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The FAO Multilateral System for Plant Genetic Resources for Food and Agriculture: Better than Bilateralism?

Muriel Lightbourne*

INTRODUCTION

Agriculture is deemed to have appeared roughly ten thousand years ago, disrupting the existing ecological balance, and allowing human population growth to take off.¹ Not all societies gave up pastoralism; however, agriculture gradually spread across the world. As explained by Jose Esquinas-Alcázar, “the process of domesticating plants and animals and the spread of agriculture were slow enough to allow a new equilibrium to emerge Genetic diversity was maintained, and even increased, during this long period; the heterogeneous varieties developed by farmers in each location became well-adapted to varying local conditions.”² The repeated selection by farmers of wild plants altered the genotypes of these plants, “and substantially added value to them.”³ This pattern of farmers developing landraces is still prevalent in many developing countries, even where some features of modern agriculture can be found. However, since World War II, farmers in many developing and industrialized countries have become reliant on public breeders and private seed-processors for their supply of quality seeds. Since

* Copyright © 2008. Formerly Visiting Scholar, University of Illinois at Urbana-Champaign College of Law.

1. STEVE OLSON, MAPPING HUMAN HISTORY: DISCOVERING THE PAST THROUGH OUR GENES 101 (2002).

2. José Esquinas-Alcázar, *Protecting Crop Genetic Diversity for Food Security: Political, Ethical and Technical Challenges*, 6 NATURE REVIEWS GENETICS 946, 947 (2005).

3. Clive Stannard, Niek van der Graaff, Alan Randell, Peter Lallas & Peter Kenmore, *Agricultural Biological Diversity for Food Security: Shaping International Initiatives to Help Agriculture and the Environment*, 48 HOW. L.J. 397, 402 (2004).

the 1980s, private breeders (seed companies) and, to a lesser extent, public agricultural research centers have embraced the biotechnological revolution. Hence, since the Green Revolution and the advent of biotechnologies, the modern agricultural system has been based on genetically uniform high-yielding crop varieties. The sustainability of such a system is at stake, owing to the loss of genetic diversity that ensues. Esquinas-Alcázar shows that of the more than 300,000 vascular plants⁴ identified, roughly 7,000 species have been used to satisfy basic human needs.⁵ However, “[b]arely more than 150 species are now cultivated; most of mankind now lives off no more than 12 plant species.”⁶ In such conditions, access to genetic resources is necessary, not only for traditional farmers but also for industrial public and private breeders, in order to maintain some genetic variability.

In 1983, the Food and Agriculture Organization of the United Nations (“FAO”) adopted the International Undertaking on Plant Genetic Resources (“IUPGR”).⁷ The IUPGR was a non-legally binding instrument based on the assumption that plant genetic resources were the common heritage of mankind and should be freely exchanged.⁸ The rationale for adopting the IUPGR was that full advantage could be derived from plant genetic resources through an effective program of plant breeding, so as to avoid erosion and loss of these resources.⁹

The IUPGR could not be adopted as a binding instrument due to the reservations of eight industrialized countries. As of December 1997, the IUPGR had gained the support of 113 parties, with Brazil, Canada, China, Japan, Malaysia, and the United States as notable exceptions. Unsurprisingly, these same countries, joined by Australia, often adopted hard stances during the negotiations of the International Treaty on Plant Genetic Resources for Food and

4. Vascular plants are those having a system of conducting tissues to transport water, mineral salts, and sugar (i.e., angiosperms, gymnosperms, ferns, but not mosses nor algae).

5. Esquinas-Alcázar, *supra* note 2, at 947.

6. *Id.*

7. International Undertaking on Plant Genetic Resources, FAO Res. 8/83 (Nov. 23, 1983), available at <ftp://ftp.fao.org/ag/cgrfa/Res/C8-83E.pdf> [hereinafter IUPGR].

8. *Id.*

9. *Id.*

Agriculture (“International Treaty”),¹⁰ while Japan and the United States declined to become signatories.

New conditions have prevailed over the transfer of plant genetic resources since the Convention on Biological Diversity (“CBD”) was opened for signature in Rio de Janeiro and entered into force in December 1993.¹¹ The CBD reaffirms the sovereignty of U.N. Member States over their natural resources.¹² This conflicted with the common heritage principle embodied in the IUPGR.¹³ The latter placed no restrictions on access to these resources, while the former allows governments to impose controls and conditions.¹⁴ This reversal can be explained by the fact that developing countries have realized the market value of by-products or processes using their biological resources, especially in the pharmaceutical industry.

Owing to the interdependency of countries with respect to food supplies, the rising awareness of environmental and health concerns constraining food production, and the growing role played by intellectual property rights in the field of agriculture, the international community needed a binding agreement organizing seed exchanges. The International Treaty was adopted after eight years of negotiations and superseded the IUPGR.¹⁵ It entered into force in June 2004.¹⁶

The International Treaty covers all plant genetic resources.¹⁷

10. International Treaty on Plant Genetic Resources for Food and Agriculture, *adopted* Nov. 3, 2001, S. Treaty Doc. No. 110–19, <http://www.fao.org/AG/cgrfa/itpgr.htm> [hereinafter International Treaty].

11. Convention on Biological Diversity (with annexes), *opened for signature* June 5, 1992, 1760 U.N.T.S. 79, *available at* <http://www.cbd.int/doc/legal/cbd-un-en.pdf> [hereinafter CBD].

12. *Id.* at pmb1.

13. IUPGR, *supra* note 7, at pmb1.

14. CBD, *supra* note 11, at pmb1.; IUPGR, *supra* note 7, at pmb1.

15. International Treaty, *supra* note 10.

16. *Id.*

17. *Id.* art. II. Under the treaty, “[p]lant genetic resources for food and agriculture” means any genetic material of plant origin of actual or potential value for food and agriculture,” and “[g]enetic material” means any material of plant origin, including reproductive and vegetative propagating material, containing functional units of heredity.” *Id.* The definition contained in the former International Undertaking in Plant Genetic Resources was sweeping, encompassing cultivars “in current use and newly developed varieties[,] obsolete cultivars[,] primitive cultivars (land races)[,] wild and weed species . . . [,] and special genetic stocks (including elite and current breeders’ line and mutants).” IUPGR, *supra* note 7, at art II. This gives the background for the adoption of FAO Resolution 4/89. FAO resolutions 4/89, 5/89, and 3/91 were annexed to the IUPGR. They respectively affirm the compatibility of plant breeders’

Article 5 promotes “an integrated approach to the exploration, conservation and sustainable use of plant genetic resources for food and agriculture.”¹⁸ In particular, on-farm and *in situ* conservation is encouraged, and so is the coordination of efforts in *ex situ* conservation. One of the proclaimed goals is “broadening the genetic base of crops and increasing the range of genetic diversity available to farmers.”¹⁹ The International Treaty creates a Multilateral System that covers all plant genetic resources “listed in Annex I that are under the control of the Contracting Parties and in the public domain”²⁰ and those genetic resources listed in Annex I that are held in *ex situ* collections of the International Agricultural Research Centers (“IARCs”) of the Consultative Group of the International Agricultural Research (“CGIAR”).²¹ Annex I lists sixty-four genera

rights with the multilateral system, recognize farmers’ rights, and recognize nations’ sovereign rights over their genetic resources. Agreed Interpretation of the International Undertaking, FAO Res. 4/89, U.N. FAO, 25th Sess. (Nov. 29, 1989); Farmers’ Rights, FAO Res. 5/89, U.N. FAO, 25th Sess. (Nov. 29, 1989); Resolution 5/91, FAO Res. 5/91, U.N. FAO, 26th Sess. (Nov. 25, 1991).

Resolution 5/89 defines farmers’ rights 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 centres of origin/diversity.” Farmers’ Rights, *supra*. The recognition of farmers’ rights in Resolution 5/89 was intended to “ensure that the need for conservation is globally recognized and that sufficient funds for [those] purposes [would] be available,” and to allow farmers to benefit from the improved use of plant genetic resources. *Id.*

18. International Treaty, *supra* note 10, art. 5.1.

19. *Id.* art. 6.2(d).

20. *Id.* art. 11.2.

21. *Id.* art. 11.5. The Rockefeller Foundation financed the first *ex situ* collection of wheat and maize germplasm, and established the CGIAR in 1971. The FAO, the United Nations Program for Development, the United Nations Program for Environment, and the World Bank now participate in the financing of the CGIAR, which federates sixteen collections and research centers, also called Future Harvest Centers (some of which, like the International Rice Research Institute, were created before the CGIAR). Countries freely contribute genetic resources to the CGIAR’s centers, and anyone can ask for free samples for research or breeding programs. The review conducted in 1986 by the FAO on the legal status of existing collections observed that control over the CGIAR centers was shared between national and international representatives and that the ownership of these collections was not clear. Food & Agric. Org. of the U.N., Comm’n on Plant Genetic Res., *Legal Status of Base and Active Collections of Plant Genetic Resources*, ¶ 61, FAO Doc. CPGR/87/5 (Dec. 1986).

Later, the CGIAR’s Ethical Principles Relating to Genetic Resources (1998) declared that the collections were being held in trust for the world community, with a view to increasing food security and alleviating poverty. CGIAR SYSTEM-WIDE GENETIC RESOURCES PROGRAMME, BOOKLET OF CGIAR CENTRE POLICY INSTRUMENTS, GUIDELINES AND STATEMENTS ON GENETIC RESOURCES, BIOTECHNOLOGY AND INTELLECTUAL PROPERTY RIGHTS VERSION 1 28–29 (2001), http://www.cglrc.cgiar.org/icraf/lawPolicyPltGenRes/Policy_Booklet_Version1.pdf

of crops and forages (thirty-five of which are food crops).²² The “crops on the list already cover about eighty percent of the world’s food-calorie intake from plants.”²³ The Multilateral System can also apply, on a voluntary basis, to plant genetic resources for food and agriculture (“PGRFAs”) held by “natural and legal persons” within the jurisdiction of the contracting parties, and to those held in international institutions other than the CGIAR with which the Governing Body for the International Treaty (“IT”) will have concluded agreements for the purposes of the International Treaty.²⁴ Thus, there are three categories of PGRFAs concerned: (1) those listed and held in public collections of IT Member States; (2) those listed and held in collections of the CGIAR; and, on a voluntary basis, (3) those held by other international institutions or by natural or legal persons who are under the jurisdiction of contracting parties.

The Multilateral System is premised on the principle that benefits accruing from the PGRFAs it covers “shall be shared fairly and equitably through the following mechanisms: the exchange of information, access to and transfer of technology, capacity-building, and the sharing of the benefits arising from commercialization.”²⁵ Contracting Parties undertake to “facilitate access to technologies for the conservation, characterization, evaluation and use” of the PGRFAs that are under the Multilateral System.²⁶ Article 13.2(b)(ii)–(iii) indicates that transfers of technology include all types of partnerships in research and development or commercial joint-

[hereinafter BOOKLET]. In October 1994, the FAO and eleven CGIAR centres depositaries of *ex situ* collections signed agreements placing collections of plant germplasm under the auspices of the FAO and instituted an International Network of *Ex Situ* Collections, “for the benefit of the international community, in particular the developing countries.” *Id.* at 21. A 1994 Joint Statement of FAO and the CGIAR Centres on the Agreement Placing CGIAR Germplasm Collections under the Auspices of FAO contains clarifications as to the interpretation of some terms of the Agreement. *Id.* at 8–9. A Second Joint Statement, adopted in 1998, acknowledges that violations by the recipients of germplasm of the prohibition from seeking intellectual property rights may occur, and it provides for proceedings to remedy such instances. *Id.* at 10–12. *Ex situ* collections are collections (gene banks, botanical gardens, etc.) of “components of biological diversity outside their natural habitats.” CBD, *supra* note 11, art. 2.

22. International Treaty, *supra* note 10, at Annex 1.

23. Stannard et al., *supra* note 3, at 413.

24. International Treaty, *supra* note 10, art. 11.

25. *Id.* art. 13.2.

26. *Id.* art. 13.2(b)(i).

ventures relating to the material received from the Multilateral System, “consistent with the adequate and effective protection of intellectual property rights.”²⁷

Article 13.2(d)(ii) constitutes the cornerstone of the Multilateral System. It posits that commercializing products that are PGRFAs and incorporating genetic material accessed from the Multilateral System triggers the payment of a contribution to the benefit sharing system, except where such products are available without restriction to others for further research and breeding.²⁸

Because innovation cycles in the plant breeding industry require five to fifteen years to create new stable varieties, the Multilateral System will not start producing effects for a few more years. However, the share of benefits derived from the commercialization of plant genetic resources that incorporate genetic material accessed from the Multilateral System should be fairly limited pursuant to the provisions of the Standard Material Transfer Agreement (“SMTA”) adopted by the International Treaty Governing Body in June 2006.²⁹ This seems to vindicate the position of China and Ethiopia, which consisted of maintaining soybean and coffee outside the Multilateral System. Part I of this Article will show that such is not the case. Part

27. *Id.* art. 13.2(b)(ii)–(iii).

28. *Id.* art. 13.2(d)(ii).

29. The STMA was adopted by Resolution 2/2006 of the Governing Body of the International Treaty during its first meeting held in Madrid in June 2006. Food & Agric. Org. of the U.N., *Report of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, First Session*, ¶ 12, FAO Doc. IT/GB-1/06/Report (June 12–16, 2006). Article 6.7 of the SMTA provides that “[i]n the case that the recipient commercializes a Product that is a Plant Genetic Resource for Food and Agriculture and that incorporates Material [received from the MLS], and where such Product is not available without restriction to others for further research and breeding,” the recipient shall pay 1.1% of the gross income resulting from the commercialization of the product less 30%, except where the product is traded as a commodity. Standard Material Transfer Agreement, art. 6.7, June 16, 2006, available at http://www.planttreaty.org/smta_en.htm [hereinafter SMTA]. The gross income taken into consideration results from the commercialization of the product by the recipient, its affiliates, contractors, licensees and lessees. *Id.* at Annex 2. An alternative scheme was proposed by the African group and accepted, under Article 6.11. Irrespective of whether the product is available without restrictions, or whether it was developed using material accessed from the MLS, the recipient may opt for an alternative scheme. *Id.* art. 6.11. The recipient shall then make payments at the discounted rate of 0.5% of the sales of the product that is a PGRFA belonging to the same crop as one of those listed under Annex I to the International Treaty, during a period of ten years, which can be extended by periods of five years. *Id.* art. 6.11, Annex I.

It will then focus on the nature of the SMTA and compare its features to those of the GNU General Public License, with a particular focus on materials under development and benefit-sharing provisions. This Article suggests that, in order to avoid hold-up situations further down the road in the innovation process and high transaction costs, materials developed by public international research centers should not be protected by intellectual property rights, whose impact on the implementation of the International Treaty is analyzed in Part III. It concludes that the International Treaty is better than its alternative, i.e., a cluster of bilateral agreements.

I. WHAT ALTERNATIVE TO THE INTERNATIONAL TREATY?

Plants held in private or public collections of countries which are not parties to the International Treaty are governed by the CBD, as are other biological resources. Similarly, pursuant to the International Treaty's Article 15.3, the material other than that listed in Annex I, which is received and conserved by an International Agricultural Research Center ("IARC") of the CGIAR under the International Treaty, "shall be available for access on terms consistent with those mutually agreed between the IARC's . . . and the country of origin of such resources . . . in accordance with the [CBD] or other applicable law."³⁰

The situation was initially different for plant genetic resources for food and agriculture other than those listed in Annex I of the International Treaty and collected before its entry into force that are held by IARCs. Article 15.1(b) requires that they be made available in accordance with the provisions of the Material Transfer Agreement ("MTA") that was in use pursuant to agreements between the IARCs and the FAO, until a new Model MTA is adopted by the Governing Body at its second session.³¹ A quick review of these agreements is in order.

30. International Treaty, *supra* note 10, art. 15.3.

31. *Id.* art. 15.1(b). The model MTA considered under Article 15 of the Treaty differs in principle from the standard MTA referred to in Article 12.4. Further, pursuant to Article 15.1(b)(ii), "[t]he Contracting Parties in whose territory the plant genetic resources for food and agriculture were collected from *in situ* conditions shall be provided with samples of such plant genetic resources for food and agriculture on demand, without any MTA." *Id.* art. 15.1(b)(ii).

In October 1994, the FAO and eleven CGIAR centers which were depositaries of *ex situ* collections had signed agreements placing these collections under the auspices of the FAO and instituting an International Network of *Ex Situ* Collections, “for the benefit of the international community, in particular the developing countries.”³² With respect to transfers of samples, the centers were to ensure by arrangements, such as material transfer agreements, that the recipients would not seek intellectual property protection on the material and that they would pass on the same obligation to subsequent recipients.³³ However, the source center was under no obligation to monitor the compliance of the recipient with these undertakings.³⁴

During its second session in November 2007, the Governing Body endorsed the proposal put forth by the IARCs to also apply the SMTA to non-listed plant genetic resources held by IARCs, without making a distinction as to the date of acquisition. This position was justified by the fact that Article 15.1(b) of the International Treaty required the model MTA to be adopted in accordance with Articles 12 and 13, i.e., the very articles instituting the multilateral system and containing the benefit-sharing provisions. The IARCs would thus be relieved of the administrative burden of keeping track of two different sets of MTAs.³⁵

In such a case, the date on which soybean or coffee samples conserved by an IARC were received would not make any practical difference. These samples could either fall under Article 15.1(b) or 15.3 of the International Treaty; they would still be subject to the SMTA, if the Governing Body maintains this solution during its third session and extends the application of the SMTA to non-listed PGRFAs.

32. BOOKLET, *supra* note 21, at 21.

33. *Id.* at 5.

34. *Id.* at 9.

35. Food and Agric. Org. of the U.N., *Consideration of the Material Transfer Agreement to Be Used by International Agricultural Research Centres for Plant Genetic Resources for Food and Agriculture Not Included in Annex 1 of the Treaty*, ¶ 6, FAO Doc. IT/GB-2/07/13 Rev.1 (Oct. 29–Nov. 2, 2007); Food & Agric. Org. of the U.N., *Report of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, Second Session*, ¶ 68, FAO Doc. IT/GB-2/07/Report (Oct. 29–Nov. 2, 2007).

The example of the Tropical Agricultural Research and Higher Education Center (“CATIE”),³⁶ located in Costa Rica, helps clarify the status of coffee germplasm under the International Treaty. Ethiopia is the center of origin and diversification of Arabica coffee. Accessions³⁷ of Ethiopian origin represent roughly 42% of the total number of CATIE accessions, amounting to 1,832.³⁸ In terms of wild coffee bushes, 78% of the 917 types maintained originate from Ethiopia.³⁹ Overall, 3,000 Ethiopian coffee samples are conserved in Costa Rican collections, along with other collections kept in Ethiopia, India, Portugal, and Tanzania, which gathered beans collected by the United Nations from 1964–1965 in Ethiopian areas being deforested.⁴⁰ Ethiopian germplasm is the genetic base of most of *Coffea arabica* grown in Latin America and Asia.

A model agreement between the Governing Body of the International Treaty and the International Agriculture Research Centers and other relevant international institutions was approved in June 2006 by the Governing Body of the International Treaty pursuant to Article 15 of the International Treaty.⁴¹ It recalls the agreement signed on October 26, 1994, placing the collections of the CGIAR under the auspices of the FAO.⁴² The new agreement has the effect of including the signatory centers in the list of International Agricultural Research Centers of the CGIAR and of granting the centers facilitated access to PGRFAs listed in Annex I.⁴³ On World

36. See CATIE, <http://www.catie.ac.cr/> (last visited Jan. 26, 2009).

37. The term “accessions” means varieties contributed to or developed by a collection.

38. FRANÇOIS ANTHONY & CARLOS ASTORGA, PROYECTO DE RENOVACIÓN DEL GERMOPLASMA DE CAFÉ DEL CATIE 4 fig. 1 (1997).

39. *Id.*

40. ETHIOPIA MINISTRY OF AGRIC. & RURAL DEV., AGRIC. MKTG. SECTOR COFFEE—THE GIFT OF ETHIOPIA TO THE WORLD 4; see also David Brough & Reese Ewing, *Decaf Coffee Find Brews into Ownership Spat*, GRAIN, July 13, 2004, <http://www.grain.org/bio-ipr/?id=404>; Mike Shanahan, *Natural ‘Decaf’ Coffee Discovered by Brazilian Scientists*, SCIDEV.NET, June 24, 2004, <http://www.scidev.net/News/index.cfm?fuseaction=readnews&itemid=1453&language=1>.

41. See Food and Agric. Org. of the U.N., *supra* note 29, ¶ 32, app. K.

42. See Agreement Between [Name of Centre] and the Food and Agriculture Organization of the United Nations (FAO) Placing Collections of Plant Germplasm Under the Auspices of FAO (Oct., 2006), available at <http://www.irri.org/GRC/GRChome/FAO-Centre%20agreement.pdf>.

43. Food & Agric. Org. of the U.N., *supra* note 29, at app. K at 3.

Food Day in October 2006, CATIE signed this agreement.⁴⁴ Hence, the coffee samples held by CATIE are now part of the Multilateral System.

Although the weight of coffee has been declining over the past decade from 67% of Ethiopia's earnings from exports in 2000⁴⁵ to 37% in 2004,⁴⁶ coffee production still involves over a million farming households (70% having land plots of less than 0.5 hectare—half hectare) and about 25% of the population of that country.⁴⁷ Owing to the new status of CATIE collections and the existence of several *ex situ* collections of Ethiopian coffee germplasm, it seems that this germplasm cannot command high prices in bilateral agreements based on the Convention on Biological Diversity.

China appears to be in a slightly better position when it comes to trading soybean germplasm. China has recently become a net importer of soybean as a commodity. In 2003, China produced 15.4 million tons of soybeans, tantamount to 9% of world production.⁴⁸ Its share of world demand rose to 18% that same year.⁴⁹ China imported 20.7 million tons of soybeans in 2003 and became the largest importer of soybeans in the world.⁵⁰ For half of its soybean use, China relies on imports from the United States, Brazil, and

44. See Food and Agric. Org. of the U.N., *Draft Agreements Between the Governing Body and the IARCS of the CGIAR and Other Relevant International Institutions*, IT/GB-1/06/9 (June 2006).

45. See Tadesse Woldemariam Gole, *Conservation and Use of Coffee Genetic Resources in Ethiopia: Challenges and Opportunities in the Context Current Global Situations 2* (Global Development Network, 2003) http://www.gdnet.org/cms.php?id=research_paper_abstract&research_paper_id=4905.

46. Food and Agric. Org. of the U.N., *FAO/WFP Crop and Food Supply Assessment Mission to Ethiopia*, 4 tbl. 2 (Jan. 28, 2005), available at <http://www.fao.org/docrep/007/j3958e00.htm>.

47. TORA BÄCKMAN, *FAIRTRADE COFFEE AND DEVELOPMENT: A FIELD STUDY IN ETHIOPIA 5*, 12 (Dep't of Econ. at the Univ. of Lund, Minor Field Study Series No. 188, 2009).

48. FRANCIS C. TUAN ET AL., *CHINA'S SOYBEAN IMPORTS EXPECTED TO GROW DESPITE SHORT-TERM DISRUPTIONS*, USDA ECONOMIC RESEARCH SERVICE OUTLOOK REPORT 6 (USDA Economic Research Service 2004), <http://www.ers.usda.gov/publications/OCS/Oct04/OCS04J01/OCS04J01/ocs04j01.pdf>.

49. *Id.*

50. *Id.* at 10.

Argentina.⁵¹ In contrast, the United States produced 35% of the world soybean output in 2003 and was the world's largest exporter.⁵²

However, China is the center of origin of the soybean and has tried to retain most of its wild lines. China's report to the FAO International Technical Conference on Plant Genetic Resources, held in Leipzig in 1996, indicates that since 1949, nearly two hundred superior varieties of soybean were selected in China.⁵³ The provinces where wild soybeans can be found are identified in the report as Tibet, Anhui, Hebei, Inner Mongolia, Heilongjiang, and Shandong.⁵⁴ Additionally, from 1979 to 1995, the Ministry of Agriculture had organized more than twenty collection trips to Yunan, to "collect key crops, including wild soybean."⁵⁵ China released 651 cultivars not related to each other from 1923 to 1995.⁵⁶

In contrast, in the United States, only 12 ancestors contributed to the genomic ancestry of 88% of the 136 soybean cultivars released from 1939 to 1998.⁵⁷ The soybeans grown today in Illinois are descended from Chinese varieties that were introduced into the United States from 1910 to 1930. A study has shown that few of the 20,000 landraces available in China by 1900 were used as breeding stock in China and North America.⁵⁸ Thus, in 1992, the U.S. Department of Agriculture ("USDA") entered into an arrangement with the Chinese Ministry of Agriculture, and received germplasm from four Chinese provinces. In 1996, a second germplasm exchange agreement was signed by the USDA and the Chinese Ministry of Agriculture, for a budget of \$160,000 (in 1996), concerning one thousand accessions from eight Chinese provinces.⁵⁹ From 1992 to

51. *Id.* at 12.

52. *Id.* at 6.

53. CHINA MINISTRY OF AGRICULTURE, CHINA COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES 32 (1995), available at <http://www.fao.org/ag/Agp/AGPS/PGRFA/pdf/china.pdf>.

54. *Id.* at 28.

55. *Id.* at 41.

56. Zhanglin Cui et al., *Genetic Diversity Patterns in Chinese Soybean Cultivars Based on Coefficient of Parentage*, 40 CROP SCI. 1780, 1780 (2000).

57. K.S. Lewers, S.K. St. Martin, B.R. Hedges & R.G. Plamer, *Testcross Evaluation of Soybean Germplasm*, 38 CROP SCI. 1143, 1143 (1998).

58. Zhanglin Cui et al., *Phenotypic Diversity of Modern Chinese and North American Soybean Cultivars Based on Coefficient of Parentage*, 40 CROP SCI. 1954, 1954 (2001).

59. *Soybean Germplasm Exchange with China*, STRATSOY, MAR. 28, 1995, <http://www>.

1999, the number of Chinese varieties in the USDA collection increased from 2,900 to 6,100, originating from 27 different provinces in China.

A third germplasm exchange with China has been negotiated since 1999 and still was the object of negotiation as of 2005, according to the last available minutes of the U.S. Soybean Crop Germplasm Committee Meeting.⁶⁰

A quote from the 1996–2005 minutes seems pertinent:

The *G. soja* collection is small compared to the *G. max* collection. It is still very difficult to obtain any *G. soja* accessions from China and that remains a high priority. No *G. soja* accessions have ever been obtained from North Korea. Additional *G. soja* collecting in South Korea, Russia, and Japan would be possible and could benefit the Collection.⁶¹

Thus, while pursuing negotiations with the Chinese authorities, the USDA conducted a collection trip to Vietnam, mainly in the northern highlands bordering China, and gathered some four hundred accessions, now grown in Puerto Rico for study. Additionally, the USDA took an interest in the Russian collections, reported to be in jeopardy, especially in the far eastern part of Russia, and reported to include fifteen thousand accessions of *Glycine max* and *Glycine soja*.⁶²

This example shows that even in situations where most of the wild lines of a given crop are kept in the center of origin, interested countries might still be able to find germplasm in centers of diversification.⁶³ More broadly, although a center of diversity,⁶⁴

stratsoy.uiuc.edu/research_96/il049017.html.

60. USDA, Soybean CGC Meeting, Soybean Crop Germplasm Committee Report-1996, http://www.ars.gov/npgs/cgc_reports/soybeanstatus96.htm (updated Nov. 2005).

61. *Id.* at pt. IV.

62. *Minutes 1999 Soybean Crop Germplasm Committee Meeting*, SOYBEAN GENETICS NEWSLETTER, <http://www.web.archive.org/web/20041221065512/http://www.soygenetics.org/minutes/1999GermplasmMinutes.htm>. *Glycine max* is the name for cultivated soybean, and *Glycine soja* is the name for wild soybean. It seems that USDA Soybean Collection efforts to get new germplasm are currently being refocused on Vietnamese germplasm. See USDA Agricultural Research Service Project, Soybean Collecting in Vietnam: Southern and Central Areas, http://www.ars.usda.gov/research/projects/projects.htm?ACCN_NO=405599 (last visited Jan. 17, 2009).

63. The previous discussion draws on Muriel Lightbourne, *Organization and Legal*

China is dependent on exotic germplasm, like most countries. Use by China of soybean elite cultivars from North America as breeding stock have been documented.⁶⁵ Further, while China distributed three thousand accessions (for all plants) to more than ninety countries in 1995, they received between three thousand and five thousand accessions from abroad.⁶⁶

A third example is provided by the duplicate set of the seed collection of the International Rice Research Institute (“IRRI”) deposited for safekeeping at a USDA gene bank in Fort Collins, Colorado.⁶⁷ An agreement was reached in 2004 to extend this cooperation between IRRI and the USDA until April 2009.⁶⁸ It appears that duplicates of FAO trust material are not necessarily placed under the same conditions as the original samples—i.e., a material transfer agreement restricting applications for intellectual property rights on the material in the form received.⁶⁹

The other features of the standard material agreement must be described, and it might be interesting to do so in comparison with the

Regimes Governing Seed Markets in the People's Republic of China, 2006 U. ILL. J.L. TECH. & POL'Y 229.

64. Nikolai Ivanovich Vavilov, a Russian scientist, developed in 1926 the theory that crops had both a center of origin in specific regions of the world where their cultivation started, and centers of diversity. The latter are areas where variation within a given crop is strongest. B.S. Kurlovich et al., *The Significance of Vavilov's Scientific Expeditions and Ideas for Development and Use of Legume Genetic Resources*, PGR NEWSLETTER (Biodiversity Int'l, Rome, Italy), Dec. 2000, at 23.

65. Cui et al., *supra* note 58, at 1954.

66. CHINA MINISTRY OF AGRICULTURE, *supra* note 53, at 36.

67. See RAFI, *The Chickpea Scandal: Trust or Consequences?*, SEEDLING, Mar. 1998, available at <http://www.grain.org/publications/mar983-en.cfm>.

68. See USDA Agricultural Research Service Project, Cooperation with the International Rice Research Institute, http://www.ars.usda.gov/research/projects/projects.htm?ACCN_NO=408165 (last visited Jan. 24, 2009).

69. The USDA “National Plant Germplasm System distributes germplasm to foreign requesters in compliance with federal quarantine regulations and restrictions of the United States and the recipient country.” USDA Agricultural Research Service, Request Germplasm-National Plant Germplasm System, <http://www.ars-grin.gov/npgs/foreign.html> (last visited May 23, 2008). Whereas the prior informed consent of the country of origin is required, there is no mention of intellectual property rights. Foreign requesters and U.S. nationals may place orders for “small quantities for research and education purposes only.” USDA Agricultural Research Service, Order Germplasm-National Plant Germplasm System, <http://www.ars-grin.gov/npgs/order.html> (last visited Mar. 12, 2009).

latest version of the GNU General Public License,⁷⁰ which constitutes one of the open source models.

II. THE FAO SMTA: FROM COMMONS TO OPEN SOURCE?

The structure of the draft SMTA laid out in 2005 departed from a classic material transfer agreement between private parties only in its Preamble. It referred to the International Treaty, to the CBD, to the sovereign rights of contracting parties to the International Treaty on their plant genetic resources, and to the “enormous contribution that the local and indigenous communities and farmers in all regions of the world . . . have made and will continue to make for the conservation and development of plant genetic resources.”⁷¹

Interestingly, Article 2 of the draft circulated in April 2006 added in brackets, under the heading “Parties to the Agreement,” that “Contracting Parties to the Treaty shall take measures to ensure that parties to this Agreement that are under their jurisdiction meet the obligations in this Agreement.”⁷² This bracketed provision showed the particular nature of the SMTA, which will often be an agreement between a private party on the one hand and, on the other, a multilateral institution, an institution holding the resource at stake on behalf of the international community, or a private germplasm collection. It was strange, however, to create an obligation for states in an agreement between what would be most often private parties. Thus, this provision disappeared from the adopted SMTA. Instead, the final SMTA, adopted by Resolution 2/2006 of the Governing Body of the International Treaty during its first meeting, in Madrid in June 2006, provides, under Article 4.2 (“General Provisions”), that “[t]he parties recognize that they are subject to the applicable legal

70. GNU GPL Version 3, <http://www.gnu.org/licenses/gpl-3.0.html> (last visited Feb. 4, 2009) [hereinafter GPL].

71. Food and Agric. Org. of the U.N., *First Draft of the Standard Material Transfer Agreement Prepared by the Secretariat*, ¶ 1c, FAO doc. CGRFA/IC/CG-SMTA-1/05/2 (July 18–22, 2005) [hereinafter 2005 SMTA Draft].

72. See Food and Agric. Org. of the U.N., *First Draft Standard Material Transfer Agreement*, art. 2.3, FAO doc. CCRFA/IC/CG-SMTA-2/06/3 (Apr. 24–28, 2006) [hereinafter 2006 SMTA Draft].

measures and procedures, that have been adopted by the Contracting Parties to the Treaty.”⁷³

The SMTA includes several provisions that draw on open source models ensuring unencumbered access to software and other provisions that are idiosyncratic. The following table contrasts the SMTA and the GNU General Public License (“GPL”) with respect to permitted uses, the prohibition of intellectual property rights (“IPRs”), the viral aspects of the license (i.e., conditions for further transfer), the prohibition of further restrictions, the possibility to charge fees and the status of improvements, the existence of a benefit-sharing scheme, and the presence of a disclaimer of warranty and liability.

	GNU GPL	IT SMTA
Permitted uses	No restriction	Food and agriculture research, breeding or training (art. 6.1)
Prohibition of IPRs	No, but non-exclusive, royalty-free patent license on the contributor’s version after 28 March 2007 (sec. 11 para. 3, 4 and 7)	On PGRFAs or their genetic parts or components in the form received (art. 6.2)
Viral aspect (conditions for further transfers)	Sec. 5: Modified version must carry notice that GPL applies, plus any additional conditions as per sec.7	When recipient transfers MLS material received, must do so under the terms of the SMTA (art. 6.3, 6.4); when he/she assigns IPRs on products derived thereof, must transfer SMTA benefit-sharing obligations (art.6.10)
No further restrictions	The only possible additional conditions can apply only to material added by the contributor (sec. 7 and 10)	Except for the transfer of material under development by the provider (art. 5.c), or by the recipient (art. 6.6)

73. Food and Agric. Org. of the U.N., *supra* note 29, at app. g at 4.2.

	GNU GPL	IT SMTA
Possibility to charge fees	Not on “covered work” (i.e. unmodified program), not on patented derivative works (sec. 10 <i>in fine</i> , sec. 11) if distributed with waiver of warranty/liability; possible otherwise (sec. 17)	For material under development (art. 6.5, 6.6); Administrative costs (art. 5(a))
Benefit-sharing	No	Compulsory payment where derivative product not available without restrictions for further research and breeding, encouraged otherwise (art. 6.7, 6.8)
Disclaimer of warranty/liability	No warranty of merchantability and fitness for a particular purpose (sec. 15); no liability for damages arising out of the use/inability to use the program, losses of data . . . (sec. 16) Assumption of liability if a fee is charged (sec. 17)	As to the safety, viability, purity of or title to the material; as to the accuracy of any passport or other data (art. 9.1)

Regarding uses, the SMTA is far more restrictive than the GPL. Article 6.1 of the SMTA reproduces the requirement set forth by the International Treaty that the material accessed not be used for chemical, pharmaceutical, or non-food/feed industrial uses.⁷⁴ In such instances, the Convention on Biological Diversity should logically apply, at least for germplasm held by collections other than the CGIAR centers. As to the latter, during the meeting of the CGIAR Genetic Resources Policy Committee (“GRPC”) held in Rome in April 2007, it was decided that for CGIAR materials accessed for non-food/feed uses and obtained before 1993, the revised interim MTA⁷⁵ would apply. The same would hold for materials obtained

74. SMTA, *supra* note 29, art. 6.7.

75. *See supra* note 31 and accompanying text.

after 1993, provided those materials were received by the IARCs on the condition that they can be distributed for research. The status of materials obtained by the IARCs after 2007, i.e., after the implementation of the SMTA started, is still under discussion.⁷⁶ During the twenty-third session of the GRPC, held in March 2008, general guidelines addressing centers' distribution of materials for purposes other than conservation, research, or training for food and agriculture were being drafted.⁷⁷

Similarly, the GPL does not provide for any restriction regarding applications for intellectual property rights, except that where a software user obtains a patent on improvements he or she made to software distributed by the Free Software Foundation, that user shall grant non-exclusive, royalty-free patent licenses.⁷⁸ The International Treaty and the SMTA prevent germplasm users from claiming intellectual property rights in plant genetic resources or their genetic parts or components "in the form received from the Multilateral System."⁷⁹ This provision raises a series of questions. Are the plant genetic resources for food and agriculture concerned all those covered by the Multilateral System, or only those accessed from the Multilateral System? What is meant by "genetic parts or components," and what does the phrase "in the form received" mean?

Depending on the choice made by the recipient of germplasm accessed from the Multilateral System regarding the modes of payment to the MLS, the germplasm concerned may simply belong to the same crop as one of those pertaining to the MLS.⁸⁰ In their review

76. MICHAEL HALEWOOD, SEARCHING FOR A LINE IN THE SAND: ISSUES TO CONSIDER CONCERNING FINANCIAL RETURNS FROM RECIPIENTS OF CENTRES' PGRFA UNDER DEVELOPMENT 36, http://www.cgiar.org/exco/exco13/exco13_grpc_ip_guidelines.pdf.

77. See Press Release, ICARDA, Meeting of the Genetic Resources Policy Committee (Apr. 3, 2008), available at http://www.icarda.cgiar.org/News/2008/3Apr08/3Apr08_A.htm.

78. GPL, *supra* note 70.

79. International Treaty, *supra* note 10, art. 12.3(d); SMTA, *supra* note 29, art. 6.2.

80. See *supra* note 29 and accompanying text. See also Annex 3 to the SMTA concerning Terms and Conditions of the alternative payments scheme under Article 6.11, which states:

The discounted rate for payments made under Article 6.11 shall be zero point five percent (0.5 %) of the Sales of any Products and of the sales of any other products that are Plant Genetic Resources for Food and Agriculture belonging to the same crop, as set out in Annex 1 to the Treaty, to which the Material referred to in *Annex 1* to this Agreement belong.

of non-monetary benefit-sharing options, distinguished commentators observed that, in general, “[t]he Multilateral System does *not* link benefit-sharing directly to access, or to individual genetic resources accessed from the Multilateral System.”⁸¹

The pivotal Article 12.3(d) of the International Treaty is reproduced under Article 6.2 of the SMTA. This was formerly Article 7.2 in the 2005 draft, under which two footnotes qualified what “the Material provided under this Agreement, or its genetic parts or components” meant.⁸² This included “seeds, organs, tissues, cells, genes and DNA that come from the Material provided under this Agreement,” but not “a gene . . . separated or refined from the Material, or their [sic] genetic parts or components received under this Agreement with a view to clarifying its functions.”⁸³ These footnotes were later withdrawn and do not appear in the final text. The reference to the patentability of an isolated gene remains highly controversial in many jurisdictions.⁸⁴ However, in the United States, Japan, and the European Union, an isolated, purified gene is no longer supposed to be “in the form received.”

Concerning the conditions for further transfer of software/material, the GPL imposes fewer restrictions on the user than the FAO SMTA. A program distributed by the Free Software Foundation

SMTA, *supra* note 29, at Annex 3.

81. See Bert Visser, Robin Pistorius, Rob van Raalte, Derek Eaton & Niels Louwaars, *Options for Non-Monetary Benefit-Sharing—An Inventory* ¶ 13 (FAO Background Study Paper No. 30, 2004).

82. 2005 SMTA Draft, *supra* note 71, art. 6.2, nn.2–3.

83. *Id.* at nn.2–3.

84. The United States introduced a new text on access to plant genetic resources during the June 2001 session, allowing intellectual property rights on “genetic parts and components that have been modified or isolated” from material received from the multilateral system. UKabc Report on the 6th Extraordinary Session of the FAO CGRFA, June 25–30, 2001, <http://www.ukabc.org/cgrfa6ex.htm> (last visited Mar. 13, 2009). Much of this text found its way in the final version of the International Treaty, although “that have been modified or isolated” was replaced with the phrase “in the form received from the Multilateral System” in a new negative sentence, prohibiting intellectual property protection. International Treaty, *supra* note 10, art. 12.3(d). As recalled by Helfer, the United States and Japan wanted the first phrase (“genetic parts or components”) deleted and the second (“in the form received”) maintained in this new sentence, whereas developing countries defended the opposite position. See Laurence R. Helfer, *Intellectual Property Rights in Plant Varieties: An Overview with Options for National Governments*, in FAO LEGAL PAPERS ONLINE, No. 31, 51 (July 2002), <http://www.fao.org/Legal/Prs-OL/lpo31.pdf>.

may be modified by a user, and the modified version may be distributed under a different license, provided that such license carries notice that the GPL applies.⁸⁵ However, pursuant to Section 10, this new license shall not include additional conditions other than those listed under Section 7 of the GPL, and these conditions can apply only to material added by the contributor.⁸⁶ This list of additional conditions constitutes an innovation of the new version of the GPL, which goes much further in terms of precision than Section 10 of the previous one.

Under the SMTA, a recipient who obtains intellectual property rights on any products developed from the material or its components and assigns such rights to a third party shall transfer the benefit-sharing obligations of this agreement to that third party.⁸⁷

Irrespective of the existence of intellectual property rights, when the recipient transfers the material supplied under the SMTA to another person or entity, he or she shall “do so under the terms and conditions of the [SMTA], through a new material transfer agreement;” and notify the Governing Body.⁸⁸ Provided these requirements are fulfilled, the recipient who transfers the material supplied shall be relieved of any further obligations concerning the actions of the subsequent recipient.⁸⁹ This provision was already present in the 2006 draft, in brackets.⁹⁰ The last sentence would have been a dangerous one in the absence of the double condition, which allows the Governing Body to track uses made of accessed material. Article 7.8 of the 2006 draft subjected any subsequent transfer of the material (by the second recipient) to the rights of the country of origin of the PGRFA at stake.⁹¹ Such a provision could have had the

85. GPL, *supra* note 70, art. 5(b).

86. *Id.* art. 7, 10.

87. SMTA, *supra* note 29, art. 6.10.

88. *Id.* art. 6.4.

89. *Id.*

90. 2006 SMTA Draft, *supra* note 72, art. 7.7. In 2006, Carlos Correa warned that “unless it is understood that the SMTA must be signed by any subsequent recipient of products that incorporate the received PGRFA, the chain of payments (except if voluntarily made) would be interrupted when the first incorporation of the material into a product takes place.” Carlos M. Correa, *Considerations on the Standard Material Transfer Agreement Under the FAO Treaty on Plant Genetic Resources for Food and Agriculture*, 9 J. WORLD INTELL. PROP. 137, 144 (2006).

91. 2006 SMTA Draft, *supra* note 72, art. 7.8.

effect of blocking further transfer of PGRFAs at some stage, when the country of origin happened to have implemented restrictive legislation on access and benefit-sharing. This would have run counter to the overarching goal of the International Treaty. It was not retained in the final SMTA.

Unlike the GPL, the SMTA prohibits the introduction of additional conditions, except where the transfer concerns material under development by the provider (Article 5(c)) or by the recipient (Article 6.5). In the first case, access to the material shall be at the discretion of the developer.⁹² In the second situation, the recipient shall transfer PGRFAs that are still under development under the terms and conditions of the SMTA through a new MTA, without Article 5(a) applying.⁹³ Thus, this recipient might be entitled to charge a fee over the minimal cost when transferring the derivative material. This is confirmed by Article 6.6, which states that for such material, parties may attach additional conditions to the MTA, including monetary consideration.⁹⁴

The GPL and the SMTA converge where compliance enforcement is concerned: both documents consider that the user who redistributes the software or material shall not be responsible for enforcing compliance by third parties.⁹⁵

Regarding the status of improvements, the GPL and the SMTA present some discrepancies. The GPL prevents a user from charging fees for the distribution of an unmodified program.⁹⁶ However, charging fees is allowed for patented derivative works provided these works are distributed with a warranty or an assumption of liability by the user/distributor.⁹⁷ Conversely, the SMTA always provides for both a disclaimer of warranty and liability and the possibility to charge fees, which shall not exceed the administrative costs involved.⁹⁸ As already seen, there are two exceptions to this rule: where the material transferred is being developed by the recipient (of

92. SMTA, *supra* note 29, art. 5(c).

93. *Id.* art. 6.5.

94. *Id.* art. 6.6.

95. *Id.* art. 6.4; GPL, *supra* note 70, art. 10.

96. GPL, *supra* note 70, art. 2.

97. *Id.* art. 17.

98. SMTA, *supra* note 29, art. 5(a).

MLS material, transformed),⁹⁹ and where the material transferred is being developed by the provider.¹⁰⁰ According to the definition included in the Standard Material Transfer Agreement, “plant genetic resources for food and agriculture under development” means material derived from material accessed from the Multilateral System, “and hence distinct from it, that is not yet ready for commercialization.”¹⁰¹

The status of material under development is currently the object of debates within the CGIAR network. In the past years, three significant documents were adopted in relation to material developed by CGIAR centers and intellectual property rights. In August 2004 the “Agreement to Establish a Consortium for the Generation Challenge Program: Cultivating Plant Diversity for the Resource-Poor” was aimed at improving food security and livelihoods in developing countries “by unlocking the genetic potential of crop species and their relatives and enhancing the use of public genetic resources in plant breeding programs through the concerted generation, management, dissemination, and application of comparative biological knowledge.”¹⁰² It states that consortium members who develop a given material will retain intellectual property rights on that material. These intellectual property rights are not meant to be purely defensive,¹⁰³ as Article 26 of the agreement

99. *Id.* art. 6.6.

100. *Id.* art. 5(c).

101. *Id.* art. 2. In 2005, GRPC of the CGIAR had endorsed the policy followed hitherto by the centers consisting in treating advanced or elite lines still under development by them as material covered by the SMTA. *See* SUMMARY REPORT OF THE GENETIC RESOURCES POLICY COMMITTEE (GRPC) MEETINGS HELD IN 2005 app. I ¶ 8, available at http://www.cgiar.org/pdf/agm05/agm05_grpc_report.pdf. According to Shakeel Bhatti, Executive Secretary of the International Treaty, the GRPC confirmed in its April 2008 meeting that the notion of “material under development” had to be interpreted in a restrictive way. Shakeel Bhatti, Executive Secretary of the International Treaty, Presentation at the World Intellectual Property Organization Symposium on Public Policy Patent Landscaping in the Life Sciences (Apr. 6, 2008).

102. AGROPOLIS ET AL., AGREEMENT TO ESTABLISH A CONSORTIUM FOR THE GENERATION CHALLENGE PROGRAM: CULTIVATING PLANT DIVERSITY FOR THE RESOURCE-POOR, Recital B, art. 3 (2004), available at http://www.generationcp.org/sccv10/sccv10_upload/Consortium_agreement.pdf.

103. A defensive approach to patents consists in applying for a patent but not working or assigning it in order to prevent others from applying and enforcing a patent on a similar invention.

specifically authorizes the consortium to “pursue opportunities to [c]ommerciali[z]e IP.”¹⁰⁴ It was subsequently amended in 2005 in order to waive intellectual property rights for the benefit of “Subsistence Users,” defined as users or consumers of the program “a) for direct personal or family consumption; or b) for barter (exchange) for personal or family food, shelter, fuel or clothing; or c) in trade for business resulting in monetary income of less than €10,000 per year per business entity.”¹⁰⁵ Two additional documents were adopted that same year, namely the Alliance of Future Harvest Centers of the CGIAR Guidelines for Center Modes of Collaboration with the Private Sector, and the Guidelines for Collaboration Agreements between CGIAR Centers and Private Companies within the context of the Scientific and Know-How Exchange Program (“SKEP”). One option considered in the latter guidelines regarding joint results resides in granting the private partner the right to apply for, maintain, and abandon registrable intellectual property rights in CGIAR countries or for CGIAR crops in the private company’s name but at the expense of the CGIAR Center.¹⁰⁶ While having a bearing on the financial resources of the CGIAR Centers, such an option would not allow them to remain in control, even in a defensive perspective, of their potential intellectual property policies.

As highlighted by Halewood, the SKEP guidelines do not specifically mention what use should be made of the royalties received. Halewood further notes that “Centres have not responded to SKEP with great enthusiasm.”¹⁰⁷ Some centers have argued that accepting financial compensation for plant genetic resources under

104. AGROPOLIS ET AL., *supra* note 102, art. 26; *see also* HALEWOOD, *supra* note 76, at 7.

105. Generation Challenge Program, Amendments to the GCP Consortium Agreement to Include Agreement Not to Assert Rights for Subsistence Use (Nov. 25, 2005), http://www.generationcp.org/comm/manual/doc_127.pdf; *see also* HALEWOOD, *supra* note 76, at 7 n.19. That provision is reminiscent of the GoldenRice™ humanitarian license. Syngenta has made GoldenRice™ freely available only to farmers earning less than \$10,000 from it per year, provided the rice they produce is not exported. GRAIN, INTELLECTUAL PROPERTY RIGHTS: ULTIMATE CONTROL OF AGRICULTURAL R&D IN ASIA 13 (2001); *see also* Goldenrice.org, Intellectual Property-Related Issues, http://www.goldenrice.org/Content2-How/how9_IP.html (last visited Jan. 22, 2009). However, unlike the GoldenRice Project, the GCP Consortium Agreement does not limit the definition of “Subsistence Users” to users in developing countries. Generation Challenge Program, *supra*.

106. *See* HALEWOOD, *supra* note 76, at 9.

107. *Id.* at 13.

development could have the effect of diverting the centers' research efforts from stakeholders unable to pay, impairing the relations with non-governmental organizations and discouraging donors from maintaining their support.¹⁰⁸ Nevertheless, several authors have observed that exclusive licensing by CGIAR Centers may become common practice.¹⁰⁹ The research on apomixis conducted by the International Maize and Wheat Improvement Center (known by its Spanish acronym CIMMYT), one of the CGIAR Future Harvest Centers, provides an example of this gradual shift. The term of "apomixis" designates the clonal propagation of plants, for instance by taking a sprout, leaf, or part of the stem cuttings (vegetative reproduction), or plant asexual reproduction involving seeds in which sexual fusion has not occurred. Apomixis is used in breeding programs to elaborate hybrids, derived from sexually reproducing plants, that would be able to reproduce clonally while retaining their vigor. Thus, there would be no need for the breeder to maintain parental pure lines, as in the case of normal hybrids. There also would be no need for the farmer to buy new seeds for every reproduction cycle. Moreover, mechanical harvesting is facilitated. In tubers, the advantage over tuber propagation lies in the reduction of virus propagation. It is assumed that genes controlling apomixis can be found in the wild species of the genus or related genera of most major cultivated crops. Since 1990, a joint research project between CIMMYT and France's Institut de Recherche pour le Développement ("IRD," ex-ORSTOM) has been focusing on how to transfer this trait to maize. In 1999, CIMMYT and IRD concluded a five-year research collaboration agreement with Pioneer Hi-Bred, Limagrain, and Syngenta with the same object.¹¹⁰ Under the terms of this agreement, CIMMYT is limited to developing research products only for

108. *See id.* at 15.

109. *See* DAVID J. SPIELMAN, FRANK HARTWICH & KLAUS VON GREBMER, SHARING SCIENCE, BUILDING BRIDGES, AND ENHANCING IMPACT: PUBLIC-PRIVATE PARTNERSHIPS IN THE CGIAR 41–42 (2007); E. Binnenbaum, *The Intellectual Property Strategy of International Agricultural Research Centres*, 12 AGRIBUSINESS REVIEW (2004), <http://www.agrifood.info/review/2004/Binenbaum.html>; *see also* HALEWOOD, *supra* note 76, at 13–14.

110. *See* Timothy G. Reeves & Kelly A. Cassaday, *Global Public Goods for Poor Farmers: Myth or Reality?*, in PROCEEDINGS OF THE WARREN E. KRONSTAD SYMPOSIUM 1, 11 (J. Reeves, A. McNab & S. Rajaram eds., 2001).

“subsistence farmers,” i.e., farmers using over 50% of their harvest on the farm.¹¹¹ CIMMYT is reportedly a co-assignee on a Patent Cooperation Treaty filed in 1998 and two Australian patent applications related to apomixis filed in 2002 and 2005, respectively.¹¹²

The provision that departs the most from an open source model is the benefit-sharing one. Pursuant to Article 13.3 of the International Treaty, benefits arising from the use of plant genetic resources for food and agriculture that are shared under the Multilateral System should flow primarily, directly and indirectly, to farmers in all countries, especially in developing countries.¹¹³ However, tracking the respective contributions of farmers, even at a collective level—such as assessing the role of farmers in a given country or region—let alone at an individual one, is impossible. As underlined in a report by several distinguished authors, the “geographical origins of the myriad distinctive properties found in PGRFA are largely shrouded in millennia of evolutionary history.”¹¹⁴ Thus, it can be argued, in reference to FAO Resolution 5/89 and following Stephen Brush, that the Multilateral System will not aim so much at rewarding past contributions, but rather at encouraging future ones and conservation of plant genetic resources by local communities.¹¹⁵

As already mentioned, Article 13.2(d)(ii) of the International Treaty provides:

[T]he standard Material Transfer Agreement referred to in Article 12.4 shall include a requirement that a recipient who

111. See GRAIN, *supra* note 105, at 13.

112. See CGIAR SCI. COUNCIL, CGIAR RESEARCH STRATEGIES FOR IPG IN A CONTEXT OF IPR—REPORT AND RECOMMENDATIONS BASED ON THREE STUDIES 23 (2006), available at http://www.sciencecouncil.cgiar.org/fileadmin/user_upload/sciencecouncil/Reports/IPR_Report_Web.pdf (quoting other cases of patent applications filed by other CGIAR Centres). A search on www.patentlens.net returned the patent applications: WO 1998/036090, AU 2002/027669, and AU 2005/200063, on June 26, 2008.

113. International Treaty, *supra* note 10, art. 13.3.

114. MICHEL PETIT, CARY FOWLER, WANDA COLLINS, CARLOS CORREA & CARL-GUSTAF THORNSTRÖM, WHY GOVERNMENTS CAN'T MAKE POLICY: THE CASE OF PLANT GENETIC RESOURCES IN THE INTERNATIONAL ARENA 9 (2001).

115. See Stephen B. Brush, *The Demise of 'Common Heritage' and Protection for Traditional Agricultural Knowledge*, in BIODIVERSITY AND THE LAW: INTELLECTUAL PROPERTY, BIOTECHNOLOGY AND TRADITIONAL KNOWLEDGE 297 (Charles McManis ed., 2007).

commercializes a product that is a plant genetic resource for food and agriculture and that incorporates material accessed from the Multilateral System, shall pay to the mechanism . . . an equitable share of the benefits arising from the commercialization of that product, except whenever such a product is available without restriction to others for further research and breeding¹¹⁶

This provision includes several problematic terms that had to be defined in the SMTA. The provision of the SMTA (initially Article 3 of the draft) setting out the definitions was one of the most controversial, particularly as far as the words “commercializes,” “product,” and “incorporates” were concerned. Among the proposals in brackets for the definition of “commercializes,” the 2005 draft listed the acts of making a request for a plant genetic resource for food and agriculture with a view to commercializing a product and of offering for sale a product, which were subsequently dropped, as these were obviously too upstream to actually generate commercial benefits.¹¹⁷ The only option retained in the April 2006 draft read as follows: “to sell, lease, or license a Product or Products for monetary consideration.”¹¹⁸ The definition finally adopted in June 2006 reads as follows: “‘To commercialize’ means to sell a Product or Products for monetary consideration on the open market Commercialization shall not include any form of transfer of Plant Genetic Resources for Food and Agriculture under Development.”¹¹⁹

In turn, among the suggestions for the definition of “Product,” the exclusion of “grain” was already present in the 2005 draft, and was retained in the 2006 draft.¹²⁰ One of the possible definitions in the April 2006 draft was

[a plant genetic resource for food and agriculture [developed by the recipient][and derived from the Material . . . through research and breeding] that incorporates [by pedigree, at least

116. See International Treaty, *supra* note 10, art. 13.2(ii).

117. 2005 SMTA Draft, *supra* note 71, art. 3.1.

118. 2006 SMTA Draft, *supra* note 72, art. 3.1.

119. SMTA, *supra* note 29, art. 2. The status of material under development by IARCs is still being discussed. See *supra* note 84 and accompanying text.

120. 2005 SMTA Draft, *supra* note 71, art. 3.1; 2006 SMTA Draft, *supra* note 72, art. 3.1.

twenty-five percent (25%) of the Material or that contains an identifiable trait of value or essential characteristic of the Material][Material accessed from the Multilateral System and that has undergone [innovation][development] and is to be commercialized.]]¹²¹

The notion of pedigree associated with a threshold would require resorting to fingerprinting and could prove cumbersome, especially as the International Treaty states that the material placed under the MLS shall be accessible “expeditiously, without the need to track individual accessions.”¹²² Such tracking would nevertheless have been useful.¹²³ However, it should still be possible (although cumbersome) to determine afterwards the genetic make-up of the material contributed to the MLS in its original form for a comparison with the modified result after development. The condition that a trait of value or essential characteristic be identifiable would have limited the scope of Article 13.2(d)(ii).¹²⁴

During the first session of the ITPGR Governing Body, in June 2006, the attention of delegates was drawn to the adoption of a workable draft of the SMTA. In this context, the definition of the term “product” gave rise to an intense debate.¹²⁵ Delegates agreed to exclude “commodities and other products used for food, feed, and

121. 2006 SMTA Draft, *supra* note 72, art. 3.1 (structure and brackets in original).

122. *See* International Treaty, *supra* note 10, art. 12.3(b).

123. In any case, the database for the germplasm distributed by IRRI under the SMTA is particularly comprehensive as pertains to each IRRI SMTA, with information including its date, the recipient’s name and country, the number of samples, their accession numbers, species, designations, date of acquisition, country of origin, pedigree, and status under the IT and storage location (including, where applicable, duplicate sites). *See* IRRI’s Portal for the Online Dissemination of Information on Rice Exported from IRRI Under the Standard Material Transfer Agreement of the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture, <http://www.iris.iri.org/smta> (last visited Jan. 19, 2009).

124. *See* International Treaty, *supra* note 10, art. 13.2(d)(ii). Indeed, whereas it may be preferable from an agricultural efficiency perspective to require that a Value in Cultivation and Use be shown when applying for the registration of a variety on a national catalogue, such a requirement as a condition for the application of the MLS benefit-sharing provision would not be in favor of farmers.

125. *See Summary of the First Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture: 12–16 June 2006*, June 19, 2006, at 1, 2, available at <http://www.iisd.ca/download/pdf/enb09369e.pdf>.

processing.”¹²⁶ The definition eventually adopted under Article 2 of the SMTA in June 2006 reads as follows:

Product means Plant Genetic Resources for Food and Agriculture that incorporate the Material or any of its genetic parts or components that are ready for commercialization, excluding commodities and other products used for food, feed and processing.¹²⁷

In the April 2006 draft, the bracketed definition for “to incorporate” referred to “the incorporation of any, alternatively, part of genetic material,” “a genotype from materials,” or “genes or functional units of heredity of plant genetic resources for food and agriculture,” which are “accessed from the [MLS] in a Product, without taking into account the expression of a trait,” or “that results in a functional trait of interest to be maintained.”¹²⁸ The option that did not require the expression of a specific trait was the most favorable to farmers, insofar as whatever transformation the material accessed underwent, the presence of the latter in the commercialized product would give rise to benefit-sharing. It might have proved too controversial an issue, as no definition was adopted in the final SMTA.

The 2006 draft added the definition of “available without restriction,” which could be found under Article 7.16 (Rights and Obligations of the Recipient) in the 2005 draft.¹²⁹ Just as the legal status (whether public or private) of the institution commercializing the product was declared irrelevant by the Expert Group, the 2006 draft stated that “[a]vailability is not dependent upon any specific type of intellectual property right claimed for the Product, but on how the owner of the [product] chooses to make the Product available.”¹³⁰ The SMTA provides the following definition (already contained, together with other options, in the April 2006 draft) of “available

126. This is reminiscent of the solution adopted in the Cartagena Protocol on Biosafety to the Convention on Biological Diversity, Jan. 29, 2000, 39 I.L.M. 1027, *available at* <http://www.cbd.int/doc/legal/cartagena-protocol-en.pdf>.

127. SMTA, *supra* note 29, art. 2.

128. 2006 SMTA Draft, *supra* note 72, art. 3.

129. *Id.*; 2005 SMTA Draft, *supra* note 71, art. 7.16.

130. 2006 SMTA Draft, *supra* note 72, art. 3.

without restriction”: a product that is “available for research and breeding without any legal or contractual obligations, or technological restrictions, that would preclude using it in the manner specified in the Treaty.”¹³¹

The subject matter of the SMTA (Article 3) consists not only of the plant genetic resources for food and agriculture described in an appendix to the SMTA, but also of the related information.¹³² This last reference was in brackets in April 2006,¹³³ although, pursuant to International Treaty Article 12.3(c), it should not have been the case (and indeed, was not in the previous draft), as all available passport data shall be made available with the PGRF provided.¹³⁴ Accordingly, the brackets were removed in the final SMTA.

Thus, databases compiling information on germplasm and whose access is restricted, patents on plants covered by the multilateral system, or techniques such as GURTs¹³⁵ are likely to give rise to compulsory contributions to the MLS. However, it was observed that applications for IPRs should not in themselves trigger benefit-sharing. Accordingly, the International Treaty benefit-sharing requirement applies where the product derived from material received from the multilateral system is commercialized with restrictions and not available for further research or breeding.¹³⁶ Thus, the Expert Group also insisted that there was no reason to exempt public institutions commercializing products when the latter are not available without restrictions for further research and breeding.

131. SMTA, *supra* note 29, art. 2.

132. *Id.* art. 3.

133. 2006 SMTA Draft, *supra* note 72, art. 4.

134. International Treaty, *supra* note 10, art. 12.3(c).

135. The so-called Genetic Use Restriction Technologies (“GURTs”) can be split into two categories: V-GURTs, which are “restriction technologies at the variety level where the seed produced from the crop is sterile,” and T-GURTs, which consist of “restriction technologies at the trait level where the seed produced from the crop is fertile and only expression of a high added-value trait requires a special treatment.” INTERNATIONAL SEED FOUNDATION, GENETIC USE RESTRICTION TECHNOLOGIES 1 (2003), [http://www.worldseed.org/cms/medias/file/PositionPapers/OnSustainableAgriculture/Genetic_Use_Restriction_Technologies_20030611_\(En\).pdf](http://www.worldseed.org/cms/medias/file/PositionPapers/OnSustainableAgriculture/Genetic_Use_Restriction_Technologies_20030611_(En).pdf). Decision V/5, Section III of the Conference of the Parties to the Convention on Biological Diversity “[r]ecommends that . . . in accordance with the precautionary approach, products incorporating such technologies should not be approved by Parties for field testing until appropriate scientific data can justify such testing.” Convention on Biological Diversity, COP 5 Decision V/5, <http://www.cbd.int/decision/cop/?id=7147> (last visited May 5, 2009).

136. International Treaty, *supra* note 10, at 13.2(d)(ii).

Hence, a case-by-case analysis will be necessary when material covered by the MLS is commercialized. However, some features of patent law and plant breeders' rights should be recalled here.

III. IMPACT OF INTELLECTUAL PROPERTY RIGHTS

A. Availability of Material Protected by Plant Breeders' Rights

The Expert Group on the Terms of the SMTA, gathered in Brussels in October 2004, identified a series of questions that deserve attention, even though some of them were not addressed later in the course of the drafting of the SMTA.

The issue relating to the monitoring of PGRFA flows giving rise to payment to the MLS was addressed in light of the reserved right of the breeder to offer the protected variety for sale.¹³⁷ The solution proposed by the Expert Group consisted in checking commercial variety catalogues. In most cases, a commercial variety either is protected by a patent and in many instances not available for further

137. The Agreement on Trade-Related Aspects of Intellectual Property Rights ("TRIPS") defines minimum rights and incorporates the main provisions of the two main international conventions on industrial property and literary and artistic works, namely the Paris Convention and the Berne Convention. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, 1869 U.N.T.S. 299, 33 I.L.M. 1197 [hereinafter TRIPS]. The Convention for the Protection of New Varieties of Plants, known under its French acronym "UPOV," was specifically designed in the early sixties for the protection of plant varieties and thereafter modified several times. International Convention for the Protection of New Varieties of Plants, International Convention for the Protection of New Varieties of Plants, Dec. 2, 1961, 33 U.S.T. 2703, 815 U.N.T.S. 109 (as amended in 1978 & 1991), available at <http://www.upov.int/en/publications/conventions/> [hereinafter UPOV Convention]. The 1991 Act of the UPOV Convention protects any plant variety, defined as a plant grouping within a single botanical taxon of the lowest known rank, i.e., lower than the rank of genus and of species. To be eligible for protection, varieties must satisfy the following criteria (the so-called "DUS" test):

- Novelty ("at the date of filing of the application . . . , propagating or harvested material of the variety has not been sold or otherwise disposed of to others, by or with the consent of the breeder"). UPOV, *supra*, art. 6.
- Distinctness (the variety must bear a characteristic which has no equivalent in other varieties). *Id.* art. 7.
- Uniformity (a broad proportion of the seedlings of a sowing must be identical). *Id.* art. 8.
- Stability (the relevant characteristics must "remain unchanged after repeated propagation"). *Id.* art. 9.

research and breeding (unless the applicable patent law provides for research exemptions), making the contribution to the MLS compulsory, or is not protected at all or protected by plant breeders' rights, and thus available to others for such purposes, at least theoretically. The contribution to the MLS is then, in these two latter hypotheses, voluntary so far, and the cost of monitoring would most likely be a deterrent. It is worth discussing the breeders' exemption further, in particular in the light of *Advanta USA, Inc. v. Pioneer Hi-Bred International, Inc.*¹³⁸ The UPOV Convention does not make compulsory the deposit of protected material. In the United States, as made clear by the *Advanta* court,¹³⁹ 7 U.S.C. § 2422(4) requires the applicant to deposit and replenish periodically in a public depository the propagating material of the protected variety.¹⁴⁰ However,

[w]hile the application is being processed and continuing through the term of protection (20-25 years), only the PVPO has access to the seed sample. . . . If the application is ineligible or denied, or if it is abandoned or withdrawn by the applicant, then the seed sample is destroyed or returned to the applicant and again is not available to others.¹⁴¹

As further explained by the *Advanta* court, it is only upon expiration of the PVP certificate that the seed sample is transferred to the National Seed Storage Laboratory general collection and becomes available to others upon request.¹⁴² Moreover, the research exemption does not grant access to protected material. It merely means that if a breeder gets access—through products on the market—to seeds and uses such seeds for research or to breed a new variety, he or she will

138. *Advanta USA, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, No. 04-C-238-S (W.D. Wis. Oct. 27, 2004), available at <http://pub.bna.com/ptcj/04238Oct27.pdf> (order granting partial summary judgment for plaintiff and partial summary judgment for defendant).

139. *Id.*

140. 7 U.S.C. § 2422(4) (2006).

141. *Advanta*, No. 04-C-238-S at 17–18 (relying upon the website of the United States Plant Variety Protection Office (“PVPO”). The case was ultimately settled during trial just before closing arguments. See Bartlit Beck Herman Plenchar & Scott, Profile of Lindley Brenza, <http://www.bartlit-beck.com/lawyers/bio.asp?whichid=B057110013&type=f> (last visited Jan. 14, 2009).

142. *Advanta*, No. 04-C-238-S at 18.

be exempt from infringement charges.¹⁴³ This was also the position expressed by the International Seed Federation (“ISF”).¹⁴⁴

The previous general assumption regarding the availability of plant material protected by breeders’ rights was indeed partly rebutted by the Expert Group in 2004 on a different ground.¹⁴⁵ Effectively, pursuant to Article 16(1)(ii) of the 1991 Act of the UPOV Convention (and, in Europe, Article 16 of EC Regulation 2100/94), the breeder can oppose acts of re-export of his protected plant material into a country that does not offer protection for the genus or species of the plant concerned, unless the exported material is for final consumption purposes.¹⁴⁶ Thus, if the breeder intends to avail himself of this right, logically he or she should then make a compulsory contribution to the MLS. The difficulty here lies in monitoring such instances; the MLS could be informed either by the breeder, the customs authorities of the country into which the seeds are tentatively re-exported, or by the importer charged royalties by the breeder.

Apart from re-export situations, the notion of essentially derived variety might also be a hindrance to the free flow of material protected by breeders’ rights.

B. The Notion of Essentially Derived Variety

The notion of “essential derivation” of the 1991 Act of the UPOV Convention has to be assessed. Effectively, pursuant to Article 14(5), a variety essentially derived from a protected variety will be deemed as falling within the scope of the breeders’ rights over that latter variety.¹⁴⁷

143. *Id.*

144. INTERNATIONAL SEED FOUNDATION, ISF VIEW ON INTELLECTUAL PROPERTY 8 (2003), [http://www.worldseed.org/cms/medias/file/PositionPapers/OnIntellectualProperty/ISF_View_on_Intellectual_Property_20030611_\(En\).pdf](http://www.worldseed.org/cms/medias/file/PositionPapers/OnIntellectualProperty/ISF_View_on_Intellectual_Property_20030611_(En).pdf).

145. First Meeting of the Expert Group on the Terms of the Standard Material Transfer Agreement, Brussels, Belg., Oct. 4–8, 2004, *Report on the Outcome of the Expert Group on the Terms of the Standard Material Transfer Agreement*, ¶ 23, FAO Doc CGRFA/IC/MTA-1/04/Rep.

146. UPOV, *supra* note 137, art. 16(1)(ii); Council Regulation 2100/94, art. 16, 1994 O.J. (L 227) I (EC).

147. UPOV, *supra* note 137, art. 14(5). This new notion, introduced by the 1991 Act of the UPOV Convention, refers to varieties which are derived from the initial variety and which are

Whereas the legal meaning of the notion of essentially derived variety (“EDV”) is disputed, it seems that many experts attach a scientific meaning to it, which can be expressed as an attempt to prevent “cosmetic breeding.”¹⁴⁸ An essentially derived variety is a variety that, although distinct in the sense of the UPOV Convention, retains the essential characteristics resulting from the genotype or combination of genotypes of the initial variety and was obtained through acts of derivation of the initial, protected variety. It is technically possible to have a “cascade” of derivation. Nevertheless, each essentially derived variety shall only depend on the initial one.¹⁴⁹ Thus, there is no legal “cascading” of essential derivation.

As breeding methods vary from species to species, or sometimes even within species, so do the thresholds being required to characterize essential derivation. Accordingly, the ISF has carried out studies on tomato, rye grass, maize, lettuce, and oilseed rape.¹⁵⁰ An additional difficulty lies in the techniques used to establish these

clearly distinguishable from the initial variety while retaining the expression of the essential characteristics that result from the genotype or combination of genotypes of the initial variety. The International Association of Plant Breeders, which merged in May 2002 with the International Seed Trade Federation into the International Seed Federation, had discussed issues regarding “converted lines,” distinctness, and novelty since its 1981 Acapulco Congress and pressed UPOV “to again study the question of important characteristics.” INT’L SEED FED’N, ESSENTIAL DERIVATION INFORMATION AND GUIDANCE TO BREEDERS 2 (2005), available at http://www.amseed.com/pdfs/EDVInfoToBreeders_0605.pdf. However, the Administrative and Legal Committee of UPOV considered during its meeting of April 28, 1983, that “amendment to the Convention was inadvisable for the time being.” *Id.* As further explained by the International Seed Federation, “[d]ue to further developments of genetic engineering, decision was taken in 1987 to revise the Convention” and introduce the concepts of essential derivation and dependence. *Id.*

148. Article 14(5)(c) of the 1991 Act of the UPOV provides examples of what constitutes an essentially derived variety from a scientific viewpoint: “Essentially derived varieties may be obtained for example by the selection of a natural or induced mutant, or of a somaclonal variant, the selection of a variant individual from plants of the initial variety, backcrossing, or transformation by genetic engineering.” UPOV, *supra* note 137, art. 14(5)(c).

149. INT’L SEED FED’N, *supra* note 147, at 4.

150. *See id.* at 5–7. The International Seed Federation has also published guidelines regarding these plants. *See* Int’l Seed Fed’n, Essential Derivation, http://www.worldseed.org/en-us/international_seed/edv.html (last visited Mar. 19, 2009) [hereinafter Guidelines]. The ISF establishes a distinction between three zones: the zone of non-derivation, the zone of uncertainty (between thresholds 1 and 2), and the zone of indisputable derivation. INT’L SEED FED’N, *supra* note 147, at 5–7. Language in all the guidelines provides that the thresholds shall be revised after a period of five years “in the light of the experience gained and the technical and scientific evolution.” Guidelines, *supra*.

thresholds. The ISF has mainly determined the published thresholds—which are not legally binding on jurisdictions—on the basis of distances measured by molecular markers. Depending on the method used, the results may vary to some extent, as the case of maize shows.¹⁵¹ Moreover, it has been suggested that measuring essential derivation as x% of genetic similarity to the original variety¹⁵² does not give any indication about the derivation process, and legally it could lead to situations where a whole gene pool would be monopolized.

More generally, as noted by the ISF, DNA marker profiles are not yet predictive of most phenotypic characteristics, as several genes might be involved in the expression of a given phenotypic trait. The ISF observes that if “DNA markers were to be used for distinctness, then the level of uniformity could not reflect existing levels of variability in varieties which have satisfied current DUS standards.”¹⁵³ The ISF concludes that this would decrease the minimum distance between two varieties, narrowing the scope of breeders’ rights and reducing genetic diversity. Thus, ISF insists on the use of different tools to assess distinctness on the one hand, which should still be based on phenotypic characteristics and not be concerned with breeding methods,¹⁵⁴ and essential derivation on the other hand, whose assessment could be based on variety origin,

151. In an initial analysis done using the Restriction Fragment Length Polymorphism technique (“RFLP”), the adopted thresholds were: red zone = above 90% of similarity, orange zone = between 90% and 85%, green zone = below 85%. INT’L SEED FED’N, *supra* note 147, at 5. A subsequent analysis using microsatellites reached a new threshold of 82% demarcating the orange and green zones. *Id.*

152. As was the case under the provisional MTA adopted by the International Centre for Tropical Agriculture, a CGIAR Future Harvest Center, before the entry into force of the International Treaty. Article 2 of that MTA was concerned with the

material . . . obtained through effective and substantial backcrossing or [that] has ¼ or more of its lineage different from germplasm accessions, the access of which is regulated either through the Food and Organization of the United Nations (FAO)-CGIAR agreement on in-trust collections signed on 26 October 1994, or by the United Nations Convention on Biological Diversity.

CIAT Material Transfer Agreement for Breeding and Bred Materials, art. 2, (2001), *available at* http://www.ciat.cgiar.org/improved_germplasm/mta_breeding.htm.

153. INT’L SEED FED’N, ISF VIEW ON INTELLECTUAL PROPERTY 4 (2003), *available at* [http://www.worldseed.org/cms/medias/file/PositionPapers/OnIntellectualProperty/ISF_View_on_Intellectual_Property_20030611_\(En\).pdf](http://www.worldseed.org/cms/medias/file/PositionPapers/OnIntellectualProperty/ISF_View_on_Intellectual_Property_20030611_(En).pdf).

154. *Id.* at 6.

breeding methods, and an analysis of both phenotypic and genotypic characteristics.¹⁵⁵

Mark Janis and Stephen Smith amply discuss these issues, reaching a totally different conclusion. Like Laurence Helfer,¹⁵⁶ these authors insist in particular on the fact that “phenotypic comparisons using traits that were specifically selected by UPOV for DUS purposes do not necessarily provide reliable estimates of genetic distance or of agronomic performance potential.”¹⁵⁷ They also show that new breeding techniques such as doubled haploids (in which recombination is reduced)¹⁵⁸ or reverse genetics tend to reduce the lead-time that PVP holders can enjoy.¹⁵⁹ Thus, Janis and Smith recommend the adoption of an unfair competition regime applicable to the commercial/agronomic value of plant datasets.¹⁶⁰

According to Srinivasan, the notion of EDV (i.e., morphological distinctness although the essential characteristics resulting from the genotype of the initial variety are retained) shakes the very foundations of conventional plant variety protection systems, based on morphological (i.e., phenotypic) differences.¹⁶¹ As expected, this notion has already started to give rise to some litigation. It might be worth mentioning here a first judgment on essentially derived

155. *Id.* at 13.

156. See LAURENCE R. HELFER, *INTELLECTUAL PROPERTY RIGHTS IN PLANT VARIETIES: INTERNATIONAL LEGAL REGIMES AND POLICY OPTIONS FOR NATIONAL GOVERNMENTS* (2004).

157. Mark D. Janis & Stephen Smith, *Technological Change and the Design of Plant Variety Protection Regimes*, 82 CHI.-KENT L. REV. 1557, 1584 (2007).

158. The technique of double haploids aims at creating pure lines. The haploid plants result from a male sexual cell or a female sexual cell without fecundation. The plants obtained normally have one batch of chromosomes instead of two, which is doubled naturally or artificially so that they become fertile. Thus, pure lines are produced in a few months instead of the eight to ten years involved in the traditional technique of self-pollination.

159. Janis & Smith, *supra* note 157, at 1604. For an explanation of reverse genetics, see Hirohiko Hirochika, *Tissue Culture-Induced Mutations and a New Type of Activation Tagging as Tools for Functional Analysis of Rice Genes*, in RICE IS LIFE: SCIENTIFIC PERSPECTIVES FOR THE 21ST CENTURY 78 (K. Toriyama, K.L. Heong & B. Hardy eds., 2005), and Gynheung An, *Functional Genomics by Reverse Genetics*, in RICE IS LIFE: SCIENTIFIC PERSPECTIVES FOR THE 21ST CENTURY, *supra*, at 76.

160. Janis & Smith, *supra* note 157, at 1607–13. These authors nonetheless note that “unfair competition models typically trade away certainty. This is a serious problem in areas where there is . . . a strong need for the ex ante allocation of rights to provide third-party notice and to hold down transaction costs.” *Id.* at 1612–13.

161. C.S. Srinivasan, *Exploring the Feasibility of Farmers’ Rights*, 21 DEV. POL’Y REV. 419, 429 (2003).

varieties, rendered by the Civil Court of The Hague in the Netherlands in October 2002. At the provisional stage, the court had to assess whether the variety “Blancanieves” of the species *Gypsophila* was a mutant of the variety “Dangypmini,” as claimed by the holder of a Community plant certificate on the latter against the Netherlands-based holder of another Community plant certificate on the former. The court considered that the phenotype of “Blancanieves” differs from that of “Dangypmini” in several characteristics, held to be essential characteristics resulting from the genetic material of “Blancanieves,” and not present in “Dangypmini.”¹⁶² On July 13, 2005, the court concluded its proceedings with a judgment holding that “Blancanieves” was not an EDV, as the plaintiff had not convinced the court that these numerous and substantial differences could result from simple acts of derivation.¹⁶³ It will be interesting to see new cases arise. However, as highlighted by Janis and Smith, this decision “suggests that phenotypic characteristics will continue to drive the scope analysis” and that “genotype evidence may well be relegated to a role (if any) as a potential source of rebuttal evidence on derivation.”¹⁶⁴

The protection of EDV might limit the “freedom-to-operate” in future breeding programs using the protected variety as starting material—legally, pursuant to the breeders’ exemption provided by UPOV Article 15.1(iii). Conversely, if a breeder uses a new cultivar developed by farmers from landraces and obtains an essentially derived variety, the acts of producing, offering for sale, selling, importing and exporting or stocking for such purposes this variety may require the authorization by the farmers who developed the cultivar. Such authorization will be necessary where an application for breeders’ rights was filed by the farmers for their cultivar within one or four years (depending on whether the breeder is located in the

162. For a summary of the provisional judgment provided by Mr. Krieno Fikkert, Secretary of the Board for Plant Breeders’ Rights, Netherlands, see *Provisional Judgment on Essentially Derived Varieties*, PLANT VARIETY PROTECTION (Int’l Union for the Protection of New Varieties of Plants, Geneva, Switz.), Dec. 2002, at 7.

163. For a summary of the judgment provided by Krieno Fikkert, see *Judgment on Essentially Derived Varieties (EDVs) (In the First Instance)*, PLANT VARIETY PROTECTION (Int’l Union for the Protection of New Varieties of Plants, Geneva, Switz.), Sept. 2005, at 9–10.

164. Janis & Smith, *supra* note 157, at 1600–01.

same country as the farmers or in another country) following the act of disposition for purposes of exploitation of the cultivar—owing to the UPOV criteria of novelty defined at Article 6.¹⁶⁵ Thus, the notion of essential derivation has to be clarified in relation to that of exploitation.

Indeed, even in situations where essential derivation can be established, dependency is not automatic. The ISF has studied the case where the initial variety was not protected at the time of the act of essential derivation but is granted protection afterwards.¹⁶⁶ According to ISF, if the acts of derivation are conducted during the grace period but before the date of application, or in between the date of application and that of granting, dependency starts on the granting date.¹⁶⁷ Nevertheless, the breeder of the initial variety might be entitled to an equitable remuneration based on the provisional protection which Article 13 of 1991 UPOV Convention requires Contracting Parties to adopt.¹⁶⁸ This type of protection, which was optional under Article 7(3) of the 1978 Act of the UPOV Convention, draws from patent regimes, to which we shall now turn.

However, prior to this, it is necessary to specify that the situation of a breeder vis-à-vis either the breeder of the initial variety or vis-à-vis the patent-holder in a cross-licensing situation is independent from whether this second breeder will have to contribute, on a compulsory or a voluntary basis, to the MLS. The situation of the breeder of an essentially derived/dependent variety has a bearing on the MLS only if this derived variety also incorporates material accessed from the MLS. In such a situation, if the breeder has to pay an equitable remuneration to the first breeder, or a royalty to the patent-holder, he or she will most likely try to recoup such fees in addition to breeding costs through intellectual property protection.¹⁶⁹

165. UPOV, *supra* note 137, art. 6.

166. INT'L SEED FED'N, ESSENTIAL DERIVATION FROM A NOT-YET PROTECTED VARIETY AND DEPENDENCY (2005), available at http://www.worldseed.org/en-us/international_seed/on_intellectual_property.html.

167. *Id.*

168. UPOV, *supra* note 137, art. 13.

169. The second breeder can apply for either a plant variety certificate or a patent, depending on the type of subject matter and of protection sought. If the second breeder applies for a patent, at least in the European Union, this situation will give rise to cross-licenses. Article 12 of Directive 98/44 on the legal protection of biotechnological inventions provides effectively

This is where the breeding of an EDV may have an impact on the MLS. Whether this EDV will be available for further breeding or not will have to be assessed in order to determine whether the breeder of the essentially derived/dependent variety has to contribute to the MLS.

C. The Notion of “Components”

As already mentioned, Article 12.3(d) of the International Treaty states that “[r]ecipients shall not 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.”¹⁷⁰ The expression “genetic parts or components” is not defined in the SMTA. However, at an early stage of drafting, “components” seems to have been understood as meaning “components containing functional units of heredity.”¹⁷¹ There are numerous elements corresponding to such a definition: genes contained in the nucleus of the cells of the plant, Expressed Sequenced Tags (“EST”),¹⁷² Single Nucleotide Polymorphisms (“SNP”),¹⁷³ and the DNA contained in the chloroplasts¹⁷⁴ and the mitochondria¹⁷⁵ of the plant cells and

for a cross-licensing scheme between patents and plant breeders’ rights. Council Directive 98/44, art. 12, 1998 O.J. (L 213) 13, 19–20 (EC). This provision was inspired by the conditions listed in Article 31 of the TRIPS (which is concerned only with compulsory licenses on patents). TRIPS, *supra* note 137, art. 31. As a corollary, Council Regulation 873/2004, 2004 O.J. (L 162) 38 (EC), modifies Article 29 of Council Regulation 2100/94, 1994 O.J. (L 227) 1 (EC), on Community plant variety rights to organize this cross-licensing scheme with patents in the realm of plant variety rights.

170. International Treaty, *supra* note 10, art. 12.3(d).

171. Food & Agric. Org. of the U.N., *Information Pursuant to Rule XXI.1 of the General Rules of the Organization*, FAO Doc. CL 121/5-Sup.1 (Oct. 20–Nov. 1, 2002), available at <http://www.fao.org/docrep/meeting/004/Y6042e.htm>.

172. An EST is a unique stretch of DNA within a coding region of a gene that serves as a landmark for mapping.

173. An SNP is a change in which a single base in the DNA of an organism differs from the usual base at that position.

174. Chloroplasts are organelles (i.e., discrete structures of a cell having specialized functions) contained in the cytoplasm of plant cells and responsible for photosynthesis and thus existing only in plants and algae. Chloroplast DNA is generally maternally inherited. See Phillip McClean, *Maternal Inheritance: Structure of Organelle Genomes* (1997), <http://www.ndsu.nodak.edu/instruct/mcclean/plsc431/maternal/maternal3.htm>.

175. Mitochondria are organelles contained in the cytoplasm of the plant cell (i.e., outside

transposons.¹⁷⁶ Some of these elements may constitute candidate subject matter of patents,¹⁷⁷ whose blocking effect on subsequent breeding programs depends on the wording of the claims and the interpretation such patent claims receive. Indeed, a search of the U.S. Patent and Trademark Office's granted-patent database using "chloroplast" as a keyword returned 174 patents, and "transposon," 191 as of February 4, 2008.¹⁷⁸ These inventions are concerned with "compositions and methods for regulating metabolism in plants,"¹⁷⁹ insect- and herbicide-resistant plants,¹⁸⁰ or gene targeting methods, among others.

Thus, where such "components" have been isolated from material accessed from the MLS, have shown a function, and have been protected by a patent, they will no longer be available without restrictions, unless the applicable patent law provides for a research exemption. In many jurisdictions (although not the United States), the

the nucleus) that can be found in most eukaryotes and are responsible for the main source of energy production, adenosine triphosphate. See Phillip McClean, Plant Genome Organization and Structure: Mitochondrial Genome Organization (1998), <http://www.ndsu.edu/instruct/mcclean/plsc731/genome/genome8.htm>.

176. Transposons are sequences of DNA located on chromosomes (i.e., in the nucleus of a cell) and have the faculty of "jumping" from one position to another within a given genome, causing insertions, deletions and translocations of genes. "Plant transposons excise imprecisely, generally leaving part of the duplication at the former insertion site . . . [This] commonly results in either an altered gene product or a frame-shift mutation." Nina Fedoroff, *Transposons and Genome Evolution in Plants*, 97 PNAS 7002, 7003 (2000), available at <http://www.pnas.org/>; see also Heinz Saedler, *Functional Evolution* (1998), <http://www.mpiz-koeln.mpg.de/english/research/saedlerGroup/saedler/index.html>; Wikipedia, Transposon, <http://en.wikipedia.org/wiki/Transposon> (last visited Nov. 27, 2006). Transposons are a reason why the UPOV Convention criteria of homogeneity and stability are expressed in terms of percentage.

177. This is true only if the usual patentability conditions are met, in particular that of utility. In the United States, the Court of Appeals for the Federal Circuit has confirmed in *In re Fisher*, 421 F.3d 1365 (Fed. Cir. 2005), the non-patentability of ESTs. Judge Rader, in dissent, analyzed ESTs as research tools, distinct from the methods (of making a compound having no known use) excluded from patentability by the United States Supreme Court in *Brenner v. Manson*, 383 U.S. 519 (1966). *In re Fisher*, 421 F.3d at 1379 (Rader, J., dissenting).

178. It is noteworthy that no U.S. patent seems to have been applied for by the joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, whose aims include "speeding up breeding of new crop varieties by increasing the efficiency of mutation . . . using molecular markers." NAFA Project, D2, <http://www.iaea.or.at/programmes/nafa/d2/index.html> (last visited May 2, 2008).

179. U.S. Patent No. 7,105,718 (filed Mar. 30, 2001).

180. U.S. Patent No. 7,129,391 (filed May 15, 1998).

subject matter of a patent may be used for further research on¹⁸¹ such subject matter during the period of protection.

Moreover, under the Patent Cooperation Treaty, the patentee is required to deposit samples of the organic material (object or starting material of the invention) that cannot be described to a collection placed under the Budapest Convention on the international recognition of the deposit of microorganisms for the purposes of patent procedure¹⁸² in order to satisfy the requirement of sufficiency of description. Depending on the jurisdiction, the patentee may be entitled to restrict access to the deposited material, at least for a fixed period of time.¹⁸³ However, after the expiry or abandonment of the patent, such material automatically falls in the public domain. The last sentence of Article 6.9 of the SMTA¹⁸⁴ is nonetheless useful in

181. As opposed to “with” such subject matter.

182. The World Intellectual Property Organization defines the term “microorganism” in the Budapest Treaty as follows:

The term ‘microorganism’ is not defined in the Treaty so that it may be interpreted in a broad sense as to the applicability of the Treaty to microorganisms to be deposited under it. Whether an entity technically is or is not a microorganism matters less in practice than whether deposit of that entity is necessary for the purposes of disclosure and whether an I[n]ternational D[eposit] A[uthority] will accept it. Thus, for example, tissue cultures and plasmids can be deposited under the terms of the Treaty, even though they are not microorganisms in the strict sense of the word.

WORLD INTELLECTUAL PROP. ORG., GUIDE TO THE DEPOSIT OF MICROORGANISMS UNDER THE BUDAPEST TREATY 4 (2009).

183. Rule 28 (3) of the Implementing Regulations of the European Patent Convention (“EPC”) makes it a general principle that the “deposited material shall be available upon request to any person from the date of publication of the European patent application.” Implementing Regulations to the Convention on the Grant of European Patents, R.28(3) (2004), available at <http://www.epo.org/patents/law/legal-texts/html/epc/1973/e/ma2.html>. However, Rule 28(4) authorizes the applicant to restrict the availability to the issue of a sample to an expert nominated by the requester, either until the publication of the mention of the grant of the European patent, or for twenty years from the date of filing if the application has been refused or withdrawn. *Id.* at R.28(4). In any case, as stated in Rule 3(b), such issue shall be made only if the requester has undertaken vis-à-vis the applicant not to make the biological or any biological material derived therefrom “available to any third party and to use that material for experimental purposes only” until the protected material enters the public domain (upon expiry, refusal, or withdrawal of the patent). *See id.* at 28(3). This rule was adopted to allow EPC members that are also EC member States to implement Article 13.4 of Council Directive 98/44 on the legal protection of biotechnological inventions. *See* Council Directive 98/44, art. 13.4, 1998 O.J. (L 213) 13, 20 (EC).

184. SMTA, *supra* note 29, art. 6.9. This last sentence encourages the recipient to place a sample of his/her/its product that incorporates MLS material into a collection that is part of the

that this material and the collection where it was deposited may not be readily identifiable (unless one goes back to the patent), and not always easily accessible. Thus, the addition of an incentive to have the material provided directly to the MLS after the termination of the protection by intellectual property rights was necessary. Prior to such termination, and so long as the products incorporating material accessed from the MLS are commercialized in a way restricting access to the subject matter, a contribution to the MLS will be required.

Thus, like some open source models, the SMTA relies on the very existence of intellectual property rights. It can be argued that the SMTA presents features of an open source system, associated with a benefit-sharing scheme that constitutes an idiosyncrasy and cornerstone of the International Treaty. However, the benefit-sharing scheme borrows more from existing copyright collecting societies than from open source systems. Thus, the Multilateral System instituted by the International Treaty appears to be a legal hybrid, drawing from different systems of Commons and open source. Moreover, the open source model emulated is, itself, a hybrid through which some degree of differentiation between the products is retained downstream, allowing the capture of value through the sale of related products and contributions to the benefit-sharing scheme on this base.¹⁸⁵

CONCLUSION

This Article has summarized the coverage of the Standard Material Transfer Agreement mechanism of the FAO International Treaty, and the potential impact of intellectual property rights on the implementation of the benefit-sharing scheme. The SMTA is particular in that it organizes transfers of germplasm between public

MLS for research and breeding, after the expiry or abandonment of the protection period of the intellectual property right on this product.

185. For a discussion of different open source models, see Joel West, *How Open Is Open Enough? Melding Proprietary and Open Source Platform Strategies*, 32 RES. POL'Y 1259 (2003), and Joel West, *Seeking Open Infrastructure: Contrasting Open Standards, Open Source and Open Innovation*, 12 FIRST MONDAY (2007), <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1913/1795>.

institutions and private operators, with a view to reducing transaction costs. In order to make up for the monitoring expenses involved by its implementation, and to generate monetary benefits to be used for the conservation and sustainable use of plant genetic resources for food and agriculture, the Multilateral System depends on intellectual property rights. However, the Multilateral System also proposes some mechanisms for procuring non-monetary benefits, such as transfers of technology and capacity building. Further, the ambit of the International Treaty is wider than that of the Multilateral System. As already mentioned, the International Treaty is concerned with the conservation of all plant genetic resources for food and agriculture, in particular *in situ*.

The number of germplasm accessions distributed by international and national genebanks was evaluated at approximately 100,000 per year.¹⁸⁶ According to Visser et al., in a scenario where all collections of the CGIAR and the national collections of major cereals are covered by the FAO Multilateral System, the number of germplasm source and destination countries entering bilateral contracts would decrease, compared to a situation where there is no MLS, down to fifty.¹⁸⁷ The number of bilateral agreements would amount to two hundred to five hundred per year.¹⁸⁸ In a scenario where eventually all food crops would be included in the MLS and bilateral agreements would concern only industrial crops, the number of such agreements would fall down to twenty to forty per year, between roughly five source countries and thirty destination countries.¹⁸⁹ The cost for each agreement—including negotiating, tracking and monitoring the use of germplasm—was estimated at \$10,000 on average, with the average number of plants to be tested per accession amounting to eight.¹⁹⁰ This figure represents a fraction of the R&D expenditures incurred by

186. BERT VISSER ET AL., TRANSACTION COSTS OF GERmplasm EXCHANGE UNDER BILATERAL AGREEMENTS 6 (2000), available at <http://www.fao.org/docs/eims/upload/206946/gfar0077.pdf>. The CGIAR Future Harvest Centres alone distribute over 50,000 samples every year. Food & Agric. Org. of the U.N., *supra* note 29, at app. N.1. IRRRI alone distributed a little less than 43,900 samples in 2007 through 474 SMTAs.

187. Visser et al., *supra* note 186, at 10.

188. *Id.* at 11.

189. *Id.*

190. *Id.* at 12, 14.

private breeders worldwide, estimated at \$1 billion, with \$50 million allocated to germplasm maintenance.¹⁹¹ The amount paid by each of the fifty germplasm-importing countries of the first hypothesis would reach \$100,000.

The impact of the International Treaty might not be tremendous, but the world is better off with it than without it, even though it meant compromising farmers' rights (which might never have been accepted by industrialized countries anyway). The International Treaty should enhance conservation efforts at the international level, thanks to the network comprised of the Future Harvest Centers and the Global Crop Diversity Trust.¹⁹² This cooperation should help channel available funds to real priorities in terms of conservation, while reducing the existing duplication of efforts conducted by separate collections. It thus goes further for plants used for food and agriculture than the CBD does and should help maintain ten times as many accessions than the existing CGIAR network. Further, owing to the interdependency of all countries regarding access to germplasm, global access to food crop germplasm is indeed the most valuable feature of the International Treaty. The ability to access germplasm is paramount to food security, in order for producers (farmers and breeders) to improve varieties—not just their yields, but also their agronomic or nutritional particularities—or to hedge against pest or disease outbreaks. The International Treaty also has the potential of bringing forth more equity in international relations than the CBD,

191. *Id.* at 16.

192. The Seventh Conference of the Parties to the Convention on Biological Diversity, held in February 2004, welcomed in its decision VII/3 the concept of this Trust, first floated at the World Summit on Sustainable Development. The Global Crop Diversity Trust was set up as an international fund under the Agreement for the Establishment of the Global Crop Diversity Trust, which entered into force on October 21, 2004 and gathers twenty-six parties as of October 2007. *See* Agreement for the Establishment of the Global Diversity Trust, <http://www.croptrust.org/main/governance.php> (last visited Mar. 22, 2009). In partnership with the FAO and the CGIAR 16 Future Harvest Centers, the Trust aims at gathering the 1,460 genebanks existing around the world. This represents an estimated 6 million accessions. The Trust is currently trying to raise an endowment of \$260 million. Global Crop Diversity Trust, *Our Mission*, <http://www.croptrust.org/main/mission.php>; *see also* Geoffrey Hawtin, Interim Executive Secretary, Global Corp., *The Global Crop Diversity Trust: Purposes, Priorities and Governance*, Speech at the Symposium on Food Security and Biodiversity: Sharing the Benefits of Plant Genetic Resources (Oct. 16, 2004), at 44–45.

whose Bonn Guidelines are not binding, or the WTO, as Farmers' Rights may be reinforced at least through the MLS, to which some systematic contributions shall be made in the Trust Account. National legislators could adopt incentives for IPRs holders to make such contributions. Parties to the International Treaty could and should additionally implement Article 9(2) on the protection of traditional knowledge or the participation of farmers in the adoption of decisions related to the conservation and sustainable use of plant genetic resources for food and agriculture, through national *sui generis* regimes taking into account customary rights.