

Update on multi-Funder initiative to enhance crop breeding programs

Purpose

This document provides background information to Agenda Item 4 of the 6th System Council meeting, on the multi-Funder initiative to enhance crop breeding programs.

Action requested

The System Council is asked to consider this material as background information to the update and discussion for input on the multi-Funder initiative to enhance crop breeding programs.

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Prepared by: Funders (AusAID/ACIAR, BMGF, BMZ/ GiZ, DFID, USAID)

Update on multi-Funder initiative to enhance crop breeding programs (“Initiative”)

This note has been prepared by Funders (AusAID/ACIAR, BMGF, BMZ/ GiZ, DFID, USAID) and is provided as background information to Agenda item 4 of the System Council 6th Meeting, Berlin, 16-17 May 2018 on the above topic.

Purpose

At the System Council Meeting in Cali, Colombia (SC5, 9-10 November 2017) the System Council member for the USA provided background to the ‘Multi-Funder initiative on Climate-, Pest-, and Disease-Resilient Nutritious Crops to End Hunger by 2030’ as outlined in meeting document SC5-07.

The Chair’s summary of that meeting noted:

- a. The crop breeding initiative builds on the example of the consolidated approach CGIAR has developed in genetic resource conservation, noting the key international public goods opportunities associated with the System’s capacity in holding genetic resources in trust;
- b. Crop improvement work has historically been an area of strength for CGIAR, however it presents challenges for investment due to long-term returns on investment;
- c. Particularly relating to key crops for nutrition and ecological stability, breeding programs do not currently attract significant investment as part of the shared agenda;
- d. CGIAR is uniquely placed to undertake these activities for key crops in response to climate threats such as heat or drought tolerance, or in response to pests or disease, however the resources to respond effectively are not readily available;
- e. The Excellence in Breeding(EiB) Platform is a possible key organizing principle for the initiative. The initiative was welcomed, as was further input into the Funder group preparing the initiative.

This note briefly outlines progress since the last System Council meeting (SC5) for the information of SC Members to provide background to a discussion of the subject under Agenda Item 4 and for an open meeting of Funders and observers to SC6 planned for Tuesday 14 May 2018.

Background

Crop breeding is a central component of CGIAR's activities and skill set which contributes to the System's goals for improved crop productivity, and through that to improved food and nutrition security. The adoption of improved varieties by farmers in developing countries has relevance to the provision of incomes, and to the resilience of crop farming systems against disease and the environmental stringencies brought about by climate change. As noted in the Chair's summary to the last meeting (SC5) a focus of CGIAR breeding programs on smallholder farmer demand is an important aspect of modernizing breeding to ensure uptake and productivity gain and sustainability, including engagement with relevant partners for 'last mile' adoption. The role CGIAR can play in the context of the SDGs is to move beyond crop improvement to development outcomes on inclusiveness, nutrition, adaptation and migration. A review and enhancement of capacity brings with it the importance of attracting talent to CGIAR breeding programs, as well as the need to identify the means through which the Initiative would be structured and implemented best within the existing CRP and Platform context. Given an agreed shape to the Initiative, funders could then determine whether additional funding would be required and could be made available.

Components of the Initiative

An inception brief of the Initiative was prepared following the last System Council meeting (in January, and was updated in March of 2018). A Priorities Group (PG) to help assess crop breeding priorities for CGIAR with a lens towards SDG deliverables in 2030 was formed. At the same time, and mindful of the need to have an objective measure of current programmatic and institutional capacity, a Breeding Program Assessment Tool (BPAT) is being systematically deployed with the support of the Bill & Melinda Gates Foundation (BMGF). A Technical Group (TEG) of experts in modern technological approaches to crop breeding has been formed by Funders to provide advice to the Initiative as to the components and approaches that the CGIAR System may need to consider in the modernization of approaches to crop breeding. Each of these aspects is briefly described below.

Reviewing crop priorities for research and development outcomes – the Priorities Group (PG)

The crops on which CGIAR has focused, and the balance of investment amongst crop breeding programs, has come about through evolution of the historical mandates attributed to CGIAR Centers and, most recently, in allocations of W1-W2 funding and bilateral Funder preferences to the collaborative Agri-Food System programs in 2016. Research on the biofortification of staple grains has added new impetus to parts of the CGIAR investment. There are now large differences in the balance of work and funding intensity across crops and differences in efficiencies in achieving genetic gains. The situation of developing country agriculture, food systems and alternative research suppliers are all substantially different today from the era in which traditional crop mandates for CGIAR Centers were assessed. The Initiative is seeking to make a first systematic prioritization of crops for research investment towards the SDG goals of 2030, i.e. which crops might be the preferential focus of the CGIAR breeding efforts and investment in the future and which crop breeding programs might merit initial

modernization because of the crop's particular value in reaching SDG 2 goals of enhanced food and nutrition security for the poor.

The multi-Funder Initiative convened a Priorities Group (PG) of eminent agricultural economists, including a relevant expert member of the ISPC, to help orient and review a poverty-weighted, economic modelling exercise on crop prioritization across the CGIAR System. It is understood that models are unlikely to be definitive in their own right - they do not include elements like the costs of research or the difficulty of the research implementation or adoption. However, as all crops are treated similarly, modelling outputs have the advantage of providing an objective comparison of crop priority for subsequent analysis purposes, including of technical feasibility and scientific opportunities per crop. The PG met in February of 2018 at IFPRI, Washington DC, to review a first run of the Impact Model (conducted by the Impact team at IFPRI, with country poverty weightings provided by colleagues at USDA). Two models were run: *a parity model* which projects the importance of consumption of individual crops to the poor in developing countries in the period 2014-2016 based on farm gate prices; and *an economic surplus model*, which examines how economic surplus from accelerated crop yield increase (enhanced genetic gain) accrues to the poor to 2030, taking into account market trends in prices under the influence of trade and population growth. The PG recommended that additional sensitivity analyses be included on such factors as the size of the simulated genetic gain shock, absolute or relative poverty gaps per country, and the effects of focusing the analysis on poorer developing countries. These new sensitivity analyses for approximately 20 CGIAR crops were presented to the TEG meeting (April 26/27) for information.

The initial results of the modelling approaches appeared to be robust across these various parameters. Both models highlight the overall importance of cereal grains in the food systems of developing countries to 2030. The major difference between the model approaches was the greater relative contribution of root crops and legumes in the parity model (focused on developing country consumption measures). Regional shares also move substantially towards Africa in the economic surplus model when using the poverty head count index. The Priorities Group is currently assessing the appropriate framing of the model outcomes, particularly seeking to analyze differential effects at the level of large countries or sub-regional groupings. Further qualitative analysis (available post-SC6) will be conducted assessing crops for their contribution to improved nutrition (protein and micronutrients) in relevant countries or sub-regions, an important determining element in meeting the goals of SDG 2.

Action to review and monitor the capacity of current crop breeding programs in CGIAR and NARES

Key to the improvement process is a uniform and objective diagnosis of the state of CGIAR and NARES breeding programs for the target crops and measures of performance. Fortunately this is already in place and underpinning progress. Funders, concerned about lower levels of genetic gains and varietal replacement from public breeding programs serving small-holder farmers, have adopted the Breeding Program Assessment Tool (BPAT – a questionnaire and expert on-site assessment based on the expected dimensions and capacities of modern breeding programs). The tool is administered by a non-CGIAR entity, the University of Queensland, with support from the BMGF.

A systematic BPAT assessment of all CGIAR crop breeding programs is underway. Summarized information, from completed assessments and from survey questionnaire responses of CGIAR crop breeding programs still to undergo full assessments, was presented to the Technical Group.

Assessing technical opportunities in enhancing breeding programs towards outcomes – The Technical Group (TEG)

A Technical Group (TEG) was formed of experts nominated by the funder agencies (including the administrators of the BPAT assessments), the private sector, the Excellence in Breeding Platform and the CGIAR System Management Office. The first face to face meeting of the group was convened at the BMGF offices in Seattle, on 26/27 April 2018.

The TEG was provided with the initial outcomes of the state of the crop priorities modelling for information. Using the frame of the model outcomes, the TEG group will be asked subsequently to examine the crop-specific opportunities (such as crops for food system resilience and technical opportunities for achieving genetic gain from the current knowledge base).

The TEG discussed summarized information from the BPAT assessments. They also considered a number of case studies in building enhanced crop breeding capacity in public and private sectors. Key technical opportunities for CGIAR programs identified from BPAT assessments to date are:

1. Product profiles, based on continually updated market intelligence, ensuring that new varieties are acceptable to farmers, processors, marketers and consumers.
2. Institutional accountability for the delivery of genetic gains to farmers.
3. Continually optimized breeding pipelines that maximize genetic gains for time and cost.
4. Variety testing and advancement systems that clearly identify products which are demonstrably superior to what farmers currently grow.
5. Demand creation and dissemination.

The schedule for BPAT assessments runs to early 2019. The TEG suggested that the areas identified would be augmented at the system level by a) improved integration of supporting sciences and staff for product development and management functions, b) significant upgrading and modernization of existing infrastructure, and, c) the establishment of shared functions which do not currently exist. For this a System strategy and managerial leadership will be required.

It was further suggested that the Excellence in Breeding Platform, which is itself consolidating its expertise during 2018 around seven focus areas, can serve as a source for advice and support, but that enhancement of individual breeding programs or breeding networks is additional to this capacity.

Future plans

The Funder group look forward to providing further information and to SC member input and discussion (both in the informal meeting on 15 May and as part of Agenda item 4 of the main SC6 meeting agenda).

A key component will be discussion of the timing for completion of the analyses and prioritization and Funders will discuss the process for formulation of strategy development and engagement with CGIAR leadership and programs (SC, SMB, ISPC, CRPs and Center breeding programs), developing clarity on actions required between June to September.

The PG will seek to finalize the economic modelling results as rapidly as possible and will interact with the TEG which will consider comparative advantage and feasibility of research in crop choice and system efficiencies towards the formulation of a System strategy.

A strategy for a CGIAR System-level enhancement approach to crop breeding and definition of budget for the priority actions and recurrent support is expected to be completed by October for the presentation of the Initiative to the System Council Meeting in November 2018.