New Visions in Agricultural Research: The Development of Global Programs Using ProMusa as an Example

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Despite all the technological advances of this century, including the green revolution, the world is still facing increasing poverty and more than 800 million people remain undernourished. Agricultural research—including all components from horticulture to food technology—is faced with the major challenges of increasing food production in a sustainable manner and improving family farm income in order to ensure household food security, while at the same time conserving the natural resource base. New tools, such as those provided by biotechnology and advances in information technologies, provide opportunities to meet these challenges. However, to ensure that this is done efficiently, equitably, and with a gender perspective, the appropriate approach to technology generation and transfer is essential. Researchers, extensionists, and end users must work together in a participative manner

to increase production and productivity in a sustainable way and to allow the benefits to reach the poorest and most needy of farmers.

In recognition of the enormous challenges lying ahead, and of the need to make the most effective use of limited resources to tackle these challenges, a new vision of a global agricultural research system building on strong cost-effective partnerships and a comprehensive global research agenda has been elaborated. This paper provides a model for implementing the global research agenda based on the development of participative global programs in specific problem areas.

NEW VISION

The need for a new vision in international agricultural research grew from a recognition that, just as world food security is based on the principle of exchange, so agricultural research is a global concern. There was a clear need to foster collaboration within the global agricultural research system, to open this system to its stakeholders, and to solicit their participation in the strategy and priority setting processes. There was also a growing concern for the need to improve the interactions between those who finance international agricultural research, those who contribute to the research, i.e., the International Agricultural Research Centers (IARCs) of the Consultative Group on International Agricultural Research (CGIAR), other advanced research institutes (ARIs), and, increasingly, the national agricultural research systems of developing countries (NARS), and those who should benefit from the results and

ensure their application. The move toward closer partnerships at the global level has occurred in parallel with other changes in the external environment in which international agricultural research is carried out. National programs have become stronger, there is a greater involvement of NGOs in the implementation of development programs and regional and subregional groupings, such as ASARECA, CORAF, and SACCAR in Africa, APAARI in Asia, and PROCIANDINO, PROCISUR, PROCITROPICO, and PROCICARIBE in Latin America, have emerged as mechanisms to set priorities on a regional basis. In addition, ARIs, of which the land-grant universities of the United States are a major component, are slowly but increasingly moving back to a greater level of involvement in international research activities.

An important step in developing a new vision of global partnerships was an international consultation process convened by the International Fund for Agricultural Development (IFAD). This consultation produced a "NARS Vision of International Agricultural Research" and resulted in a declaration and recommendations to strengthen NARS-CGIAR partnerships, as well as identifying the need to develop effective mechanisms for successfully implementing an innovative new global agenda. The new vision of agricultural research requires new ways of thinking about partnerships and the implementation of high-quality science, technology, and expertise in multidisciplinary research embracing both the social and biological sciences.

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The CGIAR, in reviewing its role within the global agricultural research agenda, and in recognition of the need to become more effective and efficient, launched a program of renewal and rededication in 1995 (CGIAR, 1995). As part of the renewal process, the CGIAR is seeking to strengthen its partnerships with NARS, regional organizations, ARIs, NGOs, farmers and farmers' organizations, and the private sector. Partnerships are essential as a means to improve research relevance, increase ownership of the South in the CGIAR system, tap additional resources, and pursue research in a more coordinated fashion. Although the CGIAR is a relatively small component of the global system, it is uniquely placed to serve as a bridge between developing country research systems and ARIs in industrialized countries.

In 1996, the first Global Forum on agricultural research was held (CGIAR, 1996). This was the first time that the various components of the global agricultural system had been brought together to explore needs and opportunities for agricultural research. The Global Forum manifested the resolve of the international community to integrate its best scientific talent in order to maximize its agricultural research capacity, and culminated in the adoption of a "Declaration of Global Partnership in Agricultural Research."

Global programs

In adopting the "Declaration of Global Partnership in Agricultural Research," signatories committed themselves to fostering the participation of all stakeholders in research collaboration. The CGIAR, including the International Network for the Improvement of Banana and Plantain (INIBAP), a program of the International Plant Genetic Resources Institute (IPGRI), is attempting to fulfill this commitment through its encouragement of, and participation in, global programs for agricultural research.

What is a "Global Program"? It is increasingly recognized that certain research problems are global in nature. Individual institutes clearly do not possess all the skills and facilities necessary to address major international research issues. Partnerships are essential and, within the context of global programs, can be fostered and ensured. A global program therefore is a program that includes all the major players and stakeholders with an interest in addressing a particular problem or set of problems that has been identified at the global level. The many actors in a global program may include ARIs, NARS, the private sector, NGOs, and IARCs, all of which play contributing and complementary roles. Such programs can be illustrated by an actor $\times$ program matrix, in which each actor is represented by a row (Table 1).

Within the context of a global program, the various actors in the global scene can be brought together, their respective roles clarified, and collaborative partnerships established. Priority setting within the program is carried out at the global level with the participation of all the

Table 1. The Global Program matrix.

Actor	Global program			
	A	B	C	D
ARIs	*	*	*	
IARCs	*	*		*
NARS	*	*	*	*
Universities	*	*	*	
Private sector	*		*	
NGOs				*
Other		*		
Other			*	

stakeholders, thus minimizing duplication of effort and increasing the efficiency with which funds are used. A global program can be initiated by any of the actors with participation based solely on ability and willingness to contribute to the overall program aims. An important principle that can be applied within the context of a global program is that of subsidiarity. That is, the primary responsibility is devolved to the lowest level in the hierarchy, from global to regional to national, where the specific activity can be carried out most effectively and efficiently.

The role of the CGIAR in global programs. The CGIAR is an important, but small, actor in the international agricultural research scene, accounting for only 4% of global expenditure on agricultural research. In relation to global programs, the CGIAR can play an important role, particularly in forging linkages between developing country NARS and the more advanced research of developed countries. Several efforts focusing on horticultural crops are under way involving the CGIAR. These include the Global Initiative on Late Blight, spearheaded by the International Potato Center, and, more recently, ProMusa, the Global Program for Musa Improvement. The development of ProMusa was initiated by the World Bank and INIBAP, both of which currently are implementing Musa research programs. Within this global program, two CGIAR centers, IPGRI through the INIBAP program and the International Institute for Tropical Agriculture (IITA), have significant, but different, and complementary roles. INIBAP, with its experience in networking as a *modus operandi* provides the secretariat and plays a coordinating role within the program. IITA will participate, along with a number of ARIs, universities and NARS, as a significant research partner. Further details of the background, development, and structure of this innovative program are provided below; other such programs might be developed for agronomic or horticultural crops, using this as a model.

ProMusa—A model for a global program

The need for a global program. Bananas and plantains are one of the world's most important, yet poorly studied, crops. They constitute a major staple food crop for millions of people in developing countries in the tropics. About 10 million ha are harvested annually, with an annual production of around 86 million t (Food and Agricultural Organization, 1995). The vast majority of producers are

small-scale farmers growing the crop either for home consumption or for local markets. Bananas and plantains are of major importance to food security and provide a valued source of income through local and international trade. In terms of gross value of production, bananas and plantains are the fourth most important global food crop. Export bananas are the fourth most important commodity and, as a fruit, rank first.

Bananas grown for export, are almost exclusively of one variety—"Cavendish"—and account for little more than 10% of global production. A very wide range of varieties is grown for local consumption, each adapted to a specific eco-region and selected for specific eating or cooking qualities. These include the true plantains of West Africa and Central and South America, the highland bananas of East Africa (used for both food and beer-making), the cooking bananas of Southeast Asia and the Americas, and the Pacific Maia Moali/Popoulu type of banana.

Varieties resistant to the major pests and diseases that affect banana and plantain production are needed, not so much for the export banana market, but for the varied needs of smallholder producers in many countries worldwide.

In the past, relatively few funds were directed toward Musa research, mainly due to the intrinsic difficulties in breeding a crop of which almost all the important cultivars are highly sterile and for which very few national programs had the resources for breeding research. Recent developments in breeding and biotechnology have allowed many of the barriers to genetic improvement to be overcome, and significant progress has been made. However, even with these advances, the genetic improvement of bananas and plantains remains an expensive and slow task, and, considering the scale and diversity of the problems facing banana and plantain growers worldwide, these programs are still too few in number. Only through close international collaboration, drawing together and building on the limited number of ongoing initiatives in Musa improvement, will a significant impact be made in years to come.

Establishment of the program

During 1996 a global Musa improvement program was proposed with the aim of bringing together all the major efforts in the area of banana and plantain improvement worldwide. INIBAP and the World Bank, through a par-

ticipative process involving extensive consultation with more than 50 individuals and partner institutes, developed an initial proposal for the program. This was further refined, incorporating inputs and suggestions received from the many partners. This participative approach enabled INIBAP to produce a final draft proposal that represented the views of all interested parties. This proposal was presented at a meeting jointly organized by INIBAP and the World Bank that brought together more than 70 researchers involved in *Musa* improvement. During this meeting, the program structure, *modus operandi*, and medium term plan were agreed upon and, as a result, the Global Program for *Musa* Improvement, ProMusa, was formally launched in March 1997.

ProMusa has been developed as a broad based program that aims at involving all the major players in *Musa* improvement. It was developed as a means to link the work on the problems of export banana producers with those initiatives directed towards improving banana and plantain production at the subsistence and smallholder level. The global program builds upon existing achievements and is based upon ongoing research initiatives. ProMusa is therefore a mechanism to further maximize the outputs and accelerate the impact of the overall *Musa* improvement effort. The program is an innovative mechanism to bring together research carried out both within and outside the CGIAR, creating new partnerships between NARS and research institutes in both developing and developed countries. It is also hoped that ProMusa will provide a suitable framework within which the private sector can be encouraged to actively participate in *Musa* research activities. The structure of ProMusa (Fig. 1) was agreed upon by all participants in the program.

Partnerships within ProMusa. Partnerships underpin this global program and are active at all levels of program management and implementation. The program operates as a series of interlinked thematic working groups coordinated by an Executive Secretariat. It is directed by a Steering Committee that includes representatives from NARS, ARIs, and IARCs and operates under a Program Support Group composed of major donors and stakeholders. ProMusa operates as a consortium and will rely on a range of funding mechanisms. Partners in the program are expected to contribute their own ongoing research and, in addition, the program seeks further resources in order to address priority research needs, as identified by the partners. Participation in ProMusa is based on the capacity to contribute through a high scientific capability in *Musa* improvement research and on comparative advantage within that research agenda.

Program activities take place in a series of thematic working groups, which operate as networks. Such a mechanism facilitates the formation of collaborative projects between group members, resulting in a division of labor and the creation of synergies. The working groups are the heart of the program. The members of these groups implement the program workplan through a project portfolio that in-

Fig. 1. The structure of ProMusa.

cludes projects carried out by individual participants, as well as collaborative projects involving a number of participants funded through various mechanisms. Working groups cover the major research needs, which at this stage include genetic improvement, fusarium wilt disease, sigatoka disease, nematodes, and viruses.

Decision making within ProMusa follows a "bottom-up" approach in which participating scientists are fully involved. Decisions on program activities are based on scientific priorities identified by program participants and are based on users' needs.

INIBAP is responsible for providing the Executive Secretariat to ProMusa and, with the close links it has already established with many national programs through regional banana networks, it is ideally placed to foster close collaboration between program participants.

Program activities. The major thrust of ProMusa is to develop a wide range of new banana hybrids suitable for production by banana growers worldwide. The program brings together conventional breeding based on hybridization techniques with genetic engineering and biotechnological breeding approaches. This broad-based genetic improvement effort is then supported by research being carried out on specific pests and diseases within the various working groups. An efficient mechanism for evaluating new varieties produced within the framework of ProMusa is also an essential component of the program. The participation of NARS in this activity ensures not only that improved hybrids are made available to them at an early stage, but also, through the creation of linkages, facilitates the two-way flow of information between breeding/research programs and evaluation sites. The global and regional *Musa* germplasm evaluation program therefore plays

a major role in ProMusa, providing a mechanism for information exchange. The provision by NARS of feedback information regarding farmers' needs is of particular importance in setting research priorities. The existing regional banana research networks also provide a useful channel through which information from national programs is fed back to the global program.

Benefits of participation in ProMusa. Participants in the program benefit from:

- global prioritization of research needs;
- improved possibilities for funding for program participants due to recognition of the program by donor agencies;
- close interactions with, and knowledge of, other research teams within their area of specialization;
- opportunities for interdependent research projects (i.e., projects requiring interdisciplinary and complementary partnerships);
- improved access to information and resources;
- participation in program meetings and conferences.

Advantages of a global program

A global program such as ProMusa, which has broad participation from worldwide partners, including IARCs, ARIs and NARS, allows research priorities to be established at the global level, while the work itself is carried out mainly at the national or regional level. ProMusa therefore allows comparative advantages to be fully exploited and at the same time fosters the principle of subsidiarity. In other words, research is carried out at the lowest possible level of the national-regional-global hierarchy and efficiency and effectiveness are maximized.

A global program such as ProMusa also

encourages new and innovative partnerships to be forged between the various program participants and encourages the creation of synergies. The involvement of NARS as partners at all levels has the effect of strengthening the capacity of such NARS to conduct *Musa*-related research and in facilitating the transfer of technology and expertise.

The advantages of global programs are

therefore considerable and Pro*Musa* can serve as a valuable model for the development of similar programs for other commodities. Global programs also serve as a valuable mechanism for universities and other ARIs to increase their involvement in international agricultural research and become more important partners in the global agricultural research system in a focused and cost-effective manner.

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