

History and Development of Law and Policy Related to Plant Genetic resources and the FAO Global System

(summary of presentation – part 1)

I. The evolution of law and policy

Legal regimes evolve over time in response to changing situations and needs. These changes are often catalyzed by scientific breakthroughs and technological advances. In the history of law, there is also a close relationship between the recognition of the economic and commercial value of a resource and the attribution and allocation of legal entitlements.

It is through examining history that one learns the factors and circumstances that have affected the evolution of law and policy in a given field. The struggle over issues of sovereignty, control and ownership of genetic resources dates back hundreds if not thousands of years. The manifestation of that struggle in real and legal terms is a reflection of the capabilities and atmosphere of the time in which the struggle took place. Growth of scientific knowledge and technological capacity, and different interests, can catalyze change in legal regimes. Legal regimes can also be a reflection in time of the power of various actors. In sum, legal regimes are not stable, but dynamic systems.

It is therefore not surprising that the legal regimes governing issues of use, ownership and exchange of genetic resources have not been static. In the world economy today, extracted natural resources are treated as commodities. These resources cannot be collected without agreement of the State under whom jurisdiction the resource falls. Until recently, a notable exception to this restriction was plant genetic resources which were accessible under the theory that the resources were part of the common heritage of humankind. This was partially because of the dual nature of plant genetic resources as both a commodity and a source of information. It is relatively easy to take or to smuggle a handful of seeds or samples out of a country¹ and under a common heritage regime there was no recourse in international law for the use of the resource as a source of information once the resource left the source State's jurisdiction.² Recently, however, technological advances—particularly with molecular biology and genetic engineering—have led to an ability to define and capture economic value in the genetic resources as a source of information. The laws and policies established in

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¹ Thomas Jefferson reported smuggling upland rice out of Italy in the linings of his coat in an attempt to introduce it and encourage its cultivation in South Carolina. According to Jefferson's accounts, the farmers of South Carolina rejected the Italian seed believing their rice to be superior. See Cary Fowler. 1994. *Unnatural Selection: Technology, Politics and Plant Evolution*. Gordon and Breach Science Publishers, Switzerland, p. 14 (citing Thomas Jefferson. 1944. *Thomas Jefferson: Garden Book*, edited by Edwin Morris Betts. The American Philosophical Society, Philadelphia, pp. 124–131).

² So in 1755 when Pierre Poivre smuggled pepper and cinnamon to Ile de France and broke the Dutch spice monopoly, he found himself ennobled by the French king. Brockway, Lucile H. 1988. Plant science and colonial expansion: the botanical chess game. P. 54 in *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (J.R. Kloppenburg, ed.). Duke University Press, London.

essence by physical might a few thousand years ago and still largely reflected in the practice of the colonial powers in the 18th and 19th centuries have given way to more political and diplomatic forms of confrontation. Intellectual property rights on or of relevance to genetic resources have been granted and their scope continues to grow. As the interest in genetic resources has grown more diverse—trade, environment and development interests all come into play—so too has the conflict or potential conflict among different legal regimes with an impact on these resources.

What history teaches is that legal regimes respond to changing circumstances and are therefore inherently unstable. In the context of plant genetic resources, history illustrates that technological and scientific breakthroughs change the nature of the conflicts over rights and responsibilities and that legal regimes governing the resources respond and evolve accordingly. In a field where so many factors interplay, PGR managers should not expect a legal regime to solve a conflict ‘once and for all.’ The historical context of current laws, policies and controversies with regard to genetic resources provides a foundation to understand why things are the way they are and the opportunities and obstacles for their evolution in ways that are supportive of the conservation, sustainable use and sound management of genetic resources.

II. Historical exchange

Historically, plant genetic resources were relatively freely exchanged³ in accordance with the idea that these resources were the common heritage of humankind.⁴ Beginning with the Age of Exploration, explorers took discovered plant species back to their own countries as new foods and raw materials for plant breeding.⁵ The movement of plant genetic resources between Europe and the colonies supported expansion and changed civilizations⁶. The Great Columbian Exchange brought the tomato to Italy, maize to Africa, wheat to Latin America and the potato to Ireland and whole populations became dependent on exotic germplasm.⁷

³ It should be noted that there are historical examples of specific governmental rules restricting the export of certain specialized and industrial breeding materials such as pepper from India, oil palm from Malaysia, coffee from Ethiopia and tea from Sri Lanka. See Agricultural Crop Issues and Policies. Chapter on Proprietary Rights, page 289. There was, however, no recourse when PGR was taken. (Klaus Bosselmann. 1996. Plant and Politics: The International Legal Regime Concerning Biotechnology and Biodiversity. Colo. J. Int'l Envtl L & Policy 7, p. 121.)

⁴ Cooper, David. 1993. The International Undertaking on Plant Genetic Resources. RECIEL 2:2, p. 158-166; Harold J. Bordwin. 1985. The Legal and Political Implications of the International Undertaking on Plant Genetic Resources, Ecology L.Q. 12:1053.

⁵ Odek, James O. 1999. Bio-piracy: creating proprietary rights in plant genetic resources. J. Intell. Prop. Law 2:141. It was with the advent of the ‘Seed Wars’ in the 1980s and the negotiation of the Convention on Biological Diversity that developing countries made clear that this practice was not acceptable and that legal mechanisms to formally support this position were sought.

⁶ Kloppenburg, Jack R. Jr. 1988. First the Seed. The Political Economy of Plant Biotechnology 1492-2000, pp. 153-157. Cambridge University Press, Cambridge, UK.

⁷ *Ibid.* citing Rebecca Margulies. 1993. Note, Protecting biodiversity: recognizing intellectual property rights in plant genetic resources. Mich. J. Intl. Law 14:322-356. The potato, native to the Andean people, was introduced to Ireland from Central Europe. Unfortunately, the Irish did not import enough genetic diversity to ensure crop stability during the great potato famine of the mid-1800s. The introduction of the potato facilitated a three-fold increase of the Irish population to 8 million people. When a previously unknown disease caused by a fungus wiped out the potato crop within 10 years, 2 million Irish people had died, 2 million had emigrated and 4 million remained, many living in terrible poverty.

'[C]ontrol over plants often meant much wealth and power.'⁸ Almost 3500 years ago, the first and only female Pharaoh, Queen Hatshepsut, dispatched her military in an attempt to collect valuable plants and to resolve any differences of opinion over ownership there might be at the same time.⁹ In colonial times, European powers laid claim to various plant species of economic importance such as sugar, tea, rubber, chinchona and indigo.¹⁰ Without much lasting success, they tried to enforce their ownership, often through removal, isolation and defence of production sites.¹¹

III. Famine and the Green Revolution: the 1960s and early 1970s

Motivated by the twin goals of research facilitation and conservation, national and international efforts to collect, evaluate and conserve PGR increased during the 1960s.¹² Originally, the goal of facilitating research was to be achieved by centralizing stores of germplasm in genebanks accessible to all rather than by having them haphazardly stored in various jurisdictions around the world.¹³ The second incentive recognized the need to conserve the genetic information upon which the development of newer and better crops depended.

These international efforts catalyzed a dramatic change in world agriculture. What came to be known as the 'Green Revolution' was instigated by the public sector and without the use of intellectual property rights in the late 1960s. It began with the development of a new set of high-yielding varieties that greatly increased agricultural production. The world food supply was dramatically increased and the plant breeder popularly regarded as the 'father of the Green Revolution,' Dr Norman Borlaug, was awarded the Nobel Peace Prize for his efforts.¹⁴

The negative aspects of the Green Revolution are now viewed by some to outweigh its benefits. The high-yielding varieties have been referred to by their detractors as 'high-input' because of the high external inputs often required to maintain them. In addition, the push toward commercially mass-produced varieties led to the abandonment of diverse landraces. As one commentator states 'The technological bind of improved varieties is that they eliminate the resource upon which they are based.'¹⁵ In 1967, a FAO technical conference proposed the creation of a global network of genebanks to store representative collections of

⁸ Busch, Lawrence, W.B. Lacy, J. Burkhardt and L.R. Lacy. 1991. *Plants, power and profit: social, economic and ethical consequences of the new biotechnologies*. Blackwells, Cambridge, MA, USA. *See also* Brockway, Lucile H. 1988. Plant science and colonial expansion: the botanical chess game. P. 49 in *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (J.R. Kloppenburg, ed.). Duke University Press, London.

⁹ Farney, Dennis. 1980. 'Meet the men who risked their lives to find new plants.' *Smithsonian*, June, 1980.

¹⁰ Crosby, Alfred. 1986. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. Cambridge University Press, Cambridge, UK.

¹¹ *Ibid.*

¹² Plucknett, D.L. *et al.* 1983. Crop germplasm and developing countries. *Science* 163:220.

¹³ Tilford, David S. 1998. Saving the blueprints: the international legal regime for plant resources. 30 *Case W. Res. J. Int'l* 373:389.

¹⁴ *Ibid.*, p. 391.

¹⁵ Kloppenburg, Jack R. Jr. 1988. *First the Seed. The Political Economy of Plant Biotechnology 1492-2000*, pp. 162. Cambridge University Press, Cambridge, UK.

the main varieties of food.¹⁶ Priority was given to preserving the landraces, many of which were immediately threatened.¹⁷

The effects of the Green Revolution and, in particular, the problem of crop uniformity were experienced in very real terms in the 1970s with the corn blight in the United States and the failure of Besostaja, a high-yielding wheat planted almost exclusively in the Ukraine during the harsh winter of 1971–72. Spurred by the epidemics of the early 1970s¹⁸, collecting missions were mounted, genebanks established and institutions created in an atmosphere of crisis. In 1971, the FAO, the World Bank and the United Nations Development Programme founded the Consultative Group on International Agricultural Research (CGIAR). The CGIAR is an association of public and private donors that supports a network of 16 international research centres (IARCs) each with its own governing body.¹⁹ With a budget of approximately US \$328 million per annum, the CGIAR oversees the largest agricultural research effort in the developing world. The CGIAR conserves approximately 600 000 seed samples which may amount to as much as 40% of the world's unique germplasm in storage worldwide. There is no dispute that the vast majority of crop germplasm held in the IARCs was collected primarily from the fields and forests of the South's farming communities.²⁰ But to whom the resources ultimately belong, to whom the CGIAR is accountable, and whether or not the CGIAR germplasm can be subject to intellectual property protection by any party, were topics of controversy and debate and these issues were central in the negotiations for the International Treaty for Plant Genetic Resources for Food and Agriculture. As Section V describes, the IT has brought clarity to these issues.

IV. The 1970s–1990s: ownership, rights and equity

Over the last 20 years or so, spurred by technological advances—particularly with molecular biology and genetic engineering—appreciation of the monetary and nonmonetary value of genetic resources has grown, leading to increasing conflict over rights and responsibilities for these resources. The current international debate on legal regimes for plant genetic resources has its origins in the late 1970s and early 1980s when developing countries became concerned over the actions by the plant breeding industry in industrialized countries to extend intellectual property rights over 'improved' varieties. The concern focused, in particular, on the inequity of continuing the historically free flow of germplasm which was seen as following a predominantly developing country to industrialized country pathway. During this same period, efforts to collect and conserve PGR in genebanks heightened and the UPOV Convention (see below) was amended to admit non-European members. This led to expanded international cooperation in the recognition of plant-related intellectual property rights. These events resulted in even greater attention being paid to questions of PGR ownership in various fora.

¹⁶ Frankel, O.H. 1986. Genetic resources: The founding years. II. The movement's constituent assembly. *Diversity* 9:30-32.

¹⁷ Wilkes, H. Garrison. 1988. Plant genetic resources over ten thousand years: from a handful of seed to the crop-specific mega-genebanks. Pp. 67-79 in *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (Jack R. Kloppenburg, ed.). Duke University Press, London.

¹⁸ Crop uniformity was one factor in the epidemics. Other factors also were important, including, for example, the international oil crisis and the Sahelian drought.

¹⁹ Four of the centres were established prior to the formation of the CGIAR.

²⁰ Bragdon, Susan H. and David Downes. 1998. Recent policy trends and developments related to the conservation, use and development of genetic resources. *Issues in Genetic Resources* No. 7, p 17. International Plant Genetic Resources Institute, Rome, Italy.

A. The Food and Agriculture Organization

The Food and Agriculture Organization of the United Nations responded in 1983 by establishing the Global System for the Conservation and Utilization of Plant Genetic Resources. A Commission on Plant Genetic Resources was created to oversee the Global System.²¹ The negotiation of an International Undertaking on Plant Genetic Resources was undertaken under the auspices of the Commission. Governments debated the ownership and control of PGR in a highly politicized environment concerned with intellectual property rights being granted for plant breeders' and national germplasm embargoes.²² The acrimonious debate on the access, ownership and control of PGR that ensued during the adoption of the IU and its further refinement was dubbed the 'seed wars' by the Wall Street Journal.²³

In contrast to the position to be taken less than a decade later at the CBD negotiations, during these negotiations, developing countries pushed and succeeded in reflecting in the IU a broader reflection of the common heritage concept. The concept, however, was to apply not just to the PGR situated in developing countries but to the PGR subject to plant breeders' rights contained primarily by industry in developed countries. In the resolution by which the IU was adopted, Member States recognized that 'plant genetic resources are a heritage of mankind to be preserved, and to be freely available for use, for the benefit of present and future generations.' The IU made clear that this open availability was to apply to all PGR, including 'special genetic stocks' which was interpreted broadly to include the specially bred proprietary lines of seed breeders.²⁴

The initial rejection of the relatively recently developed plant-related intellectual property rights regimes is what made the IU controversial to the seed industry and hence to governments of the industrialized world. Denmark, Finland, France, New Zealand, Norway, Sweden, the United Kingdom and the United States officially indicated their unwillingness to support the IU.²⁵

In the 10 years after its adoption, the IU evolved through interpretive resolutions to reflect the growing acceptance of the need to accommodate plant breeders' rights to attract developed country interest. Because of that accommodation, the assertion of national sovereignty over PGR became the mechanism through which developing countries sought to correct the asymmetry of benefits accruing to developed and developing countries from PGR. Three interpretive resolutions were adopted. The first provided an agreed interpretation which recognized that plant breeders' rights were not necessarily inconsistent with the IU.²⁶ It also recognized Farmers' Rights and defined them in a second resolution as 'rights arising from past, present and future contributions of farmers in conserving, improving and making available plant genetic resources, particularly those in the centres of origin/diversity.'²⁷

²¹ As of 23 August 1999, the Commission had 160 state members plus the European Community.

²² Mooney, P.R. 1983. The law of the seed: another development and plant genetic resources. *Development Dialogue* 1-2:7-172.

²³ Kloppenburg, Jack R. Jr. and Daniel Lee Kleinman. 1988. Plant genetic resources: the common bowl. Pp. 1-2 *in* *Seeds and Sovereignty: The Use and Control of Plant Genetic Resources* (Jack R. Kloppenburg, ed.). Duke University Press, London.

²⁴ International Undertaking, *supra* Note 7, Article 2.

²⁵ Tilford, *see* Endnote 15, *supra* at no. 251.

²⁶ FAO Conference Resolution C4/89, 1989.

²⁷ FAO Conference Resolution C5/89, 1989.

The emergence of the concept of Farmers' Rights was motivated more as part of a political effort to right the perceived imbalance created by the growing use and expansion of plant breeders' rights than as a legal concept or a property right. The countries agreed that Farmers' Rights would be recognized through an international fund, a fund that was never operationalized.

From the mid-1990s, the Commission began a negotiating process to revise the IU to bring it into harmony with the Convention on Biological Diversity. The IT, which is dealt with in Section V and in more detail in Session 5, was adopted by consensus in November 2001.

B. The Convention on Biological Diversity

The Convention on Biological Diversity was conceived in the 1980s, affected by the same climate that catalyzed the interpretive resolutions to the IU. Unlike the IU, which was negotiated under the auspices of the FAO Commission, the CBD was negotiated under the leadership of the United Nations Environment Programme. The negotiators for the CBD by and large came from the Ministries of Environment represented at UNEP and not the Ministries of Agriculture represented at the FAO. In general terms, the CBD's origins can be classified into categories corresponding to its three objectives. One major source was conservationist concerns that existing international law for protection of wildlife was a patchwork that covered only selected issues, areas and species. They called for a more general agreement that would embrace a broader concept of nature and its value—including the full diversity of life at the level of genes, species and ecosystems—and protect the many elements of biodiversity not covered by existing laws. Second, there was a move to incorporate the goal of sustainable use of biological resources into conservation policy, recognizing the need of local people living amid biodiversity for sustainable development, and conversely the need to mobilize support for conservation by providing local benefits. Third, international debate on the terms for exchanging and for sharing benefits from plant genetic resources for use in agriculture created pressure to include in the treaty obligations on these issues. Ironically, some key issues relating to agrobiodiversity—such as the status of pre-CBD *ex situ* collections and Farmers' Rights—were left outstanding.

Those advocates for a conservation orientation to the treaty supported the view that these resources were a 'common heritage of humankind.' The governments of the biodiversity 'rich' countries, however, successfully asserted their national sovereignty over their resources from the beginning of the negotiations. The expansion of intellectual property rights over biological resources led to the idea of Farmers' Rights and the reaffirmation of sovereignty in the interpretive resolutions to the IU. The negotiators to the CBD responded to the same dissatisfaction with imbalance caused by IPRs, by reaffirming their sovereign rights over their own biological resources and by establishing that States have the authority to determine access to genetic resources under their jurisdiction.

The issues of sovereignty and responsibility were most graphically displayed in discussions surrounding the questions of access to genetic resources and access to technology. The provisions on access affect the economic interests of all countries because all are interdependent when it comes to PGRFA whether it serves as a resource base for the life sciences and associated industry and/or underpins local food security. The assertions of sovereignty are most visible in Article 15 *Access to Genetic Resources*. Article 15 ultimately became a balancing act between traditional notions of sovereignty and the desire to ensure that access not become so cumbersome so as to make it effectively impossible. Despite its recognition elsewhere of a common concern for biodiversity loss, the Convention's provisions

on access to genetic resources reaffirm national sovereignty over these natural resources and hence national authority to regulate access to genetic resources under a state's jurisdiction.

The issue of IPR and biodiversity was also very controversial during the negotiations for the CBD. Article 16 *Access to and Transfer of Technology* has the only explicit reference to intellectual property rights. Perhaps as a testimony to its ambiguity, the biotechnology industry has worried that the protection is too weak²⁸ while some civil society organizations claim the language is too strong. The final paragraph of that Article makes clear that the negotiators of the treaty were unable to reach consensus on the role of IPRs in the conservation and use of biodiversity. The gist of that provision is that Parties are to make sure that IPRs are supportive of the treaty's objectives.²⁹

C. Intellectual Property Rights: national and international trends

The application of modern biotechnologies to biomaterials has brought new economic opportunities and the growth and subsequent consolidation of industry concerned with bioindustrial products. It has also brought new challenges to existing IP regimes. Driven by the private sector, the trend in industrialized countries has been toward the expansion of the scope and/or application of patents and plant breeders' rights to biomaterials. The last 20 years have been characterized by the increasing consolidation of industry involved with bioindustrial products. By 1996, the world's top 10 agrochemical corporations accounted for 82% of global agrochemical sales; the top 10 seed companies controlled approximately 40% of the commercial seed market; the top 10 pharmaceutical companies accounted for 36% of global drug sales.³⁰ Many firms are dominant actors in all of these categories.³¹ Figures disaggregated by crop show the concentration to be even higher. Both firm consolidation and IP expansion enhance market power.

Mirroring larger trends in globalization and consolidation of world markets, many private sector interests, national governments and intergovernmental organizations are making concerted efforts to 'harmonize' IPRs—to gain some semblance of cohesion in a field that is in flux. The TRIPS Agreement and the evolution of the International Union for the Protection of New Varieties of Plants (UPOV) reflect these efforts.

The TRIPS Agreement is innovative from both a trade and intellectual property perspective. From the trade perspective, the TRIPS Agreement embodies the relatively novel and counterintuitive notion that trade *restrictions*, such as embargoes on 'counterfeit' goods that imitate copyrighted or trademarked products, are necessary to promote trade *liberalization* and the lack of IPRS (which can create monopoly rights) is a restriction on trade.³² Intellectual property had previously been seen as a domestic policy to be tailored to fit a country's level of development and technological goals, not as a matter of trade policy. One

28 The Industrial Biotechnology Association (IBA) and the Association of Biotechnology Companies (ABC) to oppose US approval of the Convention. Reginald Rhein, Biological Diversity Convention Would Limit Patent Rights, Says IBA, 12 BIOTECH. NEWSWATCH 1 (18 May 1992). The President and CEO of Genetech, G. Kirk Rabe, wrote to President Bush before his departure to Rio where the CBD would be signed saying 'the proposed Convention runs a chance of eroding the progress made in protecting American intellectual property rights' Hamilton, Neil. 1993. Who owns dinner: evolving legal mechanisms for ownership of plant genetic resources. 28 Tulsa L.J. 587–646. *supra* at 623 (citing Steve Usd. 1992. Biotech Industry Played Key Role in U.S. Refusal to Sign BioConvention, Diversity 8(2):8.) President Clinton signed the treaty the day before it closed for signature with the support of the biotechnology industry with the promise that it would be sent to the Senate to consider ratification with an interpretive statement alleviating their intellectual property concerns.

29 Quote Article 16.5.

30 RAFI. 1997. Life Industry. RAFI Communique, November/December 1997.

31 Examples of major life industry firms include Sygenta, Novartis, Monsanto and DuPont.

32 Downes, David. 1997. Using Intellectual Property as a Tool to Protect Traditional Knowledge: Recommendations for Next Steps: CIEL Discussion Paper prepared for the Convention on Biological Diversity Workshop on Traditional Knowledge, Madrid, November 1997. CIEL, Washington. Discussion draft, p. 6.

practical reason for this change is that developed countries, such as the United States, wished to add intellectual property (IP) to the issues on the table in the Uruguay Round in order to achieve negotiating gains in their goals through trade-offs with other goals of interest to developing countries such as reductions in barriers to textile imports. The United States had previously had little success in gaining its IP goals within the World Intellectual Property Rights Organization (WIPO, see discussion below) where such trade-offs were impossible.

The original impetus for creating UPOV came from three organizations: a commercial plant breeders' trade association formed to promote plant variety protection, an organization with a mandate to promote industrial patents, and the International Chamber of Commerce. Six countries from western Europe founded UPOV.³³ As discussed in more detail in Session 6, UPOV encourages the adoption of *sui generis* laws for protecting new plant varieties by creating its own distinct system outside of patent law. The growth of biotechnology and the possibility of formal patent coverage created the pressure leading to the 1991 revision. What is important to note here is the trend in the revision of UPOV—there are four versions, only the most recent of which is open to new members—is toward a strengthening of the rights granted.

Developments within WIPO, an intergovernmental organization established in 1967 to promote intellectual property rights worldwide, can be understood only in relation to these global trends. WIPO was essentially sidelined for what was probably the single biggest step in strengthening international IPR standards, the negotiation of the TRIPS Agreement. This was in large part due to a deliberate move by IPR proponents who anticipated making greater gains on IPR through negotiated trade-offs within the Uruguay Round, and also sought to strengthen enforcement of IPR standards by making it possible to enforce them through the WTO dispute-settlement procedures.³⁴

Until recently, WIPO tended to avoid addressing issues relating to indigenous or traditional knowledge or to genetic resources. For example, WIPO rarely sent representatives to meetings of the CBD or FAO Commission on Plant Genetic Resources for Food and Agriculture. This has been changing over the last five or so years as the member States recognize the challenge of developing national legislation to implement the far-reaching requirements of TRIPS including the need for technical assistance³⁵, and the potential role that WIPO can play in broadening the debate on IPR and relating it more clearly with equity issues. Dr Kamil Idris, appointed in autumn 1997 as the organization's first new Director-General in 25 years, has signaled an openness to exploring how WIPO can contribute its technical expertise and resources to the exploration of these issues. In March 1998, the WIPO General Assembly approved a reinvigorated programme for the Global Intellectual Property Issues Division that would address biodiversity, human rights and indigenous rights issues through activities such as research, publication and consultations. WIPO has also established an Intergovernmental Committee on Intellectual Property Rights, Genetic Resources, Traditional Knowledge and Folklore.

³³ Fowler, Cary. 1994. *Unnatural Selection: Technology, Politics and Plant Evolution*, p. 104. Gordon and Breach Science Publishers, Switzerland.

³⁴ Jackson, John H. 1997. *The World Trading System: Law and Policy of International Economic Relations*. 2nd edition. The MIT Press, Cambridge, Mass.

³⁵ WIPO, unlike the WTO, has decades of experience and considerable staff and other resources to support provision of technical assistance on national IP laws and institutions. Thus, WTO and WIPO have signed an agreement committing the two institutions to greater cooperation on matters such as information-sharing and technical assistance.

Given the rapid pace of technological advancements in genetics and biology, it is not surprising that biological subject matter challenges the legal parameters of ownership and control. Scientists are creating artificial human chromosomes, sequencing the entire genomes of living organisms, and cloning mammals to produce human proteins in their milk. Society is struggling with the social, ethical and legal implications of humankind's ability to control the genetic blueprint of life. Opinions differ sharply on the implications of new biotechnologies, but nearly everyone agrees that advances in technology are taking place at a rate far faster than social policies can be devised to guide them, or legal systems can evolve to address them. As Session 6 discussing the relevant provisions of TRIPS and UPOV and Session 7 on intellectual property rights can affect daily management of PGRFA illustrate, whether the subject is plant breeders' rights or plant and animal patenting, there is little consensus on the potential impacts of intellectual property on biodiversity, food security and development. Despite concerted efforts to achieve harmony and consistency across national and regional borders, intellectual property as it applies to biomaterials continues to be controversial and characterized by confusion and uncertainty.

V. The Impact of National Sovereignty, the Convention on Biological Diversity and Intellectual Property Rights on Plant Genetic Resources for Food and Agriculture

The impact of the above developments on plant genetic resources for food and agriculture has been generally to slow down the exchange of those resources. With the entry into force of the Convention on Biological Diversity and the recognition of sovereign rights, countries have generally been concerned to exert greater control over access to their genetic resources, including PGRFA. In the absence of any multilateral arrangements for access and benefit sharing, access to PGRFA as well as other genetic resources has tended to be granted on a bilateral basis, thus significantly increasing the transaction costs involved. The implementation of the provisions of the CBD for PGRFA has also highlighted the difficulties of applying the concept of country of origin to PGRFA; the exchange of PGRFA has been so extensive that it is now hard if not impossible to identify countries of origin for most crops. Only a small number of countries have actually implemented ABS legislation pursuant to the CBD. But the fact that the issue of providing access to genetic resources has been so politicized has led to national institutions being reluctant to share resources in what they perceive as a policy vacuum. The rise of patent protection over innovations in the area of PGRFA has tended to restrict the availability of PGRFA for further research and plant breeding. It has also led to increased demands for some practical recognition of the contributions made by farmers over the millennia in the improvement of crops and the development of farmers' varieties.

It was these issues that the negotiation of the International Treaty on Plant Genetic Resources for Food and Agriculture (the Treaty) sought to address. Recognizing the special nature and requirements of PGRFA, the Treaty sets up a Multilateral System of Access and Benefit sharing for the crops most important to food security and on which countries are most interdependent. The multilateral nature of the new system allows for facilitated access and for benefit sharing without having to resort to bilateral negotiations over individual accessions, thus reducing transaction costs dramatically. Recognizing the importance of the continued availability of PGRFA for further research and breeding, the Multilateral System limits the extent to which intellectual property rights which restrict such availability can be taken out within the Multilateral System and provides for enhanced benefit sharing in cases where such availability is restricted. The Treaty also seeks to recognize the contributions of farmers to the development of PGRFA and to provide for the realization of Farmer's Rights.

The Treaty, which was adopted by the FAO Conference in 2001 and entered into force on June 29 2004, will be discussed in more detail in Session 5.