for the COV since it is their expertise and perspective that is most helpful in determining whether projects are innovative.

**Recommendation:**

”There is a great deal of very useful information and perspectives (white papers) available to the COV panel (<http://nsf.gov/bio/dbi/pgcov04/GPRA%20Plans.htm>), however much of the material wasn't accessible until we arrived in Arlington. Two and half day is not enough time for the COV to review that material and truly assess progress since the last COV. We realize there is a trade off with not wanting to overburden the COV but we felt could more helpful if we had two weeks in advance of the meeting with all the program announcements, reports and summaries.”

**Response:**

The PRGP agrees with this recommendation and will provide all materials to future COVs at least one month before the meeting. NSF is developing mechanisms to allow COVs to access GPRA information and final project reports prior to the onsite COV meeting.

**Recommendation:**

”It would also be valuable to collect some breakdown information of applications or awards: for example we were asked about the portion of new investigators awards to overall awards. While some of these data were available in summary tables (i.e. Table C.4), this information is only provided for the PI. Without reading individual jackets it is not possible to determine if any co-PI's are new investigators. Similarly the involvement of HBC institutions and minorities in PGRP activities may be undercounted, if they participate as Co-PI's or in supplemental activities. For example Delmer DBI 0110173

had provisions for students from a HBC to work at in her lab during the summer. Improvement. This information was available only as excerpted in reports or 'nuggets'. More systematic data collection would be helpful to the COV.”

**Response:**

The PGRP will explore the possibility of compiling this information from the NSF database in order to implement this suggestion for future COVs.