



The global programme for *Musa* improvement

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What is a "Global Programme"?

Many international agricultural research issues, which are crucial for world food security, are global in nature and individual institutes do not possess all the skills and facilities necessary to address such problems. These issues can best be addressed through partnerships and collaboration. Global programmes provide the framework within which partnerships can be developed, fostered and ensured. A global programme thus consists of a coordinated set of activities, carried out by a wide range of programme participants, or partners, directed towards solving a specific problem or set of problems which has been identified at the global level. A global programme can also be considered as:

- a set of partnerships;
- a forum for setting global research priorities;
- an umbrella for improved funding possibilities for programme participants due to recognition of the programme by donor agencies;
- a mechanism to promote close interactions between, and knowledge of, research teams within an area of specialization;
- an opportunity for interdependent research projects (i.e. projects requiring interdisciplinary and complementary partnerships);
- an opportunity for improved access to information and resources.

The overriding aim of developing such a programme is to create "added value"

through more efficient partnerships and sharing of information, materials and results. In other words, the output of the programme as a whole will be greater than the sum of its component parts.

The establishment of PROMUSA

PROMUSA was initiated by INIBAP and the World Bank, two organizations which were implementing *Musa* research programmes with components in *Musa* improvement. Because of the importance of *Musa* and the limited funding available on a global basis for improvement, the potential of bringing research partners together under the framework of a global programme was seen as an promising way to maximize progress and increase the benefit from research investment.

INIBAP and the World Bank, through a participative process involving extensive consultation with more than 50 individuals and partner institutes in the scientific and donor communities developed an initial proposal for the programme. This proposal was presented at a joint meeting, which brought together more than 70 researchers involved in *Musa* improvement as well as representatives of the donor community. During this meeting and after much debate and discussion of different views, the programme structure, *modus operandi*, and a medium term plan of activities were agreed upon. The Global Programme for *Musa* Improvement, PROMUSA, was formally launched in March 1997.

How does PROMUSA work?

Guiding Principles

The Global Programme for *Musa* Improvement focuses specifically on genetic improvement and supportive research and priority is given to research which has a global or regional significance.

PROMUSA operates as a consortium and relies on a range of funding mechanisms.

Partners in the programme are expected to contribute in-kind their own research and, in addition, the programme seeks further resources in order to address priority research needs, as identified by the programme partners.

PROMUSA's organizational structure is simple and efficient in order to ensure that maximum support is maintained for research activities.

Programme activities take place in a series of thematic working groups, or networks, which allow continual interaction between group members. Collaborative projects between group members are encouraged and facilitated, resulting in a division of labour and the creation of synergies. Interdisciplinary contact also occurs at regular intervals through meetings at the programme level and on a continuing basis through the programme secretariat.

Participation in PROMUSA is based on the capacity to contribute through a high scientific capability in *Musa* research and on comparative advantage and is on a voluntary basis.

Decision making within PROMUSA follows a 'bottom-up' approach and participating scientists are fully involved in this process.

Programme structure

The programme operates as a series of interlinked thematic working groups coordinated by a Secretariat. The programme is directed by a Steering Committee and operates under a Programme Support Group. See Figure 1.

Programme Support Group: This is composed of major donors and stakeholders and thus comprises representatives from donor agencies (e.g. countries, International Fund for Agricultural Development (IFAD), Common Fund for Commodities (CFC), United Nations Development Programme, World Bank, Foundations, private sector); other relevant organizations (e.g. FAO and the Inter-governmental Group on Bananas); representatives of ARI's, IARC's and NARS. Membership is also open to other interested parties. The Programme Support Group provides visibility,



guidance and support to the programme. It endorses the overall direction and strategy of the programme and contributes to identifying and providing additional funding and other resources as necessary.

Steering Committee: The Steering Committee comprises representatives from NARS, ARIs and IARCs. In addition, the Chair of the Programme Support Group attends the Steering Committee meetings as an observer. This committee is responsible for proposing direction and providing oversight to the programme. It sets priorities based on technical advice from the working groups compiled by the Secretariat and advises donors on the allocation of resources to the programme. The Steering Committee also approves the programme strategy, medium term plan and annual workplan. It commissions reviews of the programme, advocates on behalf of the programme and seeks external technical advice as appropriate.

Secretariat: The Secretariat is provided by INIBAP. It serves as the programme coordinator and is responsible for ensuring the smooth running of the

programme. It also facilitates the organization of technical meetings, both thematic and interdisciplinary, and disseminates information to programme partners. It prepares reports and compiles lists of priorities, based on technical advice provided by the thematic working groups. Internal communication is a particularly important aspect of the programme, and the Secretariat plays a critical role in stimulating contacts between groups. Regular inter-group information exchange is ensured through a programme newsletter, which, in the initial stage is included as a "PROMUSA" section in INIBAP's journal, *INFOMUSA*. The Secretariat also has an important role to play in providing feedback to the programme and ensuring a link with the end-users.

Thematic working groups: The working groups are the heart of the programme. The members of these groups implement the programme workplan through a project portfolio, which includes projects carried out by individual participants as well as collaborative projects involving a number of participants funded through various mechanisms. Participation in the

working groups is based primarily on capacity to contribute and comparative advantage, but also depends on the priority research needs identified by each group. As the programme evolves, research priorities will change and this will necessarily result in changes in the make up of each working group. Working groups cover the major research needs which are of global relevance. At this stage these include Genetic Improvement, Fusarium wilt, Sigatoka diseases, Nematodes and Viruses. This complement of working groups is however dynamic in nature and new groups may evolve during the lifetime of the programme.

Programme activities

The major thrust of *PROMUSA* is to develop a wide range of new banana hybrids suitable for the various needs of farmers in the different regions worldwide. The programme brings together conventional breeding based on hybridization techniques with genetic engineering and biotechnological breeding approaches. This broad-based genetic improvement effort is supported by

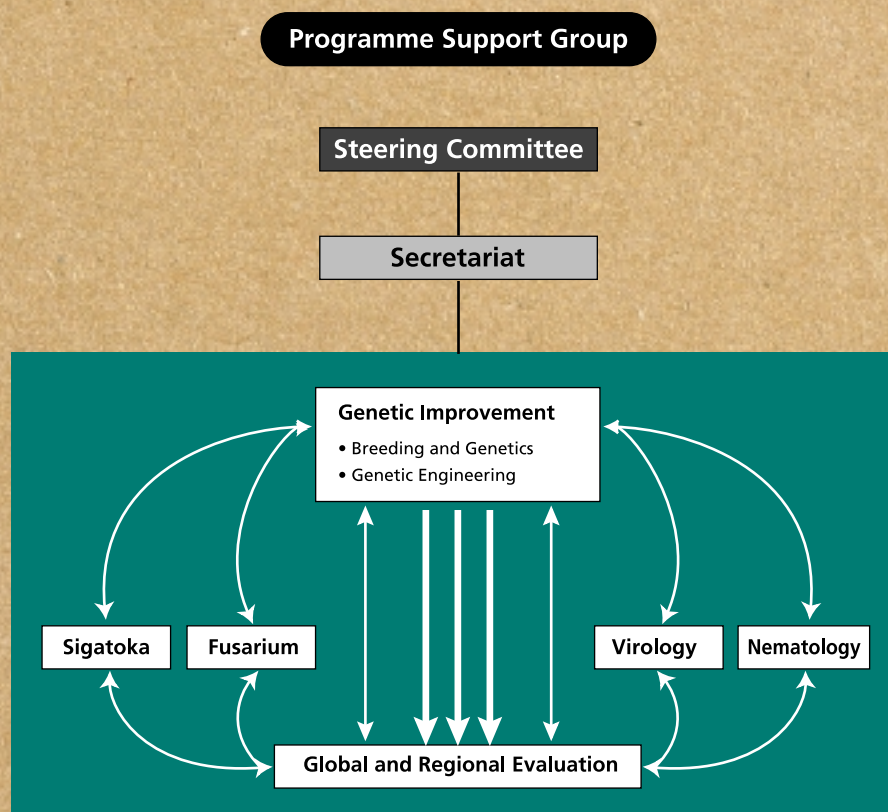


Figure 1. Structure of PROMUSA

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 programme. 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, the two-way flow of information between breeding/research programmes and evaluation sites is facilitated. The global and regional *Musa* germplasm evaluation programme therefore plays a major role in PROMUSA providing a mechanism for information exchange.

PROMUSA objectives

General objectives

- To increase the productivity of bananas and plantains produced for home consumption and local and export markets in an environmentally sustainable manner.
- To foster the development of improved *Musa* varieties with a wide genetic base and consumer acceptability and to disseminate these varieties to farmers through participating NARS.

- To facilitate and stimulate partnerships among NARS, advanced research institutes, and IARCs to increase the efficiency and cost-effectiveness of global *Musa* improvement efforts.

Specific objectives

- To obtain the necessary basic scientific information to enable the production of a wide range of genotypes resistant to the major nematode pest species and to Sigatoka and Fusarium diseases.

This will include:

- Identification of sources of resistance to nematodes, Sigatoka and Fusarium
- Better knowledge of the types of resistance to nematodes, Sigatoka and Fusarium and an understanding of the inheritance of these traits
- Information on pathogenic variability and geographic distribution of major nematode pest species and of the Sigatoka and Fusarium fungi.

- Development of efficient breeding methodologies.

This will include:

- Broadened genetic base of material used by breeding programmes
- Identification of molecular markers and their use in marker-assisted breeding
- Development of biotechnological tools
- Integration of conventional breeding and biotechnology methodologies.

- Control of viruses in *Musa*.

This is through:

- Development of robust diagnostic systems for the major viruses affecting *Musa* in order to facilitate germplasm movement
- Production of transgenic virus-resistant clones.
- Evaluation and dissemination of improved varieties through a global and regional evaluation programme.

More information on PROMUSA is available from the PROMUSA website:
<http://www.inibap.fr/promusa/>





Musa Germplasm Management

Managing INIBAP's *Musa* genebank

The main objective of the INIBAP Transit Centre (ITC) is to conserve *Musa* diversity for the benefit of the international *Musa* community and to distribute *Musa* species and cultivars for research and development. This activity is supported with funding provided by the Belgian Administration for Development Cooperation (BADC). During the year 25 new accessions were added to the collection and one accession was replaced, bringing the total number of accessions maintained to 1,114. 1,740 samples of 163 accessions were distributed during 1997 for research and development purposes.

Safety duplication

To ensure the safe conservation of the germplasm entrusted to INIBAP, it was decided in 1994 that each accession should be duplicated *in vitro* in at least one external genebank. Since then, agreements have been signed with the Taiwan Banana Research Institute (TBRI), and the *Centro Agronómico Tropical de Investigación y Enseñanza* (CATIE), Costa Rica for the maintenance of duplicate collections.

During 1997 efforts were focused on the transfer of duplicate accessions to CATIE. The 81 virus-tested ITC-accessions identified for duplication in Costa Rica are now established at CATIE and a second shipment of further accessions is scheduled for 1998.

At the end of 1997, 507 accessions (46%) of the ITC collection are duplicated *in vitro* in back-up collections at TBRI and CATIE.

Endophytic bacteria

During 1997, considerable attention was paid to the problem of endogenous bacterial contamination of accessions in the genebank. By the end of the year, over 500 accessions had been subjected to the screening procedure for endogenous microbial contaminants. Bacteria were isolated from 4.5% of tested clones and those which could be identified were found to be non-pathogenic, mostly from the genus *Bacillus*. Eradication could be achieved through the culture of small explants (meristems) or antibiotic treatment (see also Box p. 12).

Cryopreservation

Research on the development of a simple cryopreservation method for *Musa*, funded by BADC, has resulted in the development of a protocol which has proved to be suitable for the conservation of some *Musa* genotypes, but not for all. Despite modifications which were made to the recovery conditions during 1997, viability rates remained variable. ABB and AAA dessert banana genotypes

INIBAP Thematic Activities