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## ***Access: Bartering and Brokering Genetic Resources***

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The intergovernmental committee that negotiated the Convention on Biological Diversity (CBD) (United Nations Environment Program 1992) at the United Nations Environment Program (UNEP) generally lacked agricultural representation from most countries. Thus, the representatives and negotiators embarked upon their negotiations with considerable misinformation and a lack of understanding which created an atmosphere of conflict: South vs. North. An example is the Merck-INBIO Agreement in which Merck & Co., Inc., paid to INBIO in Costa Rica a flat sum of \$ 1 million to help seek biodiversity which could be analyzed for bioactive compounds and, if successfully marketed, would bring royalties. There was a general lack of understanding that biodiversity prospecting for other uses might require or take different approaches, particularly that for agricultural biodiversity where the genes of interest must also be very specific and must fit other criteria of the breeders. Breeding agricultural plants is a dynamic process, not extractive. The germplasm must provide specific trait(s), be able to be crossbred and be free from tightly linked undesirable traits.

At the same time as the negotiation of the Convention was underway, the Food and Agriculture Organization (FAO) of the United Nations continued its effort to resolve the decade-old debate in its Commission on Plant Genetic Resources (CPGR): Who owns the world's agricultural genetic resources? The CPGR was established in 1983 to implement the FAO's International Undertaking (IU) on Plant Genetic Resources, an FAO Resolution (8/83) (FAO 1983) to conserve and sustainably utilize agricultural genetic resources. The IU was triggered, to a large extent, by the expansion of breeders' rights protection as more countries joined the treaty of the Union for the Protection of Newly Developed Varieties (UPOV). Social activist groups working with peasant farmers, such as the Rural Advancement Foundation International, challenged the equity when companies in developed countries obtained property protec-

tion on cultivars of major food crops after inserting germplasm (particularly genes for disease and insect resistance) from farmer varieties (landraces). The companies made no provision for compensation to those farmer communities or countries from which the genes were obtained. (There has been no formal linkage in the international community between the exchanges and the utilization.) Some now call this proposed compensation, farmers' rights.

The FAO's IU attempted to make all germplasm, including that of private companies, freely available to all parties worldwide. Countries having strong private sector interests opposed this and did not sign onto the IU or did so with specific reservations to protect the private sector. Throughout a ten year period, generally nonconstructive debate ensued. The Keystone International Dialogue on Plant Genetic Resources, initiated in 1988, brought consensus in some areas relative to support for conservation in recognition of farmers' rights, recognition of breeders' rights, and the need for benefit-sharing with providers of germplasm (Keystone International Dialogue Series on Plant Genetic Resources 1991). These consensus points became translated into agreed interpretations to the FAO's IU which were added to the original IU as attachments. Farmers' rights are defined in the second addendum (1991) to the FAO IU, which does not advocate direct payment to farmers. The 1989 attachment clearly acknowledges the need for a fund to preserve genetic resources, such as the FAO fund — a non-existent, voluntary but authorized fund — to support conservation and utilization to recognize farmer contributions over the many years.

The FAO Conference passed the voluntary but rather regulatory International Code of Conduct for Plant Germplasm Collecting and Transfer (FAO 1993). Besides stating some ethical principles for collectors and genebank managers, this Code suggests mechanisms for receiving benefits to the donors.

One item pressed to closure in October 1994 was the agreement by the International Agricultural Research Centers (IARC) to place their collections under the auspices of the FAO Commission. The issue of interest to all is the access to the large collections of the major food crops held at the IARCs. Developing country germplasm in the collections will still be available, but restrictions prevent any property protection placed on them directly by recipients. It does not deal with derivatives, and not everyone is satisfied with the agreement.

#### Current

The Commission on Plant Genetic Resources is negotiating a revised IU since some of its text is not in harmony with the Convention on Biological Diversity. A one-week extraordinary session of the normally biennial CPGR was held in November 1994, and country representatives expressed their expectations and positions on the integrated text of the IU and its annexes. Some countries were represented by some of the same negotiators as for the CBD, and the understanding of agricultural issues was little advanced. Additionally, many

developing countries were represented only by the local permanent FAO representatives who have varying degrees of understanding of the issues at stake or of the related activities in their countries. The discussions went nowhere. The CPGR held a two-week session in late June 1995, and resumed negotiations on the 1U. The focus of the negotiating session was on the most difficult issues, thereby writing a prescription for potential failure. Property rights issues will remain very contentious as the issues will focus on access to genetic resources and farmers' rights. All of this will be conducted in a political context — not scientific, not pragmatic, and not logical such as a concern for food security.

The success of these negotiations will likely impact heavily on future advances in crop breeding and production agriculture. Restricted access will affect developing and developed nations alike, depending on the crop. Since no nation's agriculture is without interdependency of others, there will be many factors involved in what appears like a Chinese checkers match. For example, 60 percent of the world's food production is from crops and their relatives originally from Central and South America (maize, potato, sweet potato, cassava). But, rice from Asia is the world's most important cereal, followed by wheat from Western Asia. It is hard to say how the African continent would fare since only 34 percent of its production is from crops native to Africa, primarily sorghum and millets. South America, at 94 percent dependency, is heavily dependent on the corn and beans from Central America and barley, oat, rice, wheat and soybean from different parts of Asia. Of course, the U.S. with its native sunflower — developed as a crop by the Russians — plants more than 99 percent of its crop acreage to non-native crops.

Access to genetic resources has been provided by formal exchanges between countries and less formal exchanges by institutes and scientists. Scientist exchanges have generally been with other scientists after visitation or meeting in scientific conferences. These exchanges are probably closest to the "mutually agreed terms" of the CBD since each has an expectation and there is reciprocity. The CBD is more oriented to bilateral arrangements which is the more normal way most exchanges are made. However, the rules of the game, until now, have been essentially multilateral, that is, there is a commonly accepted basis for exchange. If the CBD were to hold a strict accounting of exchanges, the lack of a multilateral arrangement would play hard on the countries that could least afford access to some needed genetic resources.

There is need for information and rational action on all fronts. The Conference of Parties to the Convention needs to understand the delicate balance between breeder access to genetic resources to thwart new pest breakouts and stable food supplies at a reasonable price. There are many questioning the global commodity exchange situation after the Uruguay Round of General Agreement on Tariffs and Trade (GATT) and its new successor World Trade Organization. Should all nations develop their own

food production capacity? Some feel that with the increasing pressure on the environment, those countries best able to produce food under intensive agriculture should increase that sustainable capacity. Thus, import-dependent countries would remain so. However, no country feels comfortable being unable to control its food supply train. The U.S. exports approximately 60 percent of its wheat, 20 percent of its corn, and 35 percent of its soybean.

The U.S. Department of Agriculture (USDA) policy for the free flow of germplasm continues for the National Plant Germplasm System. During the period of 1990 through 1994, 182,678 samples were distributed to foreign requesters, about 92 percent to foreign public institutions, including the gene banks for repatriation. More than 41 percent of the germplasm was advanced germplasm and elite cultivars which went to public institutions for inclusion in their breeding programs. This is a significant contribution to development programs in other countries.

However, if de-registration of current pesticides were to occur without substitutes, U.S. crop losses would greatly reduce production and that left for export might not meet quality requirements of the importers. The impact would be considerable in international markets and the prices we all pay for grain and food. The impact on the U.S. for lack of access to genetic resources to provide genetic resistance to insects and diseases could thus be substantial. The ownership and exchange issue must be solved forthrightly.

The U.S. is greatly divided in its acceptance of the property rights on genetic resources. Institutions and breeders are divided, not necessarily along institutional lines. States are pressed financially to support crop development on crops not sufficiently lucrative to the private sector. Even fees from sales of those principal cultivars must support more than just those crops. However, most organizations feel that they could provide royalties when there has been an identifiable and substantial contribution from a plant to their new cultivar. If there is a benefit to the farmers, the farmers would justifiably pay for it in increased seed prices. However, depending on the market, they may not benefit when they sell the crop. With the increased yield obtained or protected by the gene(s), the cost per unit output will be fair or they will not pay it in the first place. In reality, they will pay since a protected crop is a value that farmers desire.

Thus, in the changing sense of equity, the public sector is moving to an understanding of the issues and accepts the need to pay for value received. The private sector has generally been aggressive in contractually buying exclusive rights to germplasm of benefit and agreeing to pay for those benefits through royalty compensation. More importantly now, how will the process work? All organizations are more oriented to utilizing material transfer agreements (MTAs) to exchange germplasm in which the limitations to use are spelled out. Development of MTAs, which enable organizations such as the USDA to pass on germplasm and its associated obligatory requirements to others, may be a possible solution to the international germplasm impasse.

However, tracking and monitoring the germplasm community for adherence to the ethical principles of acceptance and compliance with these principles will be important in maintaining such a global arrangement. This approach will have to be accepted by all for it to be effective. The biotechnology industry should foster legitimate exchange mechanisms and attempt to assure that future exchanges are transparent and fair.

The international community should consider some of the following points in establishing a protocol for germplasm exchange and benefits:

- Provide open access to all genetic resources of food and agriculture;
- Engage MTAs to enable research and breeding with the material;
- Enable a brokerage system of recognized third parties to exchange the germplasm and provide annual balance sheets of exchanged germplasm;
- Establish a tracking system and a compensation mechanism to support germplasm conservation activities, when appropriate; and
- Enable a bartering system where access is provided in exchange for training and/or technology.

If there is to be financial compensation where notable genes make contributions to new varieties or hybrids, a scale of declining royalty payments and a fixed time limit needs to be established for each contributing gene. The time limit on a particular variety may be fixed but the genes may be put into other derived varieties. The "profit" or market value of the cumulative sum of all new and old gene contributions could theoretically far exceed any expectations of profitability for any new variety. It must also be noted that value-added germplasm contributions also enter the equation, and that developing countries may now have to pay for that value when in the past, improved germplasm has been available at no cost. The proposed system will develop a bureaucracy and protectionism where there is no winner, particularly for the developing countries least able to afford it. When costs exceed benefits and the system is not working for the countries that need it, it will most likely be scrapped and bilateral conditions under mutually agreed terms will prevail.

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