in: INIBAP annual report 2002. INIBAP: Montpellier (FRA), 2003. p. 30-33

An international treaty vital for future food security

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After nearly two decades of negotiations, the International Treaty for Plant Genetic Resources was adopted in 2001. This agreement covers the world's most important food crops, including* Musa*, and sets up a multilateral system for accessing plant genetic resources and sharing benefits. Taking* Musa *as an example, this paper retraces the road leading to the Treaty.

Innovations in agriculture traditionally stem from the meticulous work of farmers and the freewheeling movement of plant materials. Comparing wild species with their domesticated relatives draws attention to the ingenuity of proto-farmers and their descendants, whereas sifting through the archaeological and historical records reveals the journeys made by domesticated plants; whether traveling as hand luggage on human migrations or being picked up by explorers and travelers. The outcome of this protracted and unplanned experiment is an interdependent world in which virtually all countries rely heavily on food plant species originating from outside their borders.

Intertwined for better or worse

Cassava, maize, groundnuts and beans, for example, originated in Latin America and became staple food crops in many countries of sub-Saharan Africa. In turn, African crops such as millet and sorghum contribute to the diet of people in India and Latin America. And of course, bananas, which started off in Asia, are an important staple food in large parts of Africa and Latin America.

As Figure 1 shows, most of the world's plant genetic resources for food and agriculture (PGRFA) originate from regions that are part of the developing world, whereas developed countries are heavily dependent on germplasm originating in other regions. But of these, only West Central Asia and South Asia get a majority of their germplasm from within their region; the others are generally poor in native crop genes (Kloppenburg and Kleinman, 1987).

But with movement of germplasm also came displacement as indigenous crops often gave way to exotic species, or more recently, to improved varieties. Concerns over genetic erosion led to a flurry of collecting in the 1970s and 1980s and to the creation of several genebanks and germplasm collections. INIBAP's own *Musa* germplasm collection, located at the INIBAP Transit Center in Belgium, was created in 1985. The year before, INIBAP had been established to coordinate research on bananas and plantains, which were plagued by increasingly virulent diseases. One of the objectives of the emerging programme was to encourage the safe exchange of *Musa* germplasm for the development of disease-resistant varieties.

The importance for breeders of being able to tap the banana genepool is exemplified by the genetic pedigree of the improved hybrids produced by the *Fundación Hondureña de Investigación Agrícola* (FHIA), in Honduras. The production of these hybrids, which have been bred to be resistant to black leaf streak disease, used material collected in The Philippines, Sabah, Sarawak, Malaysia, Java, Bali, Irian Jaya, Papua New Guinea, New Britain and the Solomon Islands.

Bananas originated from Asia but have become an important staple crop in Africa, where the rates of consumption are now the highest in the world (T. Hemelings, KCDP).

At the time of the establishment of INIBAP, however, quarantine regulations were putting a constraint on germplasm movement. The disease caused by the banana bunchy top virus was common in Africa, Asia and the Pacific, but absent in the Americas. INIBAP therefore focused its efforts on addressing quarantine issues, developing indexing methods and setting up virus indexing centres. By the late 1980s, the system to allow the safe movement of germplasm was in place, but the premise that PGRFA are "the common heritage of mankind" was coming under intense criticism. Developed countries were accused of appropriating the South's PGRFA only to sell it back to developing countries in the guise of improved varieties.

The Convention on Biological Diversity (CBD), which came into force in 1993, paid heed to this shift in thinking by affirming the sovereign rights of nations over their genetic resources. This new state of affairs raised concerns over the status of collections assembled before 1993. To ensure that the accessions contained in their collections remained freely available to all, the Centres of the Consultative Group on International Agricultural Research (CGIAR) signed an agreement with the Food and Agriculture Organization of the United Nations (FAO). Under this agreement, the Centers of the CGIAR hold the designated germplasm "in trust" for the benefit of the international community and cannot claim legal ownership nor can they seek intellectual property rights over it or related information. In 1994, the ITC became part of the International Network of *ex-situ* genebanks following the signature of an agreement between IPGRI and FAO.

The agreement with FAO ensured that the germplasm in the international genebanks would remain freely available and used in research on behalf of the international community, but it could not guarantee the reciprocal arrangement. The changes brought about by the CBD meant that bilateral agreements were the only channel remaining open for germplasm exchange. The non-binding International Undertaking (IU) adopted in 1983, was used as starting point to develop an international regime that would facilitate access and benefit sharing while retaining the spirit the CBD.

The long hiatus

During the negotiations leading up to the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture, in 2001, the uncertainty surrounding the issue of access indeed led several countries to withhold the export of their PGRFA, inaugurating a period of drastically reduced exchange of germplasm.

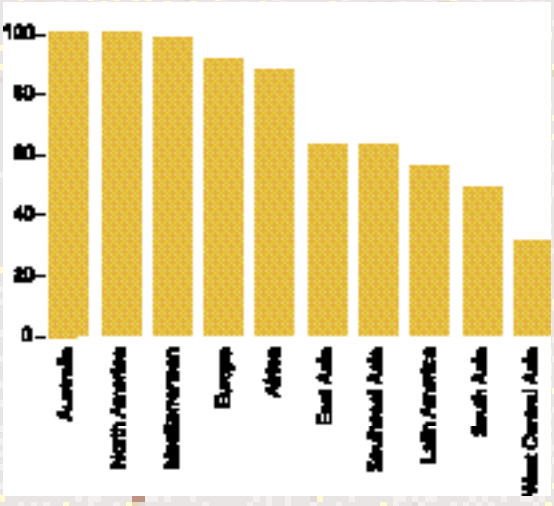

Figure 1. Percentage of regional food crop production that is dependent upon species originating in other regions of diversity (adapted from Kloppenburg and Kleinman, 1987).

The INIBAP Transit Center (ITC) was among the institutions affected.

As Figure 2 shows, the number of accessions acquired has been reduced to nearly zero in the last few years. One of the differences with the pre-CBD period is that the ITC does not always receive duplicates of the germplasm collected as part of missions supported by INIBAP, even if duplication is part of the agreement between INIBAP and the country where the collecting took place. Some countries have agreed to make cultivars available to the ITC, but added that they would hold on to their wild species until the issue of access to PGRFA is resolved. For banana breeders who depend on fertile wild species to breath some genetic diversity into cultivars, this is far from an ideal situation. For the moment, breeders have to make do with the species already collected, which represent only a fraction of the existing diversity. One of the main tasks of the ITC in the coming years will be to boost its holding of wild species.

The ITC, meanwhile, has continued providing a constantly increasing quantity of *Musa* germplasm to *bona fide* users doing research, field evaluation and breeding (Figure 3). The irony, of course, is that some of the countries withholding their germplasm use the ITC to access germplasm from other countries, confirming the need to replace the current unsustainable one-way system with the multilateral system envisaged by the Treaty.

The monetary fallouts of bilateral arrangements

According to calculations done by the FAO, bilateral arrangements would not deliver large amounts of money to the countries harbouring PGRFA. Their conclusion is based on the assumption that 10% of the net profits of the commercial seed industry – from sales totaling about US$15 000 million annually – would be shared between the providers of PGRFA. Given that approximately 5000 new varieties are protected and registered every year, and that on average a new variety is the result of crosses between materials coming from 10 countries, the US$150 million available for redistribution would represent only US$3000 on average for each source country.

Source: Report on the State of the World's plant genetic resources for food and agriculture (FAO, 1998).

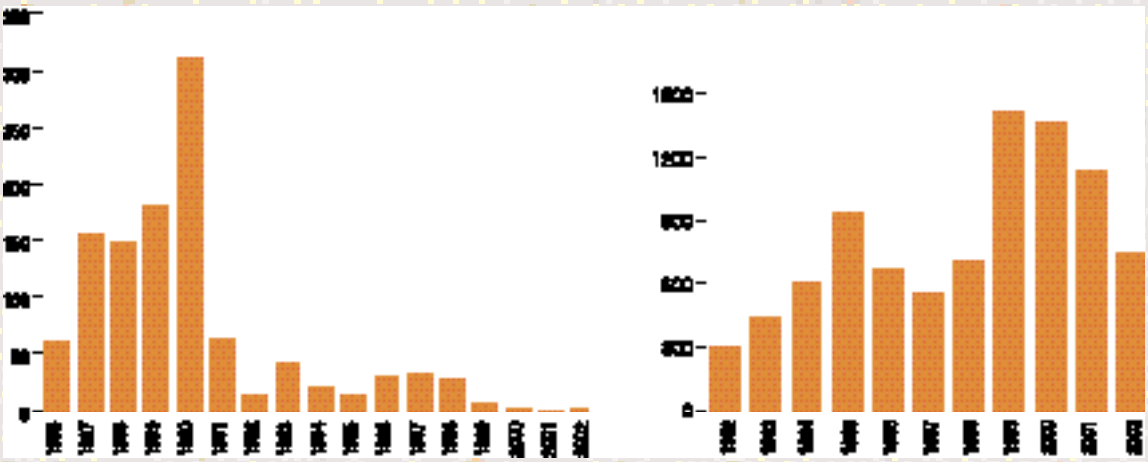

Figure 2. (left) Evolution of the number of accessions acquired by the INIBAP Transit Center.

Figure 3. (right) Evolution of the number of accessions distributed by the INIBAP Transit Center.

The Treaty in a nutshell

A multilateral system was considered preferable to bilateral agreements for several reasons. It was felt that developing countries that are poor financially and poor in genetic resources would have little prospect of obtaining genetic resources through bilateral exchange mechanisms for lack of funds or of original genetic diversity to exchange (Cooper *et al*., 1994). Besides disadvantaging many developing countries, there is also no evidence that bilateral arrangements would deliver significant riches to the countries who do have genetic resources to offer.

The Treaty sets up a multilateral system of access to the species contained in the genera of 35 food crops, including *Musa* (Table 1), 15 legume forages, 12 grass forages and 2 other forages. The genera in the list cover most of the crops important for food security. The list can be changed with the consensus of the parties to the Treaty. Initially, only the PGRFA under the management and control of parties to the treaty and the genebanks of the IARCs and other international institutions will be included in the multilateral system. This provision can be enlarged to other genebanks, e.g. university collections, pending a review by the Governing Body within 2 years of the entry into force of the Treaty. Under the Treaty, a party is obliged to provide access to the PGRFA on the list when requested to do so by another party. For species not on the list, exchange of germplasm will be conducted through bilateral agreements.

Under article 12.3 of the Treaty, access is to be "accorded expeditiously without the need to track individual accessions". Facilitated access is subject to intellectual property rights and other property rights, but recipients of germplasm obtained through the multilateral system cannot claim any intellectual property right over the material, "in the form received", ensuring that the accessed PGRFA remain in the public domain.

Among the conditions for access are the benefit-sharing provisions. Article 13 stipulates that benefits arising from the use, including commercial use, of PGRFA "shall be shared fairly and equitably through the exchange of information, access to and transfer of technology, capacity building and the sharing of benefits arising from commercialization". This is in addition to having reciprocal access to PGRFA, which in itself is probably the most important benefit.

Life after the Treaty

A state of reduced exchange of germplasm is likely to continue until the Treaty comes into force, once it is ratified by 40 countries. Each country that ratifies it will then develop the legislation and regulations it needs to implement the Treaty. The prize for being among the first 40 countries is a seat on the Governing Body, which will guide the implementation of the Treaty. One of the first tasks of the Governing Body will be to review the Material Transfer Agreement, which establishes the conditions for recipients of materials and ensures that the germplasm remains in the public domain.

Notwithstanding limitations on the types of crops and collections covered by the Treaty, the creation of a multilateral system is a considerable achievement. By reviving the possibility of drawing upon the widest genetic base possible, it should spur advancements in crop improvements and contribute to food security.

Discussions on controversial topics will no doubt continue as some feel that farmers' rights, for example, have not been adequately addressed. To certain people, those rights should be akin to intellectual property rights. Sceptics contend that the issue has raised false hopes about the potential for compensation from developed countries and the feasibility of implementing such rights (Wright, 1996). In the middle are those who think that by leaving the responsibility of implementing farmers' rights to national governments, the Treaty has taken a first step towards their clarification (GRAIN, 2003).

As far as bananas are concerned, the Treaty means that the ITC can pick up where it left off ten years ago, in particular to supplement its stock of genetic diversity with wild *Musa* species. Wild species are the mainstay of breeders and a repository of genetic treasures such as genes for resistance to diseases. It is hoped that the countries harbouring this diversity and those with breeding programmes will ratify the International Plant Treaty in order to materialize the benefits derived from the free movement of PGRFA and offer a better future to the impoverished populations of the world.

Table 1. List of food crops covered under the multilateral system.

Crop	Genus	Observations
Breadfruit	*Artocarpus*	Breadfruit only.
Asparagus	*Asparagus*	
Oat	*Avena*	
Beet	*Beta*	
Brassica complex	*Brassica et al.*	Genera included are: *Brassica, Armoracia, Barbarea, Camelina, Crambe, Diplotaxis, Eruca, Isatis, Lepidium, Raphanobrassica, Raphanus, Rorippa* and *Sinapis*. This comprises oilseed and vegetable crops such as cabbage, rapeseed, mustard, cress, rocket, radish and turnip. The species *Lepidium meyenii* (maca) is excluded.
Pigeon Pea	*Cajanus*	
Chickpea	*Cicer*	
Citrus	*Citrus*	Genera *Poncirus* and *Fortunella* are included as root stock.
Coconut	*Cocos*	
Major aroids	*Colocasia, Xanthosoma*	Major aroids include taro, cocoyam, dasheen and tannia.
Carrot	*Daucus*	
Yams	*Dioscorea*	
Finger Millet	*Eleusine*	
Strawberry	*Fragaria*	
Sunflower	*Helianthus*	
Barley	*Hordeum*	
Sweet Potato	*Ipomoea*	
Grass pea	*Lathyrus*	
Lentil	*Lens*	
Apple	*Malus*	
Cassava	*Manihot*	*Manihot esculenta* only.
Banana / Plantain	*Musa*	Except *Musa textilis*.
Rice	*Oryza*	
Pearl Millet	*Pennisetum*	
Beans	*Phaseolus*	Except *Phaseolus polyanthus*.
Pea	*Pisum*	
Rye	*Secale*	
Potato	*Solanum*	Section tuberosa included, except *Solanum phureja*.
Eggplant	*Solanum*	Section melongena included.
Sorghum	*Sorghum*	
Triticale	*Triticosecale*	
Wheat	*Triticum et al.*	Including *Agropyron, Elymus,* and *Secale*.
Faba Bean / Vetch	*Vicia*	
Cowpea et al.	*Vigna*	
Maize	*Zea*	Excluding *Zea perennis, Zea diploperennis*, and *Zea luxurians*.

Source: The International Treaty on Plant Genetic Resources for Food and Agriculture.

Farmers' Rights

The Contracting Parties recognize the enormous contribution that the local and indigenous communities and farmers of all regions of the world, particularly those in the centres of origin and crop diversity, have made and will continue to make towards the conservation and development of plant genetic resources which constitute the basis of food and agriculture production throughout the world.

The Contracting Parties agree that the responsibility for realizing Farmers' Rights, as they relate to plant genetic resources for food and agriculture, rests with national governments. In accordance with their needs and priorities, each Contracting Party should, as appropriate, and subject to its national legislation, take measures to protect and promote Farmers' Rights, including:

(a) protection of traditional knowledge relevant to plant genetic resources for food and agriculture;

(b) the right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and

(c) the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

Source: The International Treaty on Plant Genetic Resources for Food and Agriculture.

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