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## ISPC Commentary on the CRP-3.2 Maize Proposal

### Summary

MAIZE is a very well structured, articulated and conceptualised CRP proposal. In general, it sets out a reasonable, achievable and important agenda for research. Following more than 30 years of maize research at CIMMYT and IITA, this proposal now brings forward a strategic, integrated and comprehensive international approach to maize research. Openness to develop collaboration with all key institutes involved in maize research is an important step forward to avoid duplicative work and thus increase efficiency and accelerate progress that builds on each partner's experience and expertise.

As with CRP proposals previously approved, MAIZE has been developed without the guidance of an overarching CGIAR strategy for prioritizing research. However, maize is one of the three global food security crops, and among the three, the most dynamic in terms of demand growth, land area requirements, yield growth, and knock-on effects on land-use change. It is also very important as a food crop and as an income source to many of the world's poor. Given the projected importance of maize for achieving the broad development goals presented in the current Strategy and Results Framework, a program on maize and maize systems is justifiable. However, the expected dynamics of maize production and research have implications for this CRP as discussed below.

Against the background of the CGIAR's overarching goals, the rationale of MAIZE is compelling for the research agenda presented in nine distinct but well integrated Strategic Initiatives (SI), and the overall goals are clear.

### Recommendation

**The ISPC recommends that the proposal should be approved. The proponents are strongly advised to consider the ISPC's comments below and address the following issues in particular when defining the operational plan and strategy:**

- CRP3.2 should give more strategic consideration to (a) poor consumers as beneficiaries of maize research as a distinct targeted group; and (b) the dynamics in demand and use of maize (food, feed, fuel) and the dynamics in research supply (private sector) expected in target areas 1 and 2.
- CRP3.2 should develop a coherent program-level product delivery strategy that better aligns the SIs with program-level outcomes, considering also capacity and support for delivery and stakeholder feed-back.
- Attention should be paid to success factors, lessons learned and adjustment, and partnerships particularly in the following areas: innovation systems, transferring success of conservation agriculture from Asia to Africa, and the high-potential but less predictable areas of research.

- CRP management arrangements should strongly support fruitful collaboration and sharing among the principal partners, and the Program needs to develop independent oversight and evaluation mechanisms.
- Collaboration needs to be enhanced with CRP2 and IFPRI to ensure that the impact of changes in maize prices and markets at a global level are adequately understood and reflected in the research agenda of the Maize CRP.

## **1. Strategic coherence and clarity of Program objectives**

Program objectives are consistent with the SRF. The program rationale is strongly based on the analysis of effects that commodity price fluctuations have on the poor and of the effects that increasing production demands have on expansion of land in maize production. The importance of maize to global food security and income for the poor is clear and increasing. In general, researchable topics are derived from careful analysis of current problems and opportunities. The nine Strategic Initiatives (SIs) constitute a comprehensive program that covers the essential aspects for enhancing sustainable productivity in maize-based systems. The regional focus of program implementation is appropriate. Working on clearly defined types of farming systems based on dominance of maize production is an effective organizing tool for this CRP, and also for delineating boundaries and linkages with other CRPs. However, given the complexity and heterogeneity of the factors affecting impact on agricultural development in these farming systems, the constraint analysis is necessarily at a very general level only. Refining and adjusting this framework with better data, analytical tools and a process of multi-stakeholder consultation should be given a high priority as this CRP develops to help adjust SI components in terms of resource allocation, objectives, geographic focus, program outcomes and impact pathways. The “value chain” perspective emerging in some of the SIs should more clearly influence hypothesis development and implementation of research.

The proposal encompasses investments on a very broad range of activities—from increasing the efficiency of input use through smallholder precision agriculture, to molecular work on stress tolerance, to post-harvest processing. The very large agenda, squeezed into the nine SIs, and which include substantial components of continuing maize research from CIMMYT and IITA, would benefit from continuous review and prioritization. In this regard, it is positive that in most themes initial milestones include diagnostic analysis of opportunities and constraints. Strong donor influence in deciding on program orientation, which is indicated in the proposal, will challenge prioritization if based solely on the strategic framework developed for this CRP.

The proposal defines two types of smallholders as the targeted beneficiary groups: (1) those in stress-prone environments with poor market access, and (2) those that are market-oriented but technology-constrained in more benign environments. The ISPC strongly believes, however, that more attention should be given to poor consumers. In many countries that are priority areas for the MAIZE proposal, urban maize consumers are a large and growing fraction of the population. However, little consideration is given to urban consumers, and especially poor urban consumers. The drivers, constraints and preferences relevant to this group are likely to be different from those relevant to the producers. Hence, the strategy

should encompass consumers and other chain actors. More attention should also be placed on the dynamics between these target groups that currently are presented as very static. In many ways the proposed research that address the needs of Target Group 2 of maize producers and systems could have strong positive impact on urban consumers, but these linkages need to be considered explicitly as this CRP develops.

The proposal has not sufficiently considered other dynamics that affect developing countries and even the resource poor smallholders. These include: declining importance of maize as a food relative to rice and wheat due to other drivers of demand, particularly animal feed, and possibly biofuels; effects of industrial development and multilateral trade agreements on poverty alleviation, particularly on smallholder segments of agriculture in some regions; rate of technology dispersion even in resource poor regions; synergy between research on tropical and temperate maize; role of private sector along with emerging markets in regions where Target Group 1 is prevalent, including its effects on seed market evolution where clear patterns of mergers and acquisitions can be observed due to takeovers of small local seed companies by much larger national and multinational companies. From a strategic viewpoint these trends must be recognized, understood, and addressed in subsequent priority setting and adjustment across SIs.

## **2. Delivery focus and plausibility of impact**

The proposal is very clearly directed at delivery and impact, which are discussed for each SI. There is a clear description of outputs, outcomes, and milestones. In most SIs there is reference to earlier and current work done at CIMMYT in particular, but also at IITA, and in several cases both lessons learned and progress are explained, which supports the feasibility of the proposed milestones. Impact estimates are presented at the intermediate (first order) level, which is useful. These targets are, however, quite opaque because the baseline levels are not defined or quantified. Subsequently it is not easy to assess the feasibility of monitoring progress. While we commend the attempted *ex ante* impact analysis, the quantifications are not convincing, and we would like to see a discussion of how these numbers were arrived at. Perhaps most important, the outcomes and impacts on poor urban consumers should be included in the analysis. Furthermore, it would be useful to evaluate the differential effect of different maize technology and/or policy interventions. We therefore encourage further development and refinement of this *ex ante* impact assessment methodology as a tool for continued improvement in prioritizing the research agenda as this CRP develops.

A stronger program-level theory of change should be developed, including the underlying assumptions and definitions of expected innovations, and HOW the program intends to achieve its objectives through the multi-institutional innovation systems. The proposal provides reasonably appropriate assumptions about risks although more thorough sensitivity analysis is needed of key assumptions that strongly affect likelihood of outcomes.

For germplasm, impacts appear to be based on an assumption that pathways are relatively straightforward. However, generating impact from genetic improvement of crops and livestock that benefit poor farmers in resource constrained environments has been difficult

due to a number of constraints. Several of these bottle necks are recognized; for instance capacity and risk aversion preventing adoption of improved varieties, but a more thorough analysis is recommended.

Despite discussion of outcomes at the SI level, the proposal lacks a clear and coherent strategy for program-level outcomes beyond the sum of individual SI outputs. While objectives from all nine SIs can be justified as having significant *potential* to achieve impacts contribute to one or more SRF SLOs, only a small portion of these are likely to be widely adopted to provide significant quantifiable impact on smallholder target groups. This is especially true for improved germplasm where downstream constraints to adoption are many, especially in harsh environments. For example, identification of hybrids is left to NARS and Local Seed Companies—the latter of variable and declining quality following two decades of acquisition by multinationals looking to purchase high quality local companies. Thus a relatively well designed research program has a risk at the results management and delivery end, particularly regarding stock seed maintenance, hybrid seed production.

It is commendable the Proposal recognizes the limited economic value of open pollinated maize even for resource poor smallholders and thus emphasizes the need for hybrid research and development. That, however, is more demanding, particularly at the delivery end. An effective delivery and outcome-oriented strategy for hybrids would need to better align the levels from up-stream research to delivery encompassing the following: (i) a strategy and concept for breeding product development, including acquisition of the necessary genetic components for prioritized traits and development of stocks and improved, appropriately adapted hybrids; (ii) support to NARS for regional and national breeding and evaluation; and (iii) support of local seed companies for quality control in seed multiplication and delivery. Management needs to support these linkages through capacity review among in-house teams and partners. Policies, markers and financial services will also affect achievement of outcomes.

The more upstream research is presented as having high potential for improving the efficiency and precision of germplasm improvement. For several advancements clear timelines are presented. It would be useful to identify also the risks associated to this research. In some cases the time lines seem too ambitious (breeder-ready markers for large-effect QTLs for biotic stress resistance, efficient incorporation in adapted backgrounds of at least two transgenes for drought or nitrogen use efficiency, acid-, waterlogging- and heat-tolerant hybrids in advanced validation/PVS testing), and with SI8 (seeds of discovery) the outcomes may require a much longer time line.

Some components of the program could be considered as too ambitious. Areas such as production systems (with innovation systems focus), precision agriculture and post harvest are relatively new to CGIAR maize research and represent risks in terms of finding the needed research skills, as well as new partners to adapt the new approaches to local conditions and formulate impact pathways. Pathways for these innovations will be quite different than the better understood impact pathways for germplasm. With SI2 the estimated impacts are very large by 2020-2030 considering the types of deliverables from the initiative (information, decision guides, and methods), unless there is a chain of other interventions

enabled by the SI delivery. Some overlap can be seen between SI3 (sustainable intensification) and SI5 (double yield) and given the relatively small resource allocation to SI3 and what has earlier been said about enhancing focus on program outputs and outcomes, these two SIs could be merged.

The CRP's process monitoring and impact assessment includes appropriate dimensions. Participatory reviews of milestones in each region and SI is commendable, and plans for quality monitoring involving partners and a learning loop (for instance for research and service delivery) can be further strengthened. However, plans for identification of performance metrics should be refined in concert with other CRPs, and in consultation with the Consortium. Good metrics should provide input to assessment and review of SIs and SI components, and such evaluations should foster incentives for high quality research and accountability for donors and stakeholders. Thus purely quantitative indicators for short-term performance (p. 57) do not seem appropriate except for internal recording.

The program proposes partnerships that span well into adaptive research and locally integrated approaches, local capacity building and scaling up. In these activities the Centers' role is bridging and supportive. There are indications that in the broad consultations that have preceded development of the proposal, regional and NARS priorities have been incorporated into the international agenda.

Plans to address gender issues and inclusion of women as participants are systematically included for each SI. However, the research to address women's constraints is not well considered. For example, recognition of women's workload and drudgery are not considered although they have multiple implications, for instance in conservation tillage that often requires additional manual weeding and other labor requirements that can be constraints to adoption. More consideration should be put on technological interventions that have the potential to benefit women. Capacity building needs are identified in SI-specific contexts, which are appropriate, and training activities are planned in considerable detail. However, capacity building strategies could be strengthened with inclusion of institutional capacity and support for regional coordination.

Baseline studies are included in plans to facilitate *ex post* impact assessment. However, because much of this CRP represents continuation of long-term maize research, adoption studies and *ex post* impact assessment on earlier work should also continue.

### **3. Quality of science**

The germplasm research and breeding approaches appear sound and include several innovative components. The track record of partners in these areas is also of high science quality. SI8 and 9 capture well the opportunities from advanced genomics and phenotyping. Much of this work has been advanced in the Generation Challenge Program (GCP) and can benefit from continuous cereal-wide collaboration within the CGIAR. General lists of methods, outstanding innovations (for instance in SI8 they are highly relevant) and partners give a good indication of quality research. Lists of references for each SI, and lessons learnt in Part 2 are very useful. Both novel, high-potential and proven research approaches and

methods are used in a balanced way; for instance exploring intra-specific untapped genetic diversity but, at the same time, identifying opportunities for using transformation in particular situations (page 61). The ISPC supports the CRP's strategy and rationale for transgenic maize, which is the predominant transgenic crop globally. However, a necessary innovation regarding this technology is development of new and creative ways (science and policy based) to empower the international and national research systems to develop and distribute such technologies with the necessary degrees of freedom.

In some cases there is clearly scope for improving quality. For instance, the reference upon which estimates of climate change impact on maize yields is very weak. In fact, improving capacity to estimate impact of climate change on future maize yields in developing countries should be a high priority and will require collaboration with CRP7. Another area of concern is the lack of minimum datasets (particularly on various biophysical parameters) to support research on SIs 2, 3 and 5. Specifications for baseline data collection, including suitable data to allow tracking farming system performance, should be included as a matter of priority. Attention should be given to how performance benchmarks can be measured and monitored at reasonable cost and accuracy, and how data collection and data use in monitoring can be made coherent across all CRPs for similar components. In addition to methods and accumulated benchmark data that have IPG nature, the proposal should be more explicit about the IPGs that are generated from SIs 2, 3 and 5.

Although, on one hand, partners for state-of-the-art genomics and phenotyping are already identified and committed in collaborative projects; and, on the other hand, the Centers and partners hold well maintained maize genetic collections, it is the breeding, testing and scaling-up capacities, and their links with seed production systems, that will make the difference at regional and local levels for generating economic and social impacts. This has been discussed above. The CRP cannot lose sight of this aspect in the process of making research products available to national agricultural systems. Thus stakeholder involvement, particularly in *ex ante* analysis (SI1) and in SI3 focusing on closing the yield gap, is important. In aiming to double maize productivity for poor farmers (SI5) and some components of influencing policies (SI1), managing deliverables and attracting partners among stakeholders need to come together. Establishing clear rules for the use of intellectual property is essential for generating incentives and trust.

The program is not particularly elaborate regarding social science research, which is not especially innovative. Social science is essential in several SIs, and SI1 is designed to address targeting, institutional innovations and markets. Economics needs to be more prominent. Linkages with CRP2 could be stronger and more explicit.

#### **4. Quality of research and development partners and partnership management**

The partnerships are comprehensive, there is a strong framework defining the kinds of partners that provide value to each of the SIs, and partner linkages are defined for SIs. The proposal enlists support of dozens of the world's leading research institutions over a broad spectrum to leverage international resources as much as possible. Management of these partnerships is less clear. In fact, the large number of partners (>300) represents a challenge

to management at different levels, particularly if there is frequent turnover among partners. Likewise, the number of institutions involved seems far in excess of the number that could be effectively coordinated. The question of what research takes place inside the MAIZE collaboration and what takes place outside the collaboration could end up being quite complicated.

Therefore, the partnership strategy needs to be very clear. Particular challenges and opportunities of working with the big five multinational seed companies should be clearly analyzed, given that maize is a crop in which the private sector is spending at least 10 times what this CRP will spend. Private sector linkages are important regarding genome sequencing but the Program needs to be prepared to negotiate handling of restrictions to secure benefits from these partnerships. Intellectual property rights (IPR) issues are relevant for most of the SIs and the arrangements should be clear and transparent regarding final products and generating and publishing new knowledge. In networks there are plans to provide some exclusivity for partners to provide incentives. The conditions for such exclusivity agreements need to be clear. The concept of “pre-competitive ag-commons” and developing of “open-source” technology exchange and breeding practices is innovative and highly commendable.

Links to other CRPs are discussed but there are more opportunities for MAIZE to leverage other CRPs. For example, CRP2 has considerable work on input and output markets and risk management, and these are major issues for maize in Africa. In countries where maize is the major food staple, the maize CRP should be able to partner with CRP2 as the lead CRP. Similarly, CRP4 (nutrition and health), once established could assume the lead on quality maize research and research on maize mycotoxins. Closer partnership with CRP7 (Climate Change) would also be beneficial. Collaboration both in planning and implementing components that address research production and innovation systems will be important. However, in management of all the cross-dimensional partnerships (MAIZE partners and CRP partners) transaction costs need to be controlled.

The proposal is frank in its partnership risk assessment in stating that intended partner engagement depends significantly on availability of funding and other factors, such as dependence on restricted funding which could shift attention from the big picture due to sporadic partner engagement, and disturb the research dynamic thus leading to waste of resources. The capacity of NARS, and local seed companies also poses a potential risk and may require change of strategy. Risk analysis should thus be strengthened both at SI and Program levels.

## **5. Appropriateness and efficiency of Program management**

The CRP3.2 is dominated by the lead-center, CIMMYT, which is reflected also in the projected contribution from CIMMYT. No other partner has a comparable role in this CRP. Unlike GRiSP, the planning of which started some years before agreement of the CRP structure, MAIZE is a product of the reform. The CGIAR community can expect that the MAIZE partnership will foster future fruitful collaboration of CIMMYT and IITA, and management should support this aspiration. The current proposal does not show how this

collaboration could be considered in designing program management. CRP management support receives little attention and only one staff is identified (to take care of the Web portal). CRP management expenses are described as an onerous affliction. The Management Committee includes relevant directors and representative of the research primary partners (three other organizations currently considered in addition to CIMMYT and IITA). Program management is, however, closely held by the lead-center. The ISPC would argue such tight control is not a good framework for management and governance of a multi-partner program in an increasingly collaborative funding environment. Aggregation of control exceeds the level needed to control risks related to the lead Center's legal and fiduciary responsibilities. Although half of the CRP management budget is allocated to knowledge management, monitoring and evaluation but the grounds for these budget estimates are not explained.

## **6. Clear accountability and financial soundness, and efficiency of governance**

The budget presentation indicates that CIMMYT's contribution is a very large part of the overall budget. While projections through 2013 are more speculative, the relative size of CIMMYT's role compared to that of IITA continues to track in a relatively constant manner. It is also projected that a large proportion of funding will come from bilateral sources. The associated influence of those bilateral donors is a concern if their priorities are not consistent with the strategic framework and this CRP.

The CRP also lacks a strong mechanism for independent oversight and evaluation. There will be an Oversight Committee, but there are no details of how it will be elected. However, the Oversight Committee fulfil the role of independent oversight under the following conditions:

- A mechanism by which "at large" members (those not representing participating Centers or primary research partners) can be nominated and appointed in a manner not wholly influenced or controlled by the lead Center,
- A greater number of at large than representative members
- Term limits or a similar mechanism that provides for turnover among at large members and encourages individual performance
- A committee chair that is nominated from among the committee members and serves for a fixed term
- The authority to commission periodic external evaluations of the CRP, including its management and governance

The ISPC therefore strongly recommends that the Oversight Committee be established according to these conditions.