

**Comments on ExCo Feedback on the Challenge Program
'Unlocking Genetic Diversity of Crops for the Resource-Poor'
by the Proponents (IRRI, IPGRI, CIMMYT)**

May 1, 2003

All ExCo members who commented were all positive about the potential of the Challenge Program (CP) and indicated their endorsement. Each did provide valuable comments, to which, we are providing the following responses.

In general, the feedback focused on the following issues: coverage of mandated species and the focus on drought as the target trait; the involvement of various partners, e.g., other CGIAR Centers, NARS and the private sector; specific research activities, e.g., role of breeding, data quality assurance, phenotyping efforts, level of bioinformatics, and identifiable milestones; and the identification of additional funding and governance issues:

Focus of the Challenge Program – Much discussion on the crop focus has occurred among all the partners involved so far in developing the CP concept. It is true that no single CP could address all of the mandated species of the CGIAR Centers. However, the proponents of the CP feel that it is important for the developing world that this CP will bridge rather than increase the gap between well researched crops and less well researched but equally important species, and therefore it was agreed in the Alexandria stakeholder meeting, at this stage to specify a focus on crop groups (cereals, roots and tubers, legumes, *Musa* and forage species), and then set priorities within each of these groups. The CP will not be able to address all mandated species, but will strive to address priority species within each crop group. This may be only a single species, but even such a limited focus will provide the necessary first steps towards using modern genomic approaches in the group. In summary, it is anticipated that the CP can take advantage of efforts in other crop groups to define the most appropriate approach for less studied species, a major efficiency of the CP approach.

Drought as a case study – Clearly, the CP will focus on developing the platform technologies that could be applied to any species and any trait. An excellent example of such a generic technology is the development of an integrated bioinformatics platform that can provide crop information across species, traits and institutes. The participants in the CP felt it critical to identify a trait for the initial main focus. This would provide the optimal opportunities for developing the more generic technologies and approaches. While many traits could be considered, for the many reasons outlined in the proposal, drought is believed to provide the best opportunity. Drought is arguably the most important agricultural production constraint worldwide, and affects almost all crop species. In addition, many groups within the network of the CP already work on various molecular approaches to drought and this provides excellent initial opportunities for the CP researchers. However, the CP will also provide an opportunity to address other constraints (e.g. salinity tolerance) that are important for the species considered as is mentioned in the document.

Partnerships – The stakeholder meeting earlier this year in Alexandria helped broaden the involvement of the partners in the CP. Centers with plant genetic resources were represented and discussions led to a wider involvement of these Centers in CP management and direction. The initial CGIAR proponents, CIMMYT, IPGRI and IRRI, will continue to provide overall leadership but will rely on the input of the other Centers in the decision making process. The participation of other Centers in the governance and management of the CP will be at the Program Steering Committee (PSC) level, and contingent upon: a) curatorship of appropriate germplasm collections; b) capacity to undertake CP research; and, c) appropriate level of input of scientific expertise- equivalent to approximately 2 FTEs. Many CGIAR Centers (e.g. CIAT, CIP, ICARDA, ICRISAT) have already decided to participate in the CP.

NARS will be involved at all levels, from taking the lead in research, to enhancing their own abilities in genomics and genetic resources, to taking advantage of the products of the CP. The level of involvement will depend on the capacity of the NARS, and will be determined as the specific research plans of the CP are defined by the partnership, which includes NARS. As mentioned in our specific responses to ExCo and CGIAR members' comments in the February submission, we have invited GFAR to join the PSC to enhance partnerships with NARS, especially the smaller NARS. The Subprogram 4 of the CP is specifically created to give the strong emphasis of capacity building, and how we plan to bridge the gap rather than widen it, not only between North and South, but also between South and South.

The private sector can obviously provide critical and valuable input into the research and product delivery of the CP. The private sector has already indicated to be willing to provide significant in-kind contributions to the CP, thus providing additional 'funding' that would not be available to the CGIAR and its partners without the CP. As indicated in the proposal, the private sector will have a seat on the management of the CP, through the Program Advisory Committee (PAC), as proposed and agreed at the Alexandria meeting with the private sector participation and will be involved in the planning workshops to define the research undertaken by the CP. Scholarships, fellowships and training are all areas that the private sector has indicated to be interested to contribute to and this has been included in the proposal.

Research activities – The comments, provided primarily by the private sector, are well taken and will be critical in developing the actual research portfolio of the CP. The CP proposal has been drafted to describe a 'program' and specific details on research, objectives and milestones have not been described yet in great detail. It is proposed that these will be addressed in research planning meetings that will be organized shortly after final approval of the CP by the CGIAR. These will involve a wide range of participants and will address each of the specific Sub-Programs. Outcomes of these workshops will be specific objectives, activities, partnerships, budgets, and achievable, verifiable milestones (more detailed responses to the excellent points raised by the Private Sector Committee are attached as an appendix).

Funding – The issue of funding of challenge programs is much broader than just our CP. The CPs were originally intended to be a vehicle for additional and new funds. This is proving not to be the case. The European Commission has indicated a commitment of 4M Euro for this Challenge Program, however, this will be within their regular contribution to the Centers. A commitment of \$4M to the CP at this stage of its development represents about one-third of the total budget; above the indicative figure of 25% suggested by ExCo in their comments in last September. The unclear developments and positions around redirection of existing unrestricted funds and new additional funds for CPs, have made the CP proponents to be cautious in their resource mobilization efforts for this CP. All of us including Centers and the investors are facing with the new experience in developing, approving and mobilizing resources for CPs. For example, the definition of “new” or “additional” and how to verify them are not easy task for the proponents and perhaps for the investors themselves. The proponents of the CP believe that upon approval and clarification of CP resources issues, the CP will intensify fund-raising efforts and indications are that we will be successful in this endeavor, also for new and additional funds.

Governance – The governance mechanisms for all CPs require adequate attention to transparency and inclusion; for this reason, the CP has a Program Steering Committee (PSC) and a Program Advisory Committee (PAC), both of which are expected to meet on an annual basis once the CP is operational. The PSC may have an additional meeting during the first 12 months. Extraordinary items of business will be dealt with electronically and existing meetings will be used as much as possible to minimize CP-specific travel. For example, the interaction between the CP and GFAR will take place during the CGIAR AGM. It is worth noting that under a true partnership such as the CP, ‘transaction’ costs are not seen as “unproductive” costs since they contribute to the delivery of mutually beneficial outputs and outcomes.

Appendix 1

Private Sector Committee:	Response
<p>4a) The document is written at a high level and approaches are sufficiently vague that it is difficult to comment on them. We would like to see more articulate plans for the molecular characterization work.</p>	<p>By design, the document is meant to provide a research framework, so that specifics on crops and methodologies can be accommodated. Specific plans for molecular characterization will be developed during the research workshops scheduled for later this year.</p>
<p>4b) We feel the involvement of the CG center field breeders is essential to this effort but are unable to ascertain their role in the current draft. We are concerned that the project may be driven more from a molecular genetics perspective than from a molecular breeding impact perspective.</p>	<p>Yes, we agree that role of field breeders is very important, and this will be reflected in the formation of research teams in each Subprogram as well as most activities within Subprogram 3.</p>
<p>4c) There is no discussion of the costs of quality control of molecular, pedigree and phenotypic data. This is a big job and should not be underestimated. The proposal works on the assumption that all steps will run smoothly without the need to put a substantial quality control system in place, yet typically Post docs and grad students will be working on sections at different times in different crops and locations. Much of the phenotypic data may have been collected historically and be of suspect value. Thus project managers will need to be proactive in this area from the start. The real cost of IT infrastructure and statistical analysis support are going to be higher than the combination of the in-kind and additional funding.</p>	<p>We agree with the comment. Data quality, standardization and interoperability will be crucial and it will need investment above the in-kind contributions. This is what Subprogram 4 is all about. We are aware of the problems with historical data and some phenotyping may have to be repeated.</p>
<p>4d) While transgenic approaches are mentioned as having value from the discovery viewpoint, there is no mention of these in Subprogram 3. We acknowledge that transgenics currently face problems in the developing world because of IP issues, regulatory costs, public acceptance, and the lack of in-place biosafety regulations. However, markers and associative approaches only find alleles that are already extant in the germplasm being used, and quantitative genes are generally interdependent upon other genes in that background.</p> <p>Indications are becoming clearer that major impacts can be made by modulating a few</p>	<p>The importance of transgenics for diagnostics and confirmation is explicitly stated in the CP. The part we have left open is their use in germplasm development because we envision multiple ways to deliver the gene discovery products to varieties. A main goal of the program is to identify appropriate genes or gene combinations that contribute to certain traits. Both gene pyramiding and regulatory modification should be considered depending on the situation. We expect to use the most appropriate tool-box for the job including transgenesis, marker breeding and conventional breeding.</p>

<p>genes even for complex traits, that transgenes are affected less by genetic backgrounds, and that the same strategies that are successful in one crop are likely to succeed in others. Transformation technologies are no longer a hurdle in the major crops. Transgenics could result in real progress in stress tolerance in a ten-year timeframe, and, as Golden Rice has demonstrated, FTO constraints can be negotiated.</p>	
<p>4e) We cannot overlook the transaction costs when so many widely separated groups are collaborating. We presume that it would make sense to name one institution (e.g., Cornell, or CIMMYT) as the headquarters for the project, where up to 50% of the research would get done and a critical mass of researchers working on these crops could be housed. If marker analysis is centralized for high throughput genotyping, the issue of getting tissue samples to that central point in good condition for analysis will have to be addressed.</p>	<p>The ‘added value’ of the CP is comparative biology.</p> <p>It is feasible to have several institutions to team up on projects that require common approaches (e.g. genotyping). There are pros and cons in centralizing a key component at one place. We expect the competitive proposals with different ideas can help us sort out the appropriate approach.</p>
<p>4f) Subprogram 3, Gene Transfer and Crop Improvement, as it is currently written, is weak. We think it is naïve to assume that superior alleles from germplasm bank collections “not identified by traditional breeding methods” will be identified by Subprograms 1 and 2, unless a substantial new investment is made in phenotyping such collections. As a backcrossing scheme, some system for developing superior donors adapted to key ecologies should be proposed, given that transformation and regeneration often will often not take place in elite germplasm. The use of markers to develop elite donors seems fully justified, and when backcrossing enters a more extensive stage markers may be less essential.</p>	<p>While “extracting superior alleles” is not necessarily the only strategy one should use, we will also want to tap the enormous potential in favorable alleles with the help of genomics tools. We have experimental evidence to show that combining the right “superior” alleles can enhance significantly a target trait. Such progress is only the tip of the iceberg and we expect many successful stories to come.</p> <p>The suggestion on developing and characterizing superior donors for key ecologies is well made. Specific breeding strategies will come from project proposals.</p>
<p>4g) Phenotyping of the germplasm collections that would allow scientists to attach an accurate phenotype to the genetic information receives little emphasis. It is one of the most challenging questions associated with landrace collections because of their often very narrow adaptation. Nowhere is emphasis placed on the development of managed stress environments for drought tolerance, though it may be implied—the dry season in the tropics provides many opportunities. To do this well will not come cheap. It is implied that NARS will play an important part in phenotyping germplasm,</p>	<p>We agree that high quality phenotyping data are central to the CP. Though not described in great detail in the proposal, managed stress environments are currently used by several breeding programs, particularly for drought.</p> <p>With available genome sequences, reverse genetics approach can be put to much greater use in germplasm characterization. With appropriate choice in candidate genes from functional studies and identification of alleles in the accessions, sets of materials can be derived for further phenotypic characterization.</p>

<p>but our experience suggests that data quality will remain a major challenge from this source, given the general downturn in NARS funding.</p>	
<p>4h) Crop information systems are critical. We would like to a single platform through which the project data can be shared. The support for the whole IT infrastructure required to develop and maintain high quality data sets appear to underestimated. Costs of new software development are formidable, and could consume most of the budget. Reference is made to possible sharing of data from private sector databases. It may be worth exploring to see if some of the software development costs could also be shared through limited access to the database software developed by Pioneer, Bayer, Syngenta and Monsanto</p>	<p>We would also like to see a single platform, but at least a common vocabulary will be required. A lot of progress has been made through the International Crop Information System (ICIS) and this has included discussions with Bayer and Pioneer. IRRI currently works closely with one Bayer subsidiary using ICIS. SINGER, the SGRP data sharing portal for collection information, is working with the private sector for further linking databases for a variety of crops.</p>
<p>4i) The project lacks specific and verifiable milestones and timelines. Without these it is difficult to measure success of failure, or to identify areas of clear under achievement. As it stands it will always be possible to place a successful “spin” on the outcome so that the programs seems to have succeeded</p>	<p>As explained above, it is difficult to provide highly specific milestones and timelines in such a framework program. These will be developed in the research workshops and articulated in the call for proposals under the competitive grants program.</p>