

## Plant Genetic Resources and the Law. Past, Present, and Future

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In the last 30 years legal developments at national and international levels have completely reshaped the ways in which plant genetic resources are used in global agriculture. This article explores some of the legal changes that affect access to plant germplasm. It also discusses developments that have affected and will in the future specifically impact upon the practices of international agricultural research centers (IARCs).

### INTELLECTUAL PROPERTY RIGHTS

As has been chronicled extensively elsewhere, patents covering modified living organisms were first approved by the U.S. Supreme Court in 1980. Since then intellectual property rights covering organisms and/or their components have become commonplace in many countries, having been expanded internationally through treaties such as the International Convention for the Protection of New Varieties of Plants (known by its French acronym UPOV) and the World Trade Organization's (WTO) 1994 Agreement on Trade-Related Aspects of Intellectual Property (TRIPS). These treaties, which are solemn agreements among sovereign nations, established common features of certain intellectual property rights. In ratifying the treaties, each nation signatory pledged to enact those common features into its national law. One of the most controversial of those features is contained in Article 27.3(b) of the TRIPS Agreement, which requires all WTO member states to provide intellectual property protection—either patents or an effective *sui generis* system or both—for plant varieties. As a result of this TRIPS article, WTO member countries have an obligation under international law to make available some intellectual property protection for plant varieties; saying no to any proprietary rights over life forms simply is not an option.

Had they been allowed independently to consider the issue of extending intellectual property rights coverage to living organisms, many countries doubtless would have declined to do so. The notion of proprietary claims over plant varieties is alien to many

indigenous cultural traditions and presents challenges to certain traditional farming practices such as the free exchange of seed among farmers. However, acceptance of the TRIPS Agreement is one of the conditions of entry in the WTO. Accordingly, many countries reluctantly have accepted TRIPS in the hope that the benefits of WTO membership would outweigh the negative aspects of TRIPS, and that the unforeseeable consequences of radical changes in their intellectual property laws would not be severe.

Applying intellectual property rights to plant material has been highly controversial in many countries. Many cultural and moral objections have been raised against the idea of owning life. In addition, many people fear that the expansion of intellectual property rights could restrict traditional uses of plants and other substances found in nature. Although intellectual property rights are not supposed to allow materials to be taken out of the public domain once they have arrived there, several highly publicized, controversial cases—such as one involving a recent U.S. patent covering a variety of yellow beans believed by many to have been widely used for generations in Latin America (Pratt, 2001)—have caused some observers to question whether this principle actually works in practice.

The last 30 years were also marked by a heightened sense of injustice felt by developing countries in response to a phenomenon known as bioprospecting or biopiracy. Many highly successful biotechnology and pharmaceutical inventions by companies from northern countries were derived from plant genetic materials taken from less developed countries. The companies had been given liberal access to these genetic resources, and often had exploited the traditional knowledge of indigenous peoples and cultural groups about how to use such resources, generally without charge.

Many of the resulting inventions were patented, and in some cases the patent holders earned substantial profits. Although the inventions—and hence the profits—would have been impossible without the raw material obtained from the developing countries, none of the profits were returned to the country from which the material was taken. Indeed, people in developing countries from which the raw material originated had to pay the same prices as everyone else, and in some cases were not even given access to the inventions derived from the indigenous material. Many developing countries came to view these practices as a form of

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piracy or robbery, in which wealthy multinational companies misappropriated the value of important natural resources comparable to other national treasures such as crude oil and mineral ores.

Closely related to concerns over biopiracy was the belief in the south that northern seed companies were unjustly profiting from a diverse variety of germplasm collected in southern countries. The seed companies' success was seen as due in significant part to the activities of developing country farmers, who over the course of centuries had conserved and developed the landraces that became the primitive stock for the seed companies' elite varieties. The absence of a mechanism for compensating farming communities for their contributions to developed country agriculture was viewed by southern countries as another gross inequity in the commercial exploitation of plant genetic resources.

A further consequence of the extension of intellectual property rights to germplasm and genetic materials was that it undermined drastically the system of free exchange of plant genetic materials for agricultural research that had made possible major advances in agricultural productivity in the developing world. In the so-called Green Revolution of the 1960s and 1970s, IARCs such as the International Rice Research Institute and the International Maize and Wheat Improvement Center developed plant varieties that increased dramatically food production in developing and least developed countries. As a result, the lives of millions of people who otherwise would have died of hunger or malnutrition were saved. This was made possible, in part, because most agricultural research was performed by public institutions that were happy to share germplasm with other researchers without expecting any financial return for their generosity.

When it became possible to protect germplasm with intellectual property rights, a perception arose that there were significant profits to be made in the development of new plant varieties. Private enterprise invested heavily in agricultural research at the same time that public funds for the same activities diminished. While this stimulus to private investment in plant breeding and agricultural biotechnology undeniably increased the overall level of research, there were also negative consequences. Many companies, universities, and institutes—hoping to capitalize on the potential economic value of plant varieties, genes, promoters, and other components—became less willing to share these materials for research purposes. When such materials were made available, the recipient was (and is still today) often required to sign agreements that imposed major limitations on how the materials could be used and that ensured that the provider of the materials could extract a share of the profits in the event that use of the materials produced a commercially viable product. As a result of these changes, IARCs and other public sector researchers—often working for the benefit of the world's poorest people and with no intention of pro-

ducing a profit—found that they had lost much of their former ability to gain access to a wide variety of germplasm for research purposes.

The conflicting expectations of industrialized and developing countries, the increasingly restrictive terms on which germplasm could be accessed by agricultural researchers, and the evident depletion of much of the world's biological diversity were serious problems in need of a global solution. The task of crafting such a solution fell to the Food and Agriculture Organization of the United Nations (FAO).

### THE 1983 INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

In 1983, the FAO established a Commission on Plant Genetic Resources (later renamed the Commission on Genetic Resources), the first permanent intergovernmental forum devoted to germplasm conservation and development. The Commission's first major action was to adopt a nonbinding resolution known as the International Undertaking on Plant Genetic Resources. The Undertaking sought "to ensure that plant genetic resources of present or potential economic and/or social importance, particularly for agriculture, will be explored, preserved, evaluated and made available for plant breeding and other research purposes." Its fundamental assumption was "that plant genetic resources are a common heritage of mankind and consequently should be available without restriction."

The common heritage principle, however, was obnoxious to many developing countries, whose leaders felt that the principle implied that technologically advanced enterprises could continue appropriating and exploiting a country's natural resources, without compensating the country of origin or even seeking its consent to remove the materials.

Many commercial seed companies also disliked the Undertaking, because it stated that, in addition to landraces, wild species, and similar plant genetic resources, "special genetic stocks (including elite and current breeders' lines)," should also be made "available without restriction." The American Seed Trade Association, voicing the concerns of many in the industry, declared that the International Undertaking "strikes at the heart of free enterprise and intellectual property rights." Despite its nonbinding character, the United States and a number of other developed countries refused to sign the Undertaking.

Efforts to conciliate the concerns of developed and developing countries resulted in two 1989 amendments to the Undertaking. In an Agreed Interpretation of the Undertaking, adopted by resolution, the Commission stated that "plant breeders rights as provided for under UPOV ... are not incompatible with the International Undertaking."

Resolution 5/89, adopted 29 November 1989, embraced the concept of "Farmers' Rights," which were

described as, “rights arising from the past, present and future contributions of farmers in conserving, improving, and making available plant genetic resources, particularly those in the centers of origin/diversity.” The resolution took the view that the world owes a moral obligation to farmers and their descendants for their role, during “unnumbered generations,” in preserving, improving and making available plant genetic resources for the benefit of mankind. The majority of these genetic resources, recited the resolution, “come from developing countries, the contribution of whose farmers has not been sufficiently recognized or rewarded.” For this reason, the resolution stated that farmers rights “are vested in the International Community, as trustee for present and future generations of farmers, for the purpose of ensuring full benefits to farmers, and supporting the continuation of their contributions.”

The farmers’ rights envisioned in the resolution are “communal” in nature and are not analogous to western-style intellectual property rights. Instead, the “rights” of farmers are perhaps better characterized as the obligations of the International Community to provide *general support* to the traditional farmers’ activities.

After the 1989 amendments, the United States and Canada joined the Commission but still did not sign the International Undertaking.

The International Undertaking was amended again in 1991. Resolution 3/91 recognized the sovereign rights of nations over their genetic resources and stipulated that Farmers’ Rights would be implemented through an international fund for plant genetic resources.

## THE 1992 CONVENTION ON BIOLOGICAL DIVERSITY

In 1992, in Rio de Janeiro, the United Nations hosted an Earth Summit to consider the state of the world’s environment. In addition to producing a number of nonbinding declarations of international environmental policy, the Earth Summit gave birth to the Convention on Biological Diversity (CBD). The specific concern of the CBD is biological diversity, which the convention defines as “the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.” As set forth in Article 1 of the Convention, the objective of the CBD is

[t]he conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account

all rights over those resources and to technologies, and by appropriate funding.

The CBD marked the end of the common heritage of mankind conception of genetic resources. The CBD does not refer to a “common heritage,” and its preamble states only that conservation of biodiversity is a “common concern of humankind.” Instead, the CBD reasserts the principle, earlier espoused in Resolution 3/91 of the FAO Commission on Plant Genetic Resources, that nations have sovereign rights over natural resources within their boundaries, and that “the authority to determine access to genetic resources rests with the national governments and is subject to national legislation.” Article 15(5) of the CBD gives teeth to the sovereignty principle by requiring collectors of genetic resources to obtain the permission of the nation where the resources are located before they may be removed. The state’s authority to regulate access is tempered by Article 15(2), which requires signatories to the CBD to “endeavor to create conditions to facilitate access to genetic resources,” and forbids them to “impose restrictions which run counter to the objectives of this Convention.”

The sovereign rights of nations over genetic resources within their boundaries inspired concerns among intellectual property right holders that their rights would be displaced by sovereignty rights. However, the CBD’s conception of sovereign rights does not grant states an “ownership” right over genetic resources. Ownership of physical matter containing genetic material remains subject to national law, which varies considerably, and may be held by public entities or private parties. Likewise, the CBD affirms the validity of intellectual property rights over genetic resources. However, state sovereignty does give states powers to control and limit—potentially quite significantly—the exercise of such property rights.

Addressing another concern of developing countries, Article 16 of the CBD requires member countries “to provide and/or facilitate access for and transfer to other Contracting Parties of technologies that ... make use of genetic resources.” Anticipating biotechnology industry objections, the article also states that, “in the case of technology subject to patent and other [intellectual property rights], such access and transfer shall be provided on terms which recognize and are consistent with the adequate and effective protection of [intellectual property rights].”

Article 19 of the CBD provides that developing countries should receive a share in the benefits from biotechnology. Parties to the Convention must “take all practicable measures to promote and advance priority access on a fair and equitable basis by Contracting Parties, especially developing countries, to the results and benefits arising from biotechnologies based upon genetic resources provided by those Contracting Parties. Such access shall be on mutually agreed terms.” Left unresolved were key questions such as the meaning of sharing in “benefits” of

biotechnology: did this mean a share of financial rewards or only access to the technology itself?

Reactions to the CBD in the international community were mixed. Some nations hailed the Convention as a long-overdue measure of partial justice for developing countries. For some observers, the CBD seemed to raise as many questions as it answered, since many of its provisions are conceptual in nature, and it fails to provide practical guidance on how to achieve specific results. Others have criticized the Convention for its “circularity,” in assuming that simply declaring that sovereign rights and mandatory benefit-sharing are consistent with intellectual property rights makes them so. Indeed, the United States refused to sign the CBD, in part, because of biotechnology industry concerns that its sovereign rights and technology transfer provisions would undermine intellectual property rights. President Clinton eventually signed the CBD. However, the United States Senate has never ratified the Convention, and it has not become binding on the United States.

Despite the nonparticipation of the United States, forces behind the CBD gained momentum after 1992, as many nations passed legislation to implement the CBD genetic resources provisions. For example, in 1995, by executive order, President Fidel Ramos of the Philippines established a system for conservation of and access to biological and genetic resources. Among other things, the decree set forth minimum terms for academic and commercial research agreements, which provided for, *inter alia*, (1) limits on the number of biological samples that may be exported from the Philippines, (2) reciprocal rights of access by the Philippine government and Filipino citizens to collections taken from the Philippines and stored in depositories abroad, and (3) the payment of royalties to the Philippine national government, local or indigenous cultural communities or specific individuals, as appropriate, when commercial use is derived from the biological and genetic resources taken.

Similarly, in 1996, the Andean Community, in Decision No. 391, adopted a Common Regime on Access to Genetic Resources, which mirrored some provisions of the Philippine decree and also provided that member countries may establish “partial or total limitations on access to genetic resources or their derivatives” in a variety of circumstances.

These and other attempts to implement the CBD are doubtless well-intentioned, but it is now widely accepted that restrictive access laws have obstructed the international flow of plant germplasm, which is critical for continued agricultural research. This negative effect on research, combined with the fact that the CBD left many important questions unanswered, underscored the need to harmonize access and benefit-sharing mechanisms and to fill in gaps. Fortunately, steps in this direction were taken even before the CBD entered into force. In 1993, FAO adopted Resolution 7/93, calling for intergovernmental negotiations for revision of the International Undertaking. The purpose

of these negotiations, which continued until 2001, would be to make the International Undertaking legally binding, to clarify issues, and to bring it into conformity with the CBD. In the end, the negotiators agreed upon a binding treaty that brought further clarity to some of the issues left undefined by the CBD.

#### **THE 2001 INTERNATIONAL TREATY ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE: AN INTRODUCTION**

On November 3, 2001, in Rome, after more than 15 sessions of the FAO Commission on Genetic Resources and its subsidiary bodies, representatives of 116 nations approved a new International Treaty on Plant Genetic Resources for Food and Agriculture (the Treaty). Of the nations participating in the conference, only the United States and Japan abstained, both of them citing concerns about a lack of clarity regarding the effect of the Treaty on intellectual property rights. The Treaty will enter into force on June 29, 2004.

The Treaty applies only to plant genetic resources useful for food and agriculture (PGRFA). It establishes the following objectives: (1) to encourage the conservation of plant genetic resources in order to preserve and enhance the genetic diversity of plant species and varieties of value to food or agriculture; (2) to provide a workable, juridical basis for rewarding farmers for their contributions in conserving, improving, and making available plant genetic resources; (3) further development of the system of national sovereignty over plant genetic resources first established in the CBD, while ensuring that such exercise of sovereignty does not hinder international exchange of such resources; and (4) creation of a Multilateral System of Access and Benefit-Sharing, which will coordinate exchanges of plant genetic resources, and in some cases, require payments by persons or entities who commercially exploit such resources, to the nations from which such resources originated. When the Treaty comes into force, a Governing Body, comprised of states that have signed the Treaty, will be established to implement its provisions.

The general provisions of the Treaty require member states to survey, inventory, and otherwise conserve PGRFA, and to take policy and legal measures to promote their sustainable use. These measures are to be implemented at the national level and through international cooperation. Member states also agree to promote the provision of technical assistance to one another, and especially to developing country and transitioning economy members.

Article 9 of the Treaty strongly reaffirms the principle of Farmers’ Rights, and requires each member state, “subject to its national legislation,” to take measures to promote and protect Farmers’ Rights, including:

1. Protection of traditional knowledge relevant to PGRFA;

2. The right to equitably participate in sharing benefits arising from the utilization of PGRFA; and
3. The right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of PGRFA.

## IMPLEMENTATION OF THE TREATY

When the Multilateral System of Access and Benefit-Sharing created by the Treaty takes effect, it will apply to an initial annex of 35 food crops and 29 genera of forages. Because these lists are a result of political compromises achieved in multilateral negotiations, some crops that might have been expected to be covered, such as soybean, groundnuts, and sugar cane are conspicuously missing. However, important staples such as wheat and maize are included, and collectively the annexes list crops representing 80% of the world's calorie intake.

The Multilateral System does not apply to all PGRFA of crops listed in the annex to the Treaty. Rather, it covers only listed PGRFA (1) which are managed and controlled by the member states, and which are "in the public domain;" and (2) which are held in trust, in *ex situ* collections, by IARCs of the Consultative Group on International Agricultural Research (CGIAR) and other institutions.

Article 12 of the Treaty provides for facilitated access to material within the Multilateral System. Access is to be provided only for the purpose of utilization and conservation of PGRFA for research, breeding, and training for food and agriculture. The parties and centers subject to the Treaty will make available germplasm to each other on nonrestrictive terms. In addition, the Treaty requires them to make available passport data and nonconfidential information regarding the accessions (see Art. 12.3(c); ITPGRFA, 2001) as well as nonconfidential information that is available concerning catalogs and inventories and the results of technical, scientific, and socioeconomic research on the materials (see Art. 13.2(a); ITPGRFA, 2001).

Plant genetic materials covered by the system will be made available subject to a standard material transfer agreement (MTA), which, among other things, will require a recipient who commercializes a product accessed from the Multilateral System to pay into a financial mechanism an equitable share of benefits arising from commercialization of the product.

For the first 5 years after the Treaty takes effect, benefit-sharing payments will be merely encouraged, but not mandatory, if the product is made available without restriction to others for further research and breeding. As a practical matter, this seems to mean that payments would not be mandatory if the materials are commercialized under UPOV-style plant breeders' rights (PBRs), which are subject to a "breeders exemption" allowing further breeding and research with a protected variety without the PBR holder's consent.

If the materials were commercialized with patent protection, which much more narrowly restricts re-

search with patented materials, then benefit-sharing payments presumably would be mandatory. After the Treaty has been in force for 5 years, the Governing Body may assess whether benefit-sharing payments should become mandatory even when materials are commercialized without restriction (see Art. 13.2(d)(ii); ITPGRFA, 2001). When benefit-sharing payments are mandatory, the "level, form and manner of payment" will be determined by the Treaty's Governing Body "in line with commercial practice." (See Art. 13.2(d)(ii); ITPGRFA, 2001.)

Benefits shared under the Multilateral System are required to flow primarily to farmers, especially in developing countries, and countries with economies in transition, who conserve and sustainably utilize PGRFA.

Another restriction on the use of PGRFA accessed through the system is that the MTA forbids recipients to "claim any intellectual property or other rights that limit the facilitated access to the plant genetic resources for food and agriculture, or their genetic parts or components, in the form received from the Multilateral System." The practical meaning of this restriction is not evident from the Treaty text, and even delegates who participated in the drafting of the Treaty are unable to agree among themselves as to a number of implications arising from this article. It has been suggested that all intellectual property rights could be seen to limit facilitated access and therefore may be prohibited. Another view is that the "in the form received" limitation of this requirement appears to contemplate that intellectual property rights may be obtained on derivatives of such material. However, it is uncertain how much improvement on, or "distance" from, the original material there would have to be before the derived material could be protected. In addition, the language leaves unresolved whether intellectual property rights may be taken out on genes isolated and purified from the material. However, at a minimum it is clear that even in such cases the material received from the Multilateral System (e.g. in the form of seed) will remain available for use in that form even if the isolated and purified form has been patented. (Fowler, 2003)

## THE ROLE OF IARCS UNDER THE TREATY

Over the last several decades, IARCs have collected, preserved, and maintained, for the benefit of the international community, hundreds of thousands of specimens of plant genetic resources that are useful for food and agriculture. These collections represent a major source of genetic diversity for plant breeding. Therefore, with their extensive banks of plant genetic resources, IARCs will fulfill an important function in the 21st century in the international exchange of germplasm. In recognition of this role, the Treaty makes special provisions for the IARCs in Article 15.

Although the IARCs will not be signatories to the Treaty, Article 15 of the Treaty calls upon the IARCs to

enter into agreements with the Governing Body, to make PGRFA in the in-trust ex situ collections available through the Multilateral System. Among other things, these agreements between the IARCs and the Governing Body will provide for revision of the current MTAs governing access to in-trust materials, and will require the IARCs to recognize the authority of the Governing Body to provide policy guidance relating to ex situ collections that are subject to the Treaty. Member states under the Treaty have agreed to make materials available through the Multilateral System to IARCs that sign such agreements with the Governing Body.

The IARCs will not be required to enter in the Multilateral System materials which are still “under development” during the period of their development (see Art. 12.3(e); ITPGRFA, 2001). The precise meaning of this term is left to be defined by the Governing Body.

#### POTENTIAL CONFLICTS BETWEEN THE NEW SYSTEM AND INTELLECTUAL PROPERTY RIGHTS

The extent to which implementation of the Treaty will conflict with intellectual property rights, if at all, is uncertain, due to the fact that the Treaty represents an attempt to satisfy constituents whose interests are often seen as irreconcilable. The preamble to the Treaty states that “nothing in this Treaty shall be interpreted as implying in any way a change in the rights and obligations of the Contracting Parties under other international agreements” and it “is not intended to create a hierarchy between this Treaty and other international agreements.” Article 12.3(f) provides that access through the Multilateral System to PGRFA “protected by intellectual and other property rights shall be consistent with relevant international agreements, and with relevant national laws.” Likewise, Article 13.2(b), which concerns access to and transfer of technologies, improved varieties and genetic material, states that such access shall be provided “while respecting applicable property rights and access laws.” These provisions appear designed to reassure developed nations that intellectual property rights obtained in conformity with conventions such as the UPOV Conventions and the TRIPS Agreement will remain unaffected by the Treaty.

On the other hand, the preamble of the Treaty also affirms “the rights recognized in this Treaty to save, use, exchange and sell farm-saved seed and other propagating material ... are fundamental to the realization of Farmers’ Rights.” The Treaty itself does not

expressly create any such rights to save, use, exchange and sell seed. Indeed an unqualified grant of such rights would contradict intellectual property laws in many countries. The only other reference to such rights appears in Article 9.3, which appears to say that whether such rights exist is left to be determined by national law: “Nothing in this Article shall be interpreted to limit any rights that farmers have to save, use, exchange and sell farm-saved seed/propagating material, subject to national law and as appropriate.”

#### CONCLUDING OBSERVATIONS REGARDING THE TREATY

The Treaty is an ambitious document. It seeks to vindicate the interests of parties that previously were underrepresented in international legal policy relating to plant genetic resources. At the same time, it seeks to assure industrial users of such resources that their economic interests will not be harmed. And, of course, the overriding objectives of the Treaty are the conservation and diversification of PGRFA and the reinvigoration of international exchanges of germplasm. Although the Treaty is more specific in some respects than the CBD, its policies are stated broadly, and often without significant practical detail. For these and other reasons, the Treaty can be thought of as a platform on which the detailed structure of an international policy for plant genetic resources can be built. What that structure will look like when it is completed will depend upon a variety of political, economic, and scientific influences that are already at work to shape the policies of the future.

The views expressed in this article are the author’s and do not necessarily reflect policies of the International Maize and Wheat Improvement Center (CIMMYT).

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