

An Assessment of Private *Ex Situ* Seed Collections:

The Private Sector's Participation in the Multilateral System of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture

Background Study

by Claudio Chiarolla and Hope Shand



UTVIKLINGSFONDET
THE DEVELOPMENT FUND • EL FONDO DE DESARROLLO



BD
Berne Declaration
Déclaration de Berne
Erklärung von Bern



About the Authors:

Dr. Claudio Chiarolla is Research Fellow on International Governance of Biodiversity at the Institute for Sustainable Development and International Relations (IDDRI) in Paris. His research interests include: intellectual property law; international environmental law; comparative law; international regulation of biotechnology; open source systems of technology development and transfer and humanitarian licensing.

Hope Shand is an independent consultant and former Research Director of ETC Group. Her research and writing focuses on issues related to the control and ownership of agricultural biodiversity and the impact of new technologies, particularly on the global South.

Editors: Berne Declaration (BD)
and Development Fund

Layout: Andrea Münch, Grafik

Cover photo: © Heiko Meyer / Greenpeace

The Development Fund is an independent Norwegian non-governmental organization supporting development programs through its local partners in Africa, Asia and Latin America since 1978. The Development Fund's vision is a sustainable and just world without hunger and poverty. Sustainability, equality and respect for their integrity have been the foundation of the Development Fund's relationship with its partners in the South, internationally and in Norway.

Development Fund, Mariboeg gate 8,
0183 Oslo, Norway

post@utviklingsfondet.no

utviklingsfondet.no/english

The Berne Declaration is a Swiss non-governmental organization with more than 23 000 members, promoting more equitable, sustainable and democratic North-South relations since 1968.

Berne Declaration, Dienerstrasse 12,

Postfach, 8026 Zürich, Switzerland

info@evb.ch, evb.ch

Table of Contents	
Acronyms	04
Executive Summary	05
Foreword by the editors	07
1. Background	08
2. Why is facilitated access to crop genetic diversity through the Multilateral System of the ITPGRFA important?	09
3. Relevant provisions of the FAO International Treaty	13
4. Implementation of relevant obligations and decisions by the Governing Body	14
5. Assessment of private collections of PGRFA held by natural and legal persons	16
5.1. Review of private collections of PGRFA	16
5.2. Analysis of survey responses on the Private Sector's Participation in the Multilateral System	19
5.3. Discussion	23
6. Conclusions and recommendations	27
Annex I – List of Companies Selected for the Survey	30
Annex II – Consolidated survey results on the private sector's participation in the Multilateral System of the FAO International Treaty	30
Annex III – Survey templete	35
Annex IV – ISF Letter of response	38

Acronyms

ABS	Access and Benefit-Sharing
ASSINSEL	International Association of Plant Breeders for the Protection of Plant Varieties
BGCI	Botanic Gardens Conservation International
CBD	Convention on Biological Diversity
CGIAR	Consultative Group on International Agricultural Research
CGRFA	Commission on Genetic Resources for Food and Agriculture
CMS	Cytoplasmic Male Sterility
FAO	Food and Agriculture Organization of the United Nations
FIS	International Seed Trade Federation
IAASTD	International Assessment of Agricultural Knowledge, Science and Technology for Development
INRA	Institut National de la Recherche Agronomique (France)
IPR	Intellectual Property Rights
ISF	International Seed Federation
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MLS	Multilateral System (of the ITPGRFA)
MTA	Material Transfer Agreements
PGRFA	Plant Genetic Resources for Food and Agriculture
PVP	Plant Variety Protection
SMTA	Standard Material Transfer Agreement

Executive Summary

Plant genetic resources – the biological cornerstone of global food security – provide the biological options to build food and farming systems that are resilient, sustainable, and productive. Cross-border movement and facilitated exchange of plant genetic resources is paramount; no nation is self-sufficient when it comes to access to crop genetic diversity. In a world severely challenged by climate extremes, the case for international cooperation to maximize conservation, use and deployment of crop diversity has never been stronger or more urgent.

The core feature of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) is a Multilateral System (MLS) of access and benefit sharing (ABS) that assures “facilitated access” to a common pool of germplasm from 64 designated food and forage crops including many – but not all – of the world’s major food crops. The MLS operates as a common pooling, exchange and benefit-sharing system for the genetic material that it covers. “Facilitated access” means, *inter alia*, that access is granted under a standard contract – the Standard Material Transfer Agreement (SMTA).

Nine years after the ITPGRFA entered into force, it is widely acknowledged that implementation of the Treaty has been slow and benefit-sharing under the mechanism devised by the Treaty is woefully inadequate. Although many factors contribute to the Treaty’s slow implementation, a 2011 study by Berne Declaration and the Development Fund noted that natural and legal persons (i.e., the seed industry) have not contributed to the MLS by making available Plant Genetic Resources for Food and Agriculture (PGRFA) held in private sector *ex situ* collections.¹

To be effective, the Multilateral System depends on shared responsibility that involves all Contracting Parties, national agricultural research institutions, the international *ex situ* collections of the Consultative Group on International Agricultural Research, as well as the seed industry. In addition to promoting benefit-sharing as outlined in the Development Fund and Berne Declaration’s previous study, one important way that the seed industry can demonstrate a commitment to the management of PGRFA as a global public good is to make available Annex I PGRFA held in their *ex situ* collections in accordance with the International Treaty and its SMTA.

Article 11.3 of the Treaty calls on Contracting Parties to “[...] *take appropriate measures* to encourage *natural and legal persons* within their jurisdiction who hold [PGRFA] listed in Annex I to include such plant genetic resources for food and agriculture in the Multilateral System.” The Governing Body has made repeated calls to Contracting Parties to report on PGRFA that have been included in the MLS by natural and legal persons. No such reports had been received. In addition, the Governing Body has twice postponed its assessment of the progress made by natural and legal persons in including PGRFA in the Multilateral System (as provided by Article 11.4 of the Treaty).

There is very little documented and verifiable information about private sector *ex situ* seed collections. This study set out to examine the seed industry’s *ex situ* PGRFA collections and the extent to which the private sector is currently sharing or making available PGRFA to the MLS.

To this end, in June 2013 we conducted a survey of the world’s leading 15–20 seed companies, as well as some of the major independent seed companies in the global South. Our survey results reveal that private sector *ex situ* seed collections are shrouded in secrecy. In general, companies are not willing to share much information about the size and contents of their *ex situ* seed collections, nor are companies willing to share information about their participation in the FAO Multilateral System. Overall, our findings point to a remarkable discrepancy between the seed industry’s professed support for the MLS of the FAO International Treaty as a global public good, and the current level of participation by private sector seed companies. The contradiction demonstrates a flagrant disregard for the principle of equity and reciprocity enshrined in the Treaty.

Although it is generally acknowledged that the private sector holds sizeable *ex situ* collections of PGRFA, such collections are not devoted to long-term conservation, and are limited to germplasm of commercial interest. Long-term *ex situ* conservation of crop genetic diversity to underpin global food security is the essential, irreplaceable role played by the public sector.

We believe that the restrictive measure of denying facilitated access to companies should only be adopted by the Governing Body as a last resort, in the event

¹ C. Chiarolla and S. Jungcurt (2011), “Outstanding Issues on Access and Benefit Sharing under the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture”, a background study paper by the Berne Declaration and the Development Fund.

of persistent non-respect for the desired standards of participation and the principle of reciprocity. All stakeholders – including industry – will lose if PGRFA flows are further restricted.

With the aim of enhancing the private sector's participation in the Multilateral System we conclude with suggestions for a multi-step approach that the Governing Body may wish to consider as a means of expanding the scope of the MLS and increasing international equity through the sharing of PGRFA. This includes:

1) a survey assessment to be conducted by the Secretariat of the International Treaty; 2) the development and adoption of voluntary time-bound guidelines for the assessment, identification and reporting of PGRFA held by natural and legal persons; and 3) remedies and other measures, including non-facilitated access. Finally, we offer “operative text,” which the Governing Body may wish to include in drafting a decision to implement the above measures.

Foreword by the editors

Everybody will agree that facilitated access to plant genetic resources for food and agriculture (PGRFA) is of utmost importance – especially given the challenges of climate change, when food and farming systems must urgently adapt to meet future challenges.

The FAO International Treaty on PGRFA is the most important global instrument to regulate access to, exchange and benefit sharing associated with plant genetic resources for food and agriculture. Much has already been written on the failure of the benefit-sharing mechanism and the lack of inclusion of PGRFA in the Multilateral System by many stakeholders.

With this Background Study we aim to highlight another part of the Multilateral System which has not received a lot of attention: the inclusion of the PGRFA held by legal and natural persons, e.g., seed companies. The text of the International Treaty encourages the inclusion of privately-held collections of PGRFA, and also leaves open the possibility of denying facilitated access to natural and legal persons who fail to contribute. The Governing Body has already postponed twice the assessment and review of progress made by natural and legal persons in including PGRFA in the Multilateral System. As of July 2013, only six entities – and no seed companies – have notified the International Treaty's Secretariat of their PGRFA contributions.

A July 2013 report prepared for the Fifth Session of the Governing Body acknowledges that “The information regarding plant genetic resources held by natural and legal persons within the jurisdiction of Contracting Parties remains very sparse.” The report also notes that none of the Contracting Parties have responded to the Governing Body's request to inform the Secretary about measures taken to encourage natural and legal persons within their jurisdictions to include PGRFA in the Multilateral System. The lack of progress demon-

strates a lack of political will and a failure to implement this aspect of the Treaty.

This Background study confirms that very little is known about the seed industry's *ex situ* collections. The survey reveals that most seed companies are not even willing to share information about the size or the content of their collections.

The status quo is unacceptable. Companies enjoy the benefits of facilitated access, but keep privately-held collections shrouded in secrecy. A system with “free-riders” – stakeholders who benefit, but do not contribute – will sooner or later collapse. More transparency is needed, and it will be the first step to realizing the inclusion of private sector PGRFA into the Multilateral System.

With this background study we hope to revive debate and further efforts to encourage the inclusion of privately-held collections of PGRFA in the MLS. This study focuses primarily on seed and plant breeding companies, but it is evident that future work must include additional stakeholders, such as universities and botanical gardens. Our study offers recommendations for the consideration of the Governing Body at its fifth meeting in September 2013.

Many thanks to Claudio Chiarolla and Hope Shand for their work on this study. We are grateful to those few seed companies who were willing to respond to our survey, and to other resource persons who generously provided their time and knowledge. The Berne Declaration and the Development Fund appreciate and welcome any feedback on this study, and we remain eager to engage in future discussions.

August 2013

François Meienberg, *Berne Declaration*

Teshome Hunduma, *Development Fund*

1. Background

Almost 20 years ago, FAO's Commission on Plant Genetic Resources for Food and Agriculture initiated negotiations on a legally binding "Seed Treaty" that would eventually become the first international legal instrument governing access to and exchange of PGRFA.² The International Treaty was adopted in 2001 and it entered into force in 2004.

Negotiations on a multilateral agreement for conservation and use of PGRFA took place amid a complex and rapidly changing policy environment. The international community faced not only an alarming loss of plant genetic diversity, but also the urgent need to recognize the essential role of farming communities, particularly in the global South, as the primary developers, conservers and users of agricultural biodiversity. Treaty negotiations took place amid unprecedented privatization of agricultural research, rapid changes in the scope and reach of plant intellectual property laws and dramatic consolidation in the global seed industry. In 1994, the top 10 seed companies accounted for about 37% of the commercial seed market worldwide.³ Today, nearly one decade after the International Treaty entered into force, the top 3 multinational seed/agrochemical firms account for over 53% of commercial seed sales worldwide; the top 10 firms account for 75%.⁴

The FAO International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) provides a legally binding framework for the conservation and sustainable use of crop diversity and the fair and equitable sharing of benefits, "[...] in accordance with the Convention on Biological Diversity, for sustainable

agriculture and food security."⁵ In particular, the FAO Treaty establishes a Multilateral System (MLS) of Access and Benefit Sharing (ABS) that pools genetic materials from 64 food and forage crop species (included in Annex I of the Treaty) under a common set of rules, specified in a contractual instrument, known as the Standard Material Transfer Agreement (SMTA). The SMTA sets terms and conditions for the transfer and use of Annex I materials when used for certain purposes, namely research, conservation, breeding and training for food and agriculture. The Treaty calls upon governments, international research centers of the Consultative Group on International Agricultural Research (CGIAR) as well as private institutions and companies within the jurisdiction of the Contracting Parties to contribute materials to the Multilateral System.

Generally, the seed industry supports the International Treaty and views its MLS and SMTA as a "predictable, harmonized and workable system for plant breeding activities."⁶ The policy environment surrounding access and benefit sharing related to plant genetic resources is becoming more complex, however, especially in the context of the upcoming entry into force of the Nagoya Protocol on Access and Benefit Sharing (ABS) under the Convention on Biological Diversity. Uncertainties about access and benefit sharing obligations under the Nagoya Protocol (for PGRFA not covered by the ABS regime of the ITPGRFA) are heightening concerns among private sector seed companies about access to PGRFA.⁷

² See: <http://www.fao.org/nr/cgrfa/cgrfa-about/cgrfa-history/en/> accessed on 8 August 2013.

³ ETC Group (1996), "The Life Industry" available at: <http://www.etcgroup.org/sites/www.etcgroup.org/files/publication/463/01/raficom50lifeindustry.pdf>, accessed on 5 August 2013.

⁴ ETC Group (2013), "Gene Giants Seek Philanthropopoly," available at: <http://www.etcgroup.org/content/Ecomm-gene-giants-seek-philanthropopoly>, accessed on 9 July 2013.

⁵ See Treaty Article 1.1.

⁶ See Annex IV, Letter from International Seed Federation (3 July 2013).

⁷ The Commission on GRFA, at its thirteenth meeting, established an Ad Hoc Technical Working Group on ABS for Genetic Resources for Food and Agriculture to assist countries consider options and approaches for the implementation of ABS measures, while taking into account the distinctive features of genetic resources for food and agriculture. However, at its fourteenth meeting in April 2013, the Commission did not renew the mandate of the above Working Group. Besides, there was no consensus on the respective roles of the Commission and the Governing Body of the International Treaty in addressing ABS for PGRFA that falls outside of the scope of the Treaty's MLS. Action has been deferred until at least 2015. Edward Hammond (2013), "What Future for Access and Benefit Sharing for Agricultural Genetic Resources?" TWN Info Service on Biodiversity and Traditional Knowledge (May13/01), 20 May 2013, Third World Network. See also: ENB (2013), "Summary of the Fourteenth Session of the Commission on Genetic Resources for Food and Agriculture", Vol. 9 N. 600, 22 April 2013, available at: <http://www.iisd.ca/vol09/enb09600e.html>

Although the Treaty encourages the private sector to include PGRFA in the MLS,⁸ not much is known about plant genetic resources held by seed companies in *ex situ* collections. The information presented in this study may contribute to the future assessment of the Treaty's implementation and effectiveness, particularly with regard to the availability of materials held by natural and legal persons. In particular, Article 11.4 states that: *Within two years of the entry into force of the Treaty, the Governing Body shall assess the progress in including the plant genetic resources for food and agriculture referred to in paragraph 11.3 in the Multilateral System. Following this assessment, the Governing Body shall decide whether access shall continue to be facilitated to those natural and legal persons referred to in paragraph 11.3 that have not included these plant genetic resources for food and agriculture in the Multilateral System, or take such other measures as it deems appropriate.*

The link between the *assessment* and the *review* that is mandated under the above provision indicates that the latter should be undertaken in light of the principle of "reciprocity", i.e., the "application of the principle of equity [that] entails the moral obligation to give back what is received in equal measure or under equal terms."⁹ Since the Governing Body has already postponed twice the above-mentioned assessment (see below section 4) (see below section 4), the primary objective of this study is to fill this gap by providing relevant information on the participation of private seed companies in the Multilateral System of the FAO International Treaty and, in particular, on the extent to which the companies are sharing or making available PGRFA contained in private *ex situ* collections to the MLS. In order to meet this objective, we distributed a survey to individual contacts at 18 of the world's largest seed companies, as well as to some of the major independent seed companies selected areas of the global South. Respondents were assured that responses would not be linked to specific companies or individuals, and the survey responses would remain confidential. Our survey asked questions about the size and major characteristics of private *ex situ* seed collections, and the extent to which companies are participating in the MLS by sharing or making available relevant PGRFA. Although it is not possible to determine the precise market share held by these firms, we estimate that the companies included in our survey collectively account for at least 80–90% of the commercial seed market worldwide.

2. Why is facilitated access to crop genetic diversity through the Multilateral System of the ITPGRFA important?

Plant genetic resources provide the biological options to build food and farming systems that are resilient, sustainable, and productive. Crop genetic diversity is the biological cornerstone of global food security; it is the basis for livelihood strategies and nutritional wellbeing, especially for poor and marginalized people. Whether on the small plots of subsistence farmers, or in vast industrial monocultures, the ability to adapt farming systems to novel climates and unpredictable conditions hinges on access to crop genetic diversity. Cross-border movement and facilitated exchange of plant genetic resources is paramount; no nation is self-sufficient when it comes to access to crop genetic diversity. In a world severely challenged by climate extremes, the case for international cooperation to maximize conservation, use and deployment of crop diversity has never been stronger or more urgent.

Crop diversity is the biological cornerstone of global food security and key to alleviating poverty: Thousands of different and genetically distinct varieties of our food crops are the result of careful selection and nurturing by farming communities – both past and present. Crop diversity provides the raw materials for improving and adapting food and farming systems to meet future challenges. To maintain pest and disease resistance, for instance, or to develop desirable traits such as drought or heat tolerance, improved flavour or nutritional qualities, farmers and breeders must have access to a reservoir of species and intra-specific crop diversity. The erosion of crop diversity endangers the biological basis of our food production systems and compromises our ability to adapt to ever-changing needs and conditions.

Inter-dependence: When it comes to crop genetic diversity, all nations are inter-dependent. While some regions in the developing world are particularly well-endowed as the geographic centers of origin (and primary centers of diversity) of our major food crops, the food and farming systems of every single country depend on access to plant genetic resources that originate outside of their borders/regions. This reality was foremost in the minds of the governments who met over a 7-year period to negotiate the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.

⁸ Treaty Article 11.3 provides that: "Contracting Parties ... agree to take appropriate measures to encourage natural and legal persons within their jurisdiction who hold plant genetic resources for food and agriculture listed in Annex I to include such plant genetic resources for food and agriculture in the Multilateral System."

⁹ Chiarolla C. (2011), *Intellectual Property, Agriculture and Global Food Security: The Privatisation of Crop Diversity*. Cheltenham, UK • Northampton, MA, USA: Edward Elgar, p. 10.

The following examples illustrate the high degree of interdependence between countries on plant genetic resources:

- The international network of gene banks that operates under the umbrella of the Consultative Group on International Agricultural Research (CGIAR) holds genetic materials originally collected from 195 countries. From 1979–2009 these gene banks distributed germplasm samples to 178 countries, averaging 57,951 samples per annum, over the 30-year period.¹⁰
- India is widely recognized as a hotspot of crop genetic diversity. Over 341,000 samples of plant germplasm from CGIAR gene banks were distributed to India from 1979–2009 – genetic materials that were originally sourced from 180 countries. During the same 30-year period, CGIAR gene banks distributed over 244,000 samples of plant germplasm of Indian origin to 119 countries.¹¹
- Of the 7.4 million accessions currently maintained globally, national government genebanks conserve about 6.6 million – but 45 percent of these are held in only seven countries – down from 12 countries in 1996. The Second Report on the State of the World's PGRFA notes that increasing concentration of *ex situ* germplasm in fewer countries and research centres underscores the importance of mechanisms for facilitated access.¹²

Crop Diversity Underpins Livelihood and Food Security for Small-Scale Farmers: Farming communities have been creating and conserving the world's seed supply for millennia. While during the twentieth century “in North America and Europe ... the profession of farming became a separate one from crop improvement ... in many other parts of the world this separation has barely taken place.”¹³ Crop genetic diversity – in the form of traditional varieties – continues to be maintained by small-scale farmers (mostly women) in complex, risk-prone farming environments, especially in the developing world. Most of these farmers are classified as poor. Traditional crop varieties are well adapted to marginal or specific agricultural ecosystems – heterogeneous environments that are characterized by variability in rainfall, altitude and soil types. In short, crop diversity enables poor farming communities to avert risks and maximize harvests in uncertain and marginal environments. In the 1970s and 1980s plant breeders and scientists assumed that traditional crop varieties maintained by peasant communities would be rapidly replaced by modern varieties that were introduced with the Green Revolution and by commercial varieties.¹⁴ They were proved wrong.

Although the situation varies by crop and region, in some countries an estimated 80–90% of the seeds planted by farmers in the global South still come from the “informal seed sector” – that is, farm-saved seeds (including seeds exchanged with neighbouring farms as well as seeds purchased at local markets or seed fairs).¹⁵

¹⁰ These numbers exclude distributions within the CGIAR system and transfers to Norway-based Svalbard seed vault. López-Noriega, I., G. Galluzzi, M. Halewood, R. Vernooy, E. Bertacchini, D. Gauchan and E. Welch (2012), Flows under stress: Availability of plant genetic resources in times of climate and policy change, Working paper no. 18, CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

¹¹ Ibid.

¹² Germplasm of crops listed under Annex I of the ITPGRFA is conserved in more than 1,240 genebanks worldwide, adding up to about 4.6 million samples. Of these, about 51 percent is conserved in more than 800 genebanks of the Contracting Parties, and about 13 percent is held in the CGIAR collections. Source: FAO (2010), “The second report on the state of the world's plant genetic resources for food and agriculture”, FAO: Rome, Italy, p. 55.

¹³ Dutfield G. (2003), *Intellectual Property Rights and the Life Science Industries: a Twentieth Century History*, Aldershot, UK: Ashgate. See also: Chiarolla C. (2011), *supra* note 9, p. 54–61.

¹⁴ Louwaars, N. and Simon de Boef, W. (2012), “Integrated Seed Sector Development in Africa: A Conceptual Framework for Creating Coherence between Practices, Programs, and Policies.” *Journal of Crop Improvement*, 26:39–59 and Jarvis, D., T. Hodgkin, B. R. Sthapit, C. Fadda and I. Lopez-Noriega, (2011), “An Heuristic Framework for Identifying Multiple Ways of Supporting the Conservation and Use of Traditional Crop Varieties within the Agricultural Production System”, *Critical Reviews in Plant Sciences*, 30: 125–176.

¹⁵ Jarvis, D., Sthapit, B. and Sears, L. eds. (2000), *Conserving agricultural biodiversity in situ: A scientific basis for sustainable agriculture*, International Plant Genetic Resources Institute, Rome, Italy.

With its focus on profitable seed products, especially maize and other cereal hybrids¹⁶ and high-value horticultural crops, the corporate seed sector has neither the capacity nor interest in supplying the seed diversity required by small farmers in low-input and marginal farming systems.¹⁷

In the face of climate change, access to crop genetic diversity is essential for agricultural adaptation and survival: Farmers have always faced pressures to adapt their crops to pests, disease and adverse conditions, but the speed and complexity of climate change poses new and more intense challenges. Climate change will alter future farming conditions in virtually all countries. The poorest and most vulnerable, especially in Sub-Saharan Africa, Southeast Asia and South Asia will be most severely affected.¹⁹ Genetic resources for food and agriculture – including the wild relatives of domesticated crops – provide the genetic options that will enable plants to adapt to environmental stresses such as drought, extreme heat or cold, salinity intrusion due to sea-level rise, and rapidly evolving pests and disease.

A 2012 study predicts that unchecked climate change will slash yields of the world's three most important food staples – rice, wheat and maize – the crops that currently provide over half of the calories consumed globally. By 2050 Asian rice yields could plunge 15%; wheat yields in the global South could fall by 13%;

and African maize farmers could see yields drop 10–20%.²⁰ Climate scientists predict that by the end of this century farmers in many areas of the tropics will experience seasons that are hotter than the hottest year on record.²¹ Farmers will need to look outside their national borders to find seeds and develop new crops that might meet future conditions.²² According to FAO, “adapting crop varieties to local ecological conditions can reduce risk due to climate change, but the need for adapted germplasm is urgent and requires characterization, evaluation, and the availability of materials now housed in genebanks.”²³

This means not only access to greater genetic diversity within local crops, but also access to exotic species that are better adapted to new and changing conditions. Crop wild relatives are one of the richest sources of genes and traits for crop improvement and will play a crucial role in confronting environmental stresses associated with climate change. Many crop wild relatives are threatened with extinction and their habitats are especially vulnerable to climate change.²⁴ A very small percentage of crop wild relatives are currently found in genebanks, although efforts are underway to collect and safeguard them.²⁵

In the face of climate change, cross-border movement and facilitated exchange of crop diversity is paramount. Access to diversity underpins the ability of food and farming systems to adapt to new climatic con-

¹⁶ For example, a single crop, maize, accounted for about 25% share of the total global market for commercial seed in 2001–2005. In the area of biotech research and development (R&D), maize accounts for about 45% of all private-sector seed-related biotech research. By contrast, rice, the second most widely grown crop worldwide, accounted for just over 1% of the commercial seed market. Source: Fuglie, K., Heisey, P., King, J., Pray, C., Day-Rubenstein, K., Schimmelpfennig, D., Wang, S. L. and Rupa Karmarkar-Deshmukh (2011), *Research Investments and Market Structure in the Food Processing, Agricultural Input, and Biofuel Industries Worldwide*. ERR–130. U.S. Dept. of Agriculture, Econ. Res. Serv.

¹⁷ Louwaars, N. and Simon de Boef, W. (2012), *Integrated Seed Sector Development in Africa: A Conceptual Framework for Creating Coherence between Practices, Programs, and Policies*. *Journal of Crop Improvement*, 26: 39–59.

¹⁹ World Bank (2013), *Turn Down the Heat: Climate Extremes, Regional Impacts, and the Case for Resilience*. A report for the World Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics. Washington, DC: World Bank.

²⁰ Thornton, P. (2012, October). *Recalibrating Food Production in the Developing World: Global Warming Will Change More than Just the Climate*. CGIAR, Research Program on Climate Change, Agriculture and Food Security. Available at: <http://tinyurl.com/bppwbvx>

²¹ Battisti D., Naylor R. L. (2009), “Historical Warnings of future food insecurity with unprecedented seasonal heat”, *Science* 323 (5911): 240.

²² Burke, M. B., Lobell, D. B. and Guarino, L. (2009), “Shifts in African crop climates by 2050, and the implications for crop improvement and genetic resources conservation,” *Global Environmental Change*, 19, 317–325.

²³ Jarvis, A. and Upadhyaya, H. D. and Gowda, C. L. L. and Agrawal, P. K. and Fujisaka, S. and Anderson, B. (2008), *Climate Change and its Effect on Conservation and Use of Plant Genetic Resources for Food and Agriculture and Associated Biodiversity for Food Security*, FAO: Rome.

²⁴ A study predicts that 16–22% of the wild relatives of peanut, cowpea and potato will become extinct by 2055 and the geographic range of the remaining wild species will be reduced by more than half.

²⁵ See: “Crop wild relatives and climate change”, available at: <http://www.cwrdiversity.org/> accessed on 01 July 2013.

ditions and socio-economic needs. Climate change will increase demand (both volume and variety) for PGRFA globally and intensify the need for international cooperation.²⁶

Plant Genetic Resources are a Strategic Resource for Sustainable Agriculture: There is growing consensus worldwide that agriculture must be reoriented towards production systems that are not only highly productive, but also highly efficient and environmentally sustainable.²⁷ The crop diversity developed and maintained by small-scale farming communities – and reinforced by gene bank collections – is key to building and maintaining sustainable farming systems. According to FAO:

*[...] production strategies that include the deployment of diversity are likely to be more stable overall than monocultures of uniform varieties, they reduce risk of crop failure and require fewer pesticides. There is also evidence that in cases where heterogeneous varieties are able to exploit a given environment more efficiently and effectively, this can even result in higher yields.*²⁸

The first-ever independent global assessment of agricultural science and technology, approved by 58 governments in April 2008, the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD), calls for a fundamental shift in conventional agricultural development and advocates the increase of agroecological science and practice.²⁹

Agroecology refers to the study and design of sustainable agriculture systems that work with natural processes (i.e., nutrient recycling, nitrogen fixation) and integrate traditional farming knowledge and practice.³⁰ Among its core principles, agroecology emphasizes the integration of crops and livestock, and maximizes the use of both species and genetic diversity over time and space. Low-input and resource conserving practices are employed to build soil fertility and achieve biological pest controls, rather than relying on chemical fertilizers, pesticides and other external inputs. A growing body of evidence from around the world confirms that sustainable/agroecological practices can achieve impressive gains in productivity while improving the resilience and sustainability of food systems.³¹

Plant genetic diversity underpins nutritional well-being: Chronic micronutrient deficiencies, known as “hidden hunger”, afflict over two billion people worldwide, especially women and children. Even when sufficient calories are available, the lack of essential vitamins and minerals – especially vitamin A, iron, zinc and iodine – undermines human health, growth and development. Poverty and lack of dietary diversity – compounded by the adoption of crop monocultures – are underlying causes of micronutrient deficiencies. Studies show that nutrient-rich dietary diversity, based on agricultural biodiversity, is the safest, most affordable and sustainable approach to overcoming micronutrient deficiencies in the global South.³²

²⁶ Jarvis et al. (2008), supra note 22.

²⁷ Jarvis et al. (2008), supra note 22.

²⁸ FAO (2010), “The second report on the state of the world’s plant genetic resources for food and agriculture”, FAO: Rome, Italy, p. 184.

²⁹ IAASTD (2009), “Agriculture at a crossroads – International Assessment of Agricultural Knowledge, Science and Technology for Development”, FAO, the Global Environmental Facility, World Bank, UNDP, UNEP, UNESCO and WHO, available at: [http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Synthesis%20Report%20\(English\).pdf](http://www.unep.org/dewa/agassessment/reports/IAASTD/EN/Agriculture%20at%20a%20Crossroads_Synthesis%20Report%20(English).pdf) accessed on 04 July 2013.

³⁰ Altieri, M., et al. (2012), *Nourishing the World Sustainably: Scaling Up Agroecology*. Ecumenical Advocacy Alliance, available at <http://tinyurl.com/9cyuce7> and University of California, Santa Cruz (USA), Agroecology website: <http://www.agroecology.org/>

³¹ See, for example: Pretty, J. et al. (2006), “Resource-conserving agriculture increases yields in developing countries.” *Environmental Science and Technology*, 40:4, pp. 1114–1119, available at: <http://pubs.acs.org/doi/abs/10.1021/es051670d> and UNEP-UNCTAD Capacity Building Task Force on Trade, Environment and Development (2008), *Organic Agriculture and Food Security in Africa*, New York/Geneva, United Nations, p. 16, available at: http://unctad.org/en/Docs/ditcted200715_en.pdf

³² Burchi, F., Fanzo, J. & Frison, E. (2011), “The Role of Food and Nutrition System Approaches in Tackling Hidden Hunger”, *Int. J. Environ. Res. Public Health*, 2011 February; 8(2): 358–373. Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3084466/>

3. Relevant provisions of the FAO International Treaty

Part IV of the ITPGRFA establishes a Multilateral System which facilitates access to 64 important crops and forage species to improve global food security. The food crops and forages included in the MLS are listed in Annex I of the ITPGRFA. These pooled resources are available only for the purpose of utilisation and conservation for research, breeding and training for food and agriculture. This means that national ABS laws under the CBD may apply if recipients intend to make use of PGRFA for other purposes, such as “[...] chemical, pharmaceutical and/or other non-food/feed industrial uses.”³³

While the ITPGRFA encourages facilitated access to all plant genetic resources for food and agriculture, only PGRFA that are under ‘the management and control of the Contracting Parties and in the public domain’ should automatically be included into the MLS. In particular, Article 11 of the FAO International Treaty establishes the coverage (i.e. the scope) of the Multilateral System.³⁴ Under the terms of the Treaty, providers of PGRFA under the jurisdiction of Contracting Parties can only be obliged to grant access to materials that are: a) under the direct or indirect management and control of the State; and b) unencumbered by property rights or other legal entitlements.

However, besides the compulsory inclusion of PGRFA into the MLS, with a view to achieving the fullest possible coverage of the Multilateral System, the Contract-

ing Parties are also required to invite all other holders of the PGRFA listed in Annex I to include them in the Multilateral System (Article 11.2). In accordance with Treaty Article 11.3, “Contracting Parties also agree to take appropriate measures to encourage natural and legal persons within their jurisdiction who hold PGRFA listed in Annex I to include such plant genetic resources for food and agriculture in the Multilateral System.”

Treaty Article 11.4 further provides that the Governing Body of the Treaty shall *assess* the *progress* made by natural and legal persons in including PGRFA in the Multilateral System. Following this assessment, the Governing Body shall decide whether facilitated access should continue to be available to those natural and legal persons who have not made contributions from their PGRFA collections in the Multilateral System, or take other such measures as it deems appropriate.

Finally, Treaty Article 12.2 states that access “shall also be provided to legal and natural persons under the jurisdiction of any Contracting Party, subject to the provisions of Article 11.4”, meaning that the Governing Body could decide to discriminate between those recipients who have made their own collections available to the MLS and those who have not. Therefore, as a last resort, the Governing Body may decide to refuse facilitated access to natural and legal persons who have not made contributions from their collections to the MLS.³⁵

³³ Treaty Article 12.3(a).

³⁴ It states that the latter shall cover the PGRFA listed in Annex I that are under the management and control of the Contracting Parties and in the public domain.

³⁵ C. Chiarolla and S. Jungcurt (2011), “Outstanding Issues on Access and Benefit Sharing under the Multilateral System of the International Treaty on Plant Genetic Resources for Food and Agriculture”, a background study paper by the Berne Declaration and the Development Fund.

4. Implementation of relevant obligations and decisions by the Governing Body

Since the entry into force of the Treaty, the Governing Body has twice postponed its assessment of the progress made by natural and legal persons in including PGRFA in the Multilateral System (as provided by Article 11.4 of the Treaty). In March 2011, just before the fourth meeting of the Governing Body, the Berne Declaration and the Development Fund released a background study on outstanding ABS issues under the Multilateral System of the Treaty.³⁶ This study highlighted that “the least progress in implementation has been achieved in the inclusion of collections held by natural and legal persons who are not considered to be part of national programs or policy frameworks, such as collections held by private plant breeders or other institutions not under the control of governments.”

Decisions by the Governing Body

In 2009, the Governing Body of the Treaty, at its third meeting, requested that Contracting Parties:³⁷

- Report on the collections of PGRFA held by natural and legal persons who are not part of the government system, but might be willing to make such information available; and
- Encourage natural and legal persons within the Contracting Parties jurisdictions to include PGRFA in the Multilateral System.

In 2011, the Governing Body, at its fourth meeting, decided “to again postpone the reviews and assessments foreseen under Articles 11.4 and 13.2(d)(ii) of the Treaty to its Fifth Session”.³⁸ In preparation for the reviews foreseen under Articles 11.4 and 13.2(d)(ii) of the Treaty, The Governing Body also requested:

- Contracting Parties to provide more information to the Secretary on the inclusion of PGRFA in the Multilateral System by natural and legal persons within their jurisdictions;³⁹
- Contracting Parties to take measures to encourage natural and legal persons within their jurisdictions to include PGRFA in the Multilateral System, and inform the Secretary accordingly, preferably through their national focal points;⁴⁰
- The Secretary to compile a report, and for this purpose to request information from Contracting Parties, international institutions that have concluded agreements under Article 15 of the Treaty, and other natural and legal persons, preferably through the national focal points of the Contracting Parties in order to provide it to its Fifth Session;⁴¹

³⁶ *Ibid.*

³⁷ Resolution 4/2009

³⁸ IT/GB-4/11/Report, Appendix A, page 27, paragraph 32, see: “Reviews and assessments under the Multilateral System, and of the implementation and operation of the SMTA.”

³⁹ *Ibid.*, para. 4.

⁴⁰ *Ibid.*, para. 5.

⁴¹ Emphasis added, *Ibid.*, para.33.

The report compiled by the Treaty Secretariat (IT/GB-5/13/5, paragraphs 35–37) states that:

The information regarding plant genetic resources held by natural and legal persons within the jurisdiction of Contracting Parties remains very sparse. [...] At the time of writing, no such reports had been received. At the time of the last report, the only two direct reports from such natural and legal persons were from two public-private associations in France: the *Association pour l'étude et l'amélioration du maïs* (PRO-MAIS) and the *Association française des semences de céréales à paille et autres espèces autogames* (AFSA).

In addition, the website of the International Treaty provides copies of the notifications received from Contracting Parties, and others, on materials included in the MLS. The notifications can be sorted by: Contracting Party; gene banks of the Consultative Group on International Agricultural Research (CGIAR) and other international centers;⁴² and “natural or legal person” within the jurisdiction of Contracting Parties.⁴³ As of July 1, 2013:

- 31 Contracting Parties have provided official notification to the Treaty Secretariat about the inclusion of material in the MLS;
- 17 International Centers, including the International Agricultural Research Centers of the CGIAR;

- In the category of “natural and legal persons”, the Secretariat has received notifications of inclusion from six entities that have voluntarily included their PGRFA in the MLS. Two of the six are non-governmental organizations devoted to crop conservation (in Peru and India); two are universities (in Kenya and Costa Rica); and two are French breeders’ organizations,⁴⁴ both in cooperation with the *Institut National de la Recherche Agronomique* (INRA).

As of July 2013, the Secretary had not received any reports from Contracting Parties in response to the request for information on the inclusion of PGRFA in the Multilateral System by natural and legal persons within their jurisdictions (whose PGRFA collections are not under the management and control of the Contracting Parties). Further, it is unclear whether the Contracting Parties have taken any measures to fulfill their obligations under Treaty Article 11.3 to encourage natural and legal persons within their jurisdictions to include PGRFA in the Multilateral System.

⁴² On the proportion of world holdings of PGRFA held by Contracting Parties and Article 15 International Institutions, and resources currently available under the terms and conditions of the SMTA, see IT/GB-5/13/5, paragraphs 24–34, and table 1 in the Appendix.

Crops	World ex situ holdings (accessions)	World holdings: % with Parties	% of Parties' holdings actually available	World holdings: % with Institutions	% of Institutions' holdings actually available	World holdings: % with Parties + Institutions	% of Parties' + Institutions holdings actually available	% of total world holdings actually available
Wheat	911,405	49.92	26.89	16.85	100.00	66.76	45.34	30.27
Rice	782,628	38.54	2.46	16.70	100.00	55.24	31.94	17.65
Maize	326,159	40.55	8.78	8.23	100.00	48.78	24.18	11.79
Other Annex I	2,492,448	57.24	24.55	12.08	99.06	69.32	37.53	26.02
Non-Annex I	2,484,244	58.42	4.46	2.68	74.91	62.00	8.52	5.28

⁴³ See: <http://www.planttreaty.org/inclusions> accessed on 4 July 2013.

⁴⁴ PRO-MAÏS – a non-profit breeders’ organization that aims at advancing the study and improving maize, and the Association Française des Semences de céréales à paille et autres espèces Autogames (AFSA).

5. Assessment of private collections of PGRFA held by natural and legal persons

5.1. Review of private collections of PGRFA

What do we know about private sector ex situ seed collections?

As noted in the previous section, the Governing Body of the International Treaty has made repeated calls to Contracting Parties to report on PGRFA that have been included in the MLS by natural and legal persons – i.e., commercial seed companies and breeders. However, there is very little documented and verifiable information about private sector *ex situ* seed collections.

It is widely acknowledged that seed companies maintain their own germplasm collections. The seed industry's desire to secure strategic germplasm collections is frequently cited as one of the reasons propelling seed industry mergers and acquisitions. For example, in Syngenta's recent news release announcing the acquisition of a Zambian maize seed company, Syngenta notes: "MRI's corn germplasm is among Africa's most comprehensive and diverse, incorporating temperate, tropical and subtropical material. This unique portfolio will be developed to support expansion in high-growth East African markets and may be leveraged globally through Syngenta's elite breeding programs."⁴⁵

Both the First and Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture make reference to private sector *ex situ* collections, but specific information about the contents and size of seed collections is not publicly available. For instance, the Second Report on the State of the World's PGRFA notes:

*Private sector companies are very diverse in size, scope and core business... Their interests and involvement vary from the collecting and maintenance of germplasm collections (generally breeders' working collections) and the evaluation of germplasm, to genetic improvement, multilocation testing, biosafety and seed release, multiplication and distribution.*⁴⁶

As noted above, the seed industry is not a monolith and the extent to which companies maintain their own collections depends on the species of interest and the strategic business plans of the individual company.

On two occasions (in 1996 and 2001), the seed / plant breeding industry has surveyed its members to determine how much the seed industry spends on in-house conservation and maintenance of PGRFA:

- In 1996, the International Association of Plant Breeders for the Protection of Plant Varieties (ASSINSEL), now known as the International Seed Federation (ISF),⁴⁷ conducted a survey of its members to determine the amount of money spent by private sector breeders on germplasm maintenance. ASSINSEL presented the findings of the survey to the FAO Commission in 1997.⁴⁸ According to the 1996 survey, 88% of member companies had gene banks. Based on responses, ASSINSEL estimated that member seed companies spent, on average, 5% of their research budgets on maintaining genetic resources – roughly US\$ 50 million per year.⁴⁹
- ASSINSEL conducted a new membership survey in 2001. Based on responses from 63 companies in 14 countries, the 2001 survey found that member companies spent, on average, 5.1% of their research budget on maintaining internal gene banks and 5.8% of their research budget for the characterization and evaluation of PGRFA held in their genebanks. According to ASSINSEL, its members collectively spent roughly US\$ 170 million per annum on conservation, characterization and evaluation of germplasm. ASSINSEL's press release on the 2001 survey mentions that a "significant part" of the US\$ 170 million is used to maintain improved breeding lines, but 80% of surveyed

⁴⁵ Syngenta (2013), "Syngenta to acquire African corn seed business," 3 July 2013, Available at:

<http://www.syngenta.com/global/corporate/en/news-center/news-releases/Pages/130703.aspx> accessed on 11 July 2013.

⁴⁶ FAO (2010), "The second report on the state of the world's plant genetic resources for food and agriculture", FAO: Rome, Italy, p. 126.

⁴⁷ ASSINSEL merged with FIS (Fédération Internationale du Commerce des Semences) in 2002 and became the International Seed Federation (ISF).

⁴⁸ FAO (1997), Reports from International Organizations on their Policies, Programmes and Activities on Agricultural Biological Diversity, CGRFA-7/97/7 Part III.

⁴⁹ Although several publications make reference to the results of the survey, we were not able to obtain a copy of the 1996 survey, which is not available on the International Seed Federation website. See, for example: Visser, B., Eaton, D., Louwaars, N. and Engels, J. (2000), Transaction Costs of Germplasm Exchange Under Bilateral Agreements. Global Forum on Agricultural Research, <http://www.fao.org/docs/eims/upload/206946/gfar0077.PDF> accessed on 4 July 2013, and Virchow, D. (1999), Conservation of Genetic Resources: Costs and Implications for a Sustainable Utilization of Plant Genetic Resources for Food and Agriculture, Springer-Verlag: Berlin.

members also “maintain obsolete varieties, about two thirds conserve landraces, while more than half maintain wild relatives in their genebanks.”⁵⁰

Thus, according to the seed industry’s own surveys (1996 and 2001), companies spend a significant amount of money on gene banks and maintenance of germplasm, suggesting that they hold sizeable *ex situ* collections of PGRFA. However, several experts in plant genetic resources who were interviewed for this study believe that the estimates provided by ASSINSEL/FIS were inflated and not realistic. Given that the surveys of private sector collections were not made publicly available, it is not possible to evaluate or verify this information.

In order to collect background information for this study, the authors conducted informal interviews with five experts in the field of genetic resources and representatives of the seed industry.⁵¹ This information includes the following key points:

- In addition to their *ex situ* holdings, most companies continue to rely on access to public sector collections – both national and international gene banks;
- It is difficult to generalize about the *ex situ* PGRFA holdings of seed companies, since decisions about these collections depend on individual company’s needs and strategies for the different priority crops;
- Some companies, including some of the world’s

largest, do not maintain long-term seed storage for the purpose of conservation. Although many companies maintain active collections used by breeders to develop new materials, in the words of one industry spokesperson, “Long-term conservation is not our business.” Some companies maintain collections of historically-important in-bred lines (parent lines used to make commercial hybrids) for species of interest, such as maize;

- In recent decades, some large seed companies, especially companies that specialize in vegetables, have made strategic decisions to build larger in-house genebank collections to ensure ready access to materials;
- Uncertainties about access and benefit sharing obligations under the Nagoya Protocol are heightening concerns among private sector seed companies about access to PGRFA.

A 2013 report published by the CBD, “*Bioscience at a Crossroads: Access and Benefit Sharing in a Time of Scientific, Technological and Industry Change: The Agricultural Sector*”, also provides a summary of recent trends in private sector germplasm collections (see Box 1).

Box 1: Recent trends in private sector germplasm collections in the agricultural sector

A significant source of genetic material resides with companies themselves, and larger companies in particular. Historically, these were considered as “working collections” within individual companies, with most material sourced from national and international genebanks and elsewhere. As access became increasingly restricted in the early 1990s, companies turned their attention towards maintaining and renewing their collections from available public and *ex situ* collections. Although the SMTA has facilitated access to Annex I crops, in recent years the maintenance and expansion of private collections has intensified by many of the larger companies, largely to reduce reliance on public sector collections and to avoid any risks of reduced access. Acquisitions and mergers have bolstered such collections, but other strategies such as the dramatic increase in cross-licensing of germplasm to other companies and strategic alliances with technology companies, along with continued access to the International Agricultural Research Centres, ensure that companies have unrestricted access to a broader germplasm pool. All these factors have led to a trend of decreased use of national genebanks over time by larger companies.

Source: Rachel Wynberg (2013), *Bioscience at a Crossroads: Access and Benefit Sharing in a Time of Scientific, Technological and Industry Change: The Agricultural Sector*, Secretariat of the Convention on Biological Diversity, Montreal, at p. 11.

⁵⁰ FIS/ASSINSEL Press Release (no date), “Plant Breeders Contribute Substantially to the Global Effort on Plant Genetic Resources.” This press release – from ISF archives – was made available via email to the authors by ISF. However, copies of the original survey were not available upon request. ISF confirmed that the release is from 2002.

⁵¹ All interviews were confidential and off-the-record.

University/Research Institute Collections and Botanical Gardens

Important collections of PGRFA are held in universities, research institutes and botanical gardens. However, it is not always clear which collections are “under the control and management” of Contracting Parties – and which are not. Some Contracting Parties to the Treaty have specifically identified botanic garden collections and university/research institutes whose collections of Annex I materials are included in the MLS.⁵² Some examples include:

- The Wild Species Collection held in the Millennium Seed Bank of the Royal Botanic Gardens, which was included in the MLS by the UK Government;
- The bean, Irish potatoes and rice collections held by the Higher Institute of Agriculture and Animal Husbandry (ISAE) located in Musanze, which was included in the MLS by the Government of Rwanda;
- The Solanaceae collection (non-tuber bearing wild species) held by the Radboud University, as well as the apple collections of the Pomologische Vereniging Noord-Holland and the Stichting Fruithof Frederiksoord, which were included in the MLS by the Government of the Netherlands.

According to a database maintained by Botanic Gardens Conservation International (BGCI) – which represents over 700 botanic gardens in 118 countries⁵³ – there are currently 255 botanic gardens that have seed banks maintaining seeds in long-term and medium-term storage.⁵⁴ Some of these hold collections related to PGRFA. However, information is not currently available to determine which seed banks operated by botanic gardens

contain PGRFA, and if they are privately-held or under the “management and control” of a Contracting Party to the Treaty. At the time of writing, BGCI was undertaking a survey of its members to identify how botanic gardens are addressing food security issues. One of the survey questions asks if botanic garden staff members are aware of the ITPGRFA and if so, how it affects their work. According to the BGCI, out of 74 people who responded to this question, only 24 (32%) answered yes.⁵⁵

Global Information System

Article 17 of the International Treaty states that “Contracting Parties shall cooperate to develop and strengthen a global information system to facilitate the exchange of information, based on existing information systems, on scientific, technical and environmental matters related to plant genetic resources for food and agriculture.” To this end, in 2011 the Secretariat of the International Treaty, in partnership with Bioversity International and the Global Crop Diversity Trust, launched a global information portal known as Genesys to provide information about PGRFA.⁵⁶ Genesys provides information on over 2.3 million accessions belonging to Annex I species that are held by 365 institutes.⁵⁷ However, the Genesys portal does not currently provide aggregated data on the amount of materials that are included (and available) in the Multilateral System,⁵⁸ nor is it possible to readily identify which PGRFA samples are held by institutes that are private “natural or legal persons” – beyond those that are part of national programs or policy frameworks under the “management and control” of Contracting Parties (which have a legal obligation to contribute PGRFA to the Multilateral System of the Treaty).

In November 2012, the Treaty’s Secretariat reported

⁵² Notifications from Contracting Parties to the Treaty Secretariat are available here: <http://www.planttreaty.org/inclusions>

⁵³ <http://www.bgci.org/global>

⁵⁴ http://www.bgci.org/garden_advanced_search.php?action=Find&mode=&ftrCountry=All&ftrInstitutionType=All&ftrKeyword=&ftrSeedBank=Y&x=27&y=24

⁵⁵ The results of the survey will be released in July 2013. Preliminary information provided by Suzanne Sharrock, BGCI staff, via email.

⁵⁶ Available at: <http://www.genesys-pgr.org> accessed on 19 June 2013. Data partners also include:

- SGRP of CGIAR – international collections
- EURISCO – European catalog
- GRIN – USDA-ARS

See: Michael Mackay, “Information opportunities – GENESYS & GRIN-Global Systems to manage and publish Information on Plant Genetic Resources”, ECPGR-NENA Workshop (28–29 Sept 2011), p. 15, available at:

http://www.ecpgr.cgiar.org/fileadmin/www.ecpgr.cgiar.org/Presentations/NENA/Mackay_Genesys_G-G_lzmir.pdf accessed on 5 August 2013.

⁵⁷ The crops included in the database are the following: banana; barley; beans; breadfruit; cassava; chickpea; coconut; cowpea; faba bean; finger millet; grass pea; lentil; maize; pearl millet; pigeon pea; potato; rice; sorghum; sweet potato; taro; wheat and yam.

⁵⁸ Several randomly viewed accessions indicate that some accessions are not available to others for research and breeding – a status that would prevent their inclusion in the Multilateral System.

that more than one half million accessions have already been exchanged and reported through electronic means to the Governing Body.⁵⁹ In addition to the actual exchange of samples, 1.5 million documented accessions in the Treaty's Multilateral System come from CGIAR alone.⁶⁰ These accessions include Annex I as well as non-Annex I PGRFA.

5.2. Analysis of survey responses on the Private Sector's Participation in the Multilateral System

Scope and rationale of the survey

In an attempt to address the data gap on the state of private PGRFA collections held by seed companies, this study set out to survey the world's leading 15–20 seed companies in developed countries, as well as some of the major independent seed companies in the global South.⁶¹ A survey on the private sector's participation in the Multilateral System was submitted to 31 selected companies.⁶² We estimate that the collective market share of these companies accounts for the overwhelming majority of the commercial seed market worldwide.

Methodology and representativeness of the survey

The companies selected for our survey include the world's top 10 seed companies (ranked by 2011 revenues). Beyond the top 10 companies we identify eight additional companies that are very likely among the top 20 seed firms. According to agribusiness consultants Phillips McDougall, the value of the commercial seed market worldwide was US\$ 34,495 million in 2011.⁶³ Using information compiled by Philips McDougall, ETC Group estimates that the top 10 companies account for 75.3% of the commercial seed market worldwide.⁶⁴ Although the precise market share is not available, the 18 major seed companies included in our survey likely account for at least 80–90% of the commercial seed market worldwide. The companies selected for our survey specialize in major agronomic crops (maize, wheat, cotton, soya, rapeseed, etc.) as well as vegetables, forage and grass crops.

In an effort to identify major independent seed companies in the global South, we chose to focus on major emerging seed markets of India, East Africa, Southern Africa and Brazil. Brazil is the 4th largest commercial seed market in the world (accounting for 6% of global market share)⁶⁵ and India is the 5th largest (4.4%)⁶⁶ – after the US (27%), China (20%) and France (8%).

⁵⁹ See the "Report on the implementation of the SMTA and the Multilateral System", IT/GB-5/13/Inf.3, Annex A, paragraph 7.

⁶⁰ <http://www.cgiar.org/consortium-news/taking-stock-itpgrfa-and-the-new-cgiar>

⁶¹ For companies in the global South, the focus is on companies operating in large and emerging seed markets that are not subsidiaries of the major multinational firms in India, East Africa and Southern Africa, and Brazil.

⁶² The companies selected for the survey are listed in Annex I. The consolidated survey results are presented in Annex II. The template of survey questionnaire is included in Annex III.

⁶³ Phillips McDougall, "The Global Seed Market: Seed Industry Synopsis," August 2012. Available at: <http://www.phillipsmcdougall.com/uploadedContent/Seed%20Industry%20August%202012.pdf>, accessed on 21 June 2013.

⁶⁴ ETC Group (2013), "Gene Giants Seek Philanthropopoly," available at: <http://www.etcgroup.org/content/Ecomm-gene-giants-seek-philanthropopoly>, accessed on 9 July 2013. The top 10 seed companies, ranked by 2011 sales are the following: 1. Monsanto (US); 2. Dupont Pioneer (US); 2. Syngenta (Switzerland); 4. Groupe Limagrain/Vilmorin (France) 5. Land O' Lakes/Winfield (USA); 6. KWS (Germany); 7. Bayer Cropscience (Germany); 8. Dow Agrosiences (US) 9. Sakata (Japan); and 10. Takii (Japan).

⁶⁵ The sources used for the identification of Brazilian seed companies include:

- John Wilkinson and Pierina German Castelli, *The Internationalization of Brazil's Seed Industry: Biotechnology, Patents and Biodiversity*, Rio de Janeiro, 2000, available at:

http://www.iatp.org/files/Internationalization_of_Brazils_Seed_Industry_.htm (All of the major independent seed companies in Brazil identified in this 2000 report have since been acquired by major multinational firms.)

- Consultations with the Associação Brasileira de Sementes e mudas (ABRASEM);
- Consultations with an anonymous seed industry consultant in Brazil.

⁶⁶ The sources used for the identification of Indian companies include:

- Frontier Growth Advisors, *Indian Seed Industry: Current Scenario & Future Prospects* (13 February 2013), (unpublished report). David J. Spielman, Deepthi Kolady, Anthony Cavalieri, N. Chandrasekhara Rao, Environment and Production Technology Division. *The Seed and Agricultural Biotechnology Industries in India An Analysis of Industry Structure, Competition, and Policy Options*, IFPRI Discussion Paper 01103, July 2011, available at:

<http://www.ifpri.org/sites/default/files/publications/ifpridp01103.pdf>

- National Seed Association of India, available at: <http://nsai.co.in/images/pdf/memberlist%202012-13.pdf>

South Africa represents the largest commercial seed market in Africa.⁶⁷ However, in recent years seed companies in Brazil, India and South Africa have been the target of major seed company acquisitions. Merger and acquisition activities include cross border as well as domestic consolidation. Thus, it is increasingly difficult to identify major independent seed companies that have not been acquired by multinational firms.⁶⁸

Assessment of the survey results

As of 1 July 2013, a total of five seed companies had responded to the survey. Of these, three South-based independent seed companies and only one North-based company responded to the questionnaire.⁶⁹ Another company from a developed country also contributed to this assessment by providing useful information by email, while not directly responding to the questionnaire. When the information provided by this company is directly relevant to our survey questions, the information is included and presented jointly with the survey results.⁷⁰ Overall, just two of the world's leading 10 seed companies responded directly to our request for information.

In addition to the feedback received from individual companies, the International Seed Federation (ISF) submitted a letter of response "[...] on behalf of the seed industry."⁷¹ Since some of the information provided by ISF is directly relevant to some survey questions (especially those which allow open answers of a

qualitative nature), it is also aggregated and presented jointly with the survey results.⁷²

Given the low number of responses, it is not possible to conclude that our survey results are representative of the global seed sector. However, the survey responses, jointly with the qualitative elements of response provided by one respondent, on behalf of his company, and by ISF, on behalf of its members, allow us to identify some important trends concerning the participation of the private sector in the FAO Multilateral System.

In order to analyse the survey results, we have clustered the responses under four main headings:

- The respondent's company;
- The company's *ex situ* collection of PGRFA;
- Access to companies' plant genetic resources for research and breeding;
- The Multilateral System of the FAO International Treaty.

Survey responses related to the respondent's company

Respondents indicate that their companies have branches or subsidiary operations ranging from one country to more than 50 countries. Some surveyed companies report that they market PGRFA in a relatively limited number of countries, while other companies indicate presence in the global market for seeds and propagating materials with marketing options in several countries (in one case more than 100 countries).

⁶⁷ The sources used for the identification of African companies include:

- International Maize and Wheat Improvement Center (CIMMYT). (2008). An Analysis of the Bottlenecks Affecting the Production and Deployment of Maize Seed in Eastern and Southern Africa. Appendix 2: List of Seed Companies Interviewed, see p.33.
- Consultations with the African Centre for Biosafety;
- Africa Seed Trade Association: <http://afsta.org/memberships/afsta-members>

⁶⁸ In a recent issue of *Seed World* (online trade journal), industry consultant Tray Thomas of Context Network notes that: "Overall, there aren't many acquisitions left to be made in the U.S." quoted in: Dick Hagan, "Consolidation," *Seed World*, October 2012, p.5. The world's major multinational firms are continuing to consolidate by making acquisitions elsewhere, particularly in emerging markets of the global South.

⁶⁹ When the authors submitted the questionnaire to selected companies inviting them to participate, we assured them that all responses would be treated anonymously – in the sense that all information would be aggregated and presented in a way that does not allow linking any particular company to specific answers. We also emphasized that the survey questions provide an option to treat commercially sensitive information as confidential. This mechanism was expressly designed to allow companies to participate in the survey, while addressing their concerns about providing information that they deem as proprietary or particularly sensitive.

⁷⁰ See Annex II.

⁷¹ The ISF describes itself as the organisation that "[...] represents the interests of the mainstream of the seed industry at a global level. It is the main body that interacts with public and private institutions at the international level on matters that impact the plant breeding industry. The national seed associations of 47 countries are members of ISF in addition to around 100 companies many of whom are from countries where there is no national association. The members of ISF together account for about 96% of the international Trade in seed."

⁷² In such cases, the elements of response collectively provided by the ISF "on behalf of the seed industry" will be clearly identified alongside the individual responses provided by companies. See, in particular, **Annex II** – Consolidated survey results on the private sector's participation in the Multilateral System of the FAO International Treaty. The letter received from ISF is reproduced in **Annex IV** – ISF Letter of response.

Survey responses related to the company's collection

The International Seed Federation and all individual respondents report that their companies maintain *ex situ* collections of crop varieties. Three respondents indicate that their company has a specific policy on the conservation of PGRFA (e.g. characterization, storage, rejuvenation, etc.), while two respondents indicate that the content of such a policy is confidential.

As regards the size of the companies' collections of PGRFA, only three respondents provided information on this survey question, with one company indicating that its collection ranges from 500 to 5000 accessions and the other two indicating that their collections are between 5000 and 25,000 accessions. These collections are comparable in size to – and even larger than – many collections included by Contracting Parties to the Treaty as part of the MLS.⁷³

The three respondents also reported that their companies' most important collections include accessions of the following crops: maize, wheat, soybeans, cotton, lolium, festuca, poa, trifolium, rice and tomato (of these, soybeans, cotton and tomato are not included in Annex I of the Treaty). Two other respondents noted that species-related information on targeted crops in their breeding programmes is confidential, as well as information on the estimated number of accessions per targeted crop in their genebanks.

While no clear trends emerge from the responses on the estimated share of materials at different stages of evaluation, characterization and documentation, research, development, and commercialization (see questions 10 to 14), overall the survey responses (and the literature review) clearly indicate that private companies have sizeable collections, but they are not willing to share much information about their contents.

Survey responses regarding access to companies' plant genetic resources for research and breeding.

Four companies (out of five) respond that it is possible for external researchers and breeders to obtain plant genetic resources from the companies' collections. In addition, ISF writes that private sector PGR collections “[...] are made available to others through various mechanisms that have evolved over time and in keeping with advances in commercial plant breeding.” However, a range of PGRFA were reported not to be accessible by other breeders, such as: patented and other proprietary materials; parent generations of hybrids;

and materials under development – i.e. “non-commercial, working materials” (ISF). ISF adds that “breeders often exchange material under development under licensing agreements or other mutually agreed terms. The transfer of such material also depends on the material itself, the purpose for which the material is requested, the conditions to which the breeders is bound and which may need to be transferred to subsequent users, as well as on the person requesting the material (research institute, a seed company or a competitor). Transfers, therefore, occur on a case-by-case basis and the terms and conditions may differ per case.”

In response to the question about how individuals might obtain information on materials in company collections that are accessible for further research and breeding, three of the five respondents report that direct contact with the company's breeders is the best way to obtain such information. With regard to the availability of materials for further research and breeding, ISF, together with one respondent, emphasize that part of private sector plant breeders' collections consist of commercialized varieties which are subject to Plant Breeders' Rights. Such materials may be available to other parties for further breeding under the so-called breeders' exemption. Further, ISF indicates that other proprietary materials (protected by patents) may be “generally available at the end of the period of protection. This material is in highly demand by other breeders.”

As regards the conditions under which companies transfer their PGRFA to other breeders, three respondents indicate that they do so under *ad hoc* conditions, which are defined in the specific material transfer agreements (MTA) that are attached to the materials in question. In addition, three companies report that they have included some portion of their PGRFA collection in a national genebank to facilitate access to external researchers and breeders. The proportion of included materials (compared to the total size of their reference collections) is either very small (in one case) or unknown/confidential (in two cases). Consistent with the above responses, ISF further highlights that: “[...] several breeders deposit (older) commercial varieties in a genebank [...] By doing so, commercial varieties are conserved, are used to optimize/expand the genetic diversity of a collection and can be used for further breeding. The conditions under which these commercial varieties are made available depend on those applied by the genebank.” However, on the basis of

⁷³ See the notifications of inclusions of PGRFA in the Multilateral System, available at: <http://www.planttreaty.org/inclusions> accessed on 15 July 2013.

available information, it is not possible to know which PGRFA and how many samples private companies have included in the MLS through national genebanks.

Two other respondents indicate that they have no intention of including a portion of their PGRFA collection in the national genebanks of their host country, or in any other public collection, to facilitate access to external researchers and breeders. No respondent reported using the Standard material Transfer Agreement (SMTA) of the FAO International Treaty for the transfer of PGRFA to other breeders.

Survey responses regarding the Multilateral System of the FAO International Treaty

Four respondents (out of five) reported that their companies make use of PGRFA received from the FAO Multilateral System. The ISF indicates strong support for the Multilateral System and the full implementation of facilitated access to PGRFA, which is seen as “the major benefit of any germplasm exchange system.”⁷⁴ However, one respondent indicated that his company had never accessed materials from the MLS, because it was not necessary for his company’s breeding programme. None of the respondents report that his or her company had been encouraged by a Contracting Party to include PGRFA in the Multilateral System. With regard to the question of whether the surveyed companies had considered making available some portion of their collections directly to the Multilateral System, no respondent provided an affirmative response. This appears to be consistent with the absence of reported uses of the SMTA, on the one hand, and with the preference of some companies to share materials through national genebanks – under *ad hoc* or specific terms (through

different MTAs) – on the other. In essence, companies are providing access to PGRFA on a bilateral – rather than multilateral – basis.

Two companies, as well as the response from ISF, note that they have a preference for including PGRFA in national/public genebanks. However, none of the respondents who indicated that their companies have made available some portion of their PGRFA collections to national genebanks provided information on the number of accessions they made available, nor did they indicate to which species or genera such accessions belong.

Finally, three respondents indicate that they had no intention of contributing PGRFA directly to the Multilateral System. In particular, one respondent highlights “legal uncertainties” as the reason not to share materials, while another respondent emphasises that the “strength of [the companies’] collection, [most] of which is proprietary, gives [them] a competitive advantage on the market.”

One company further highlights, *inter alia*: its financial contribution to collecting missions undertaken by its national genebank with the view to the possible development of the MLS; cooperation with the latter in characterization projects where the company contributes resulting data to the MLS; and in-kind contributions, such as multiplication of materials included in the MLS for national genebanks. Along the same lines, ISF further emphasises that: “it is also very common that seed companies contribute to the conservation of material in genebanks through various activities such as financial support, assistance in characterization and maintenance of collections, and collaboration in diverse projects.”

⁷⁴ However, note the discrepancy with Treaty Article 13, which states that: “The Contracting Parties recognize that facilitated access to [PGRFA...] constitutes itself a major benefit of the Multilateral System and agree that benefits accruing therefrom shall be shared fairly and equitably in accordance with the provisions of this Article. [...] benefits arising from the use, including commercial, of [PGRFA] under the Multilateral System 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 [...]”. Emphasis added.

5.3. Discussion

Our survey results show that very few private sector seed companies are willing to share information about their participation in the FAO Multilateral System of ABS. Nor are private sector companies willing to share much information about the size and contents of their *ex situ* seed collections. Such collections are shrouded in secrecy. Overall, the paucity of our survey results – including the large number of companies that chose not to participate in the survey as well as the companies that delegated their response to the International Seed Federation – demonstrates a general lack of transparency and a disregard for the principle of reciprocity.

The ISF letter does not respond to the survey questions (especially to questions of quantitative nature) and confirms the findings of our survey that the size and contents of germplasm collections held by specific companies is a well hidden secret. However, the survey results also indicate that companies have sizeable collections, which are comparable to – and even larger than – some PGRFA collections included in the Multilateral System.⁷⁵ Most companies are not willing to share much information about their collections and the germplasm they hold appears to be accessible to other breeders under terms and conditions that are not transparent.

While it may be true that private seed companies are trying to decrease their dependency on public collections, including through mergers and acquisitions,⁷⁶ it is important to stress that the private sector's in-house collections are not focused on long-term conservation of PGRFA. The public sector's agricultural research and *ex situ* conservation of PGRFA provides a public good that cannot be duplicated or replaced by companies. Private seed companies continue to rely on, and benefit from, national and international PGRFA collections and facili-

tated access to and exchange of materials in the MLS. Therefore, this study raises further questions about the principle of reciprocal benefits and the terms under which seed companies share PGRFA in their *ex situ* collections.

Our survey indicates that some private seed companies are sharing some PGRFA materials⁷⁷ and – in some cases – data that are relevant to PGRFA in the MLS. However, in the overwhelming majority of cases, they do so under *ad hoc* or specific bilateral conditions – i.e., under their own terms rather than via the facilitated access mechanism of the FAO International Treaty. In some cases, “natural and legal persons” that make available PGRFA to public or private research partners do so under bilateral MTAs that are different from, and more restrictive than, the SMTA of the Treaty.

The ISF letter states that the private sector seed collections include three kinds of materials: 1) commercialised seeds which are available on the market; 2) seeds received from public collections, which continue to be available through these genebanks; and 3) materials “under development”, which may not be available to the general public. In the Treaty context, the term material “under development” indicates a specific legal concept. Treaty Article 12.3(e) states that: “Access to PGRFA under development, including material being developed by farmers, shall be at the discretion of its developer, *during the period of its development*.” (Emphasis added.) Thus, this Article offers the opportunity to implement an exception to the general rules of facilitated access during the period of development and the possibility to attach additional (bilateral) conditions to the transfer of PGRFA under development, including through licensing and the payment of royalties. However, the concept of “PGRFA under development”⁷⁸ for which the above exception is

⁷⁵ See supra note 72 and accompanying text.

⁷⁶ See, for instance, supra note 44 and accompanying text.

⁷⁷ Breeders at national breeding programs in the developing world indicate that 16% of the breeding materials that they use are sourced from the private sector. This is probably via public/private collaborations. See: Fig. 4.1 on p.96 of the Second Report on the State of World's PGRFA.

⁷⁸ SMTA Article 2 defines a “PGRFA under Development” as “material derived from the Material, and hence distinct from it, that is not yet ready for commercialization and which the developer intends to further develop or to transfer to another person or entity for further development”. C. Chiarolla (2008) highlights that: The International Crop Information System (ICIS) of the GGIAR further explains the following three requirements (International Crop Information System, 2007). First, the germplasm under development must be a “breeding line”, i.e. an individual plant with specific characteristics (N.K. Rao et al., 2006). Second, it must be “derived from” a PGRFA included into the MLS. In other words, “it must have MLS germplasm in its ancestry”. When new accessions are entered into the MLS, the curator of the collection assigns a unique identifier code, called Germplasm Unique ID, and marks the samples with an attribute that indicates that they are MLS materials. Therefore, a breeding line that does not have MLS ancestors in its pedigree cannot be a PGRFA under Development. The third requirement is that the material must be “distinct” from its MLS ancestors. This means that “it must not be designated as MLS germplasm in its own right”. ICIS specifies that this requirement is not fulfilled, if the material “is derived only by maintenance method from” MLS materials. However, the fundamental issue here is whether the genetic distance between a breeding line and the original material is sufficient to establish “distinctness.” See: C. Chiarolla (2008), “Plant Patenting, Benefit Sharing and the Law Applicable to the FAO Standard Material Transfer Agreement”, *The Journal of World Intellectual Property* (2008) Vol.11 (1), 1–28.

provided is distinct from, and much narrower than the concept of “working collections”, which is a general expression that indicates all materials held by breeders and other scientists – i.e., by “natural and legal persons.”⁷⁹

As previously noted, one factor prompting seed industry mergers and acquisitions, among others, is a company’s desire to obtain a competitors’ germplasm collection – regardless of whether such germplasm is PGRFA under development or not. In sum, without much proactive substantial involvement of the private sector (and a better system of measures and remedies against free riding), it is impossible to assess how much PGRFA, including that which is neither publicly available nor under development, is held in the private sectors’ working collections.

Regarding to proprietary materials, some companies, and the response from ISF, indicate that once their patents expire, these materials are generally made available in national gene banks. This may be true in some cases. However, other forms of contractual restrictions may impinge on the availability of PGRFA materials even at the end of the period of protection – i.e. when, in principle, further breeding is allowed. Such contractual restrictions, which are often included in so called “shrink-wrap” seed packages,⁸⁰ may ‘survive the life of relevant patents’ and can be binding on other breeders even in the absence of formal intellectual property rights (IPR) restricting further breeding. This example demonstrates how the seed industry can place restrictions on access to PGRFA – even after such materials are no longer *stricto sensu* proprietary and supposedly in the public domain.

Parent lines of hybrids are usually kept as trade secrets and they are not shared. These lines, especially the par-

ent lines of commercialized hybrids, cannot be seen as material under development and they are indeed very valuable PGR for other breeders. In other cases, there are technical means in widespread use that are restricting access to PGRFA for research and breeding – e.g., cytoplasmic male sterility (CMS) breeding or CMS-hybrids. Such technological restrictions represent a technical barrier to access to PGRFA that are available on the market.⁸¹ While cytoplasmic male sterility may naturally occur in some species (e.g. radish), proprietary techniques (e.g. protoplast fusion) have been used to transfer CMS to species where it does not occur naturally or cannot be hybridized through conventional techniques.⁸² A 2011 study indicates that most vegetable seed companies are focusing on CMS breeding and that this is a strategic decision to restrict access to PGRFA that the companies regard as proprietary.⁸³ For example, the overwhelming majority of commercialized varieties of cauliflower are male sterile and those male sterile cauliflowers are useless for further breeding.

In addition, plant varieties that are no longer offered for sale by private sector companies and those whose patent or PVP protection has expired, are not always made available to national genebanks. According to an anonymous source interviewed by the authors, in one recent case, a small breeding company requested access to a number of plant varieties, which were still offered for commercial sale in other countries by a leading seed company. Although the company declared that it was willing to grant access to the small-scale breeder, it took one year, several e-mail exchanges and a meeting before most of the varieties requested were actually made available. Despite numerous inquiries the small breeder never received a response to the request for vari-

⁷⁹ This term was historically used in FAO to distinguish the breeders’ working collections from so called “base collections” (held by the International Agricultural Research Centers of the CGIAR and by national institutions for long-term conservation) and “active collections” (serving a country or circumscribed region in the short to medium term). See: Jack R. Kloppenburg, Jr. (ed.) (1988), *Seeds and Sovereignty: Debate over the Use and Control of Plant Genetic Resources*, Duke University Press, p. 26.

⁸⁰ Examples of such licensing restrictions can be found in: No Patents on Seeds (2012), How big companies and patents are hampering plant breeding, a Factsheet prepared for the Public debate at the European Parliament, Brussels, 8 February 2012, pp. 5–6, available at: http://www.no-patents-on-seeds.org/sites/default/files/news/fs_seeds_ep_en_fin_0.pdf accessed on 16 July 2013.

⁸¹ In crops in which CMS is introduced from non-crossable species through protoplast fusion no restorer genes are present, and therefore such plants cannot be used in breeding programs and can thus not contribute to further development. However, some breeding companies in vegetable crops prefer CMS due to its 100% inbred free hybrid production, and especially due to its ‘inbuilt’ protection against use by competitor-breeders, as these varieties have only a limited application in a breeding program. Breeding companies use different plant sources of CMS and have patents on the application of these kinds of CMS by describing the associated DNA changes in mitochondrial genome. They can thus protect their breeding lines. CMS in that sense is primarily about ownership and control of seeds whereas organic production is about stewardship of seeds. See: ECO-PB Workshop on “Strategies for a future without cell fusion techniques in varieties applied in Organic Farming”, 27–28 April 2009, Paris, France.

⁸² See C. Chiarolla and S. Jungcurt (2011), *supra* note 1, at pp. 44–45.

⁸³ *Ibid.*

eties which were no longer being offered for commercial sale. According to the small-scale breeder, the process of requesting germplasm from the large seed company proved to be much more complicated, non-transparent and time-consuming than the procedure to gain access to public collections. Given this type of obstacle to access, it may be important for Contracting Parties to consider a mechanism or procedure under the FAO International Treaty to routinely assess and promote the inclusion of relevant commercial varieties into the Multilateral System at the end of the period of commercialization and immediately after the expiry of the protection period, if any.

ISF states that its members are strongly in favour of facilitated access to PGRFA. However, the majority of private seed companies are not actively participating in the Treaty's Multilateral System – at least not in terms of transparently contributing germplasm to the Multilateral System. While it was not the primary expectation that companies would voluntarily contribute their germplasm to the Multilateral System,⁸⁴ it is essential that ISF members are transparent about their *ex situ* collections and take concrete steps to promote the integration of their collections into the MLS, especially materials which are not under development as well as those that are no longer offered for commercial sale.

This study concurs with ISF that facilitated access to PGRFA is a mayor benefit of the MLS. However, if some users of the Multilateral System only access PGRFA – i.e., they benefit from it – but they have no commitment to provide access to their PGRFA in a

transparent manner and under equal terms, this begs the question of whether such behaviors may run against the principle of equity that underpins the ABS system of the FAO Treaty. In addition, the private sector is not contributing in any significant way to the Multilateral System in terms of monetary benefit-sharing. According to the letter from ISF, some companies are contributing non-monetary benefits on their own terms, often through national genebanks. However, this occurs in a non-transparent manner and on a bilateral – rather than multilateral – basis. As a consequence, it is urgent for the Governing Body to adopt effective measures to tackle the imbalance between users of the Multilateral System that contribute their PGRFA (and related information) to the system⁸⁵ and those who have not (yet) envisaged making such contributions.

According to a 2012 working paper by CGIAR researchers, “it is becoming increasingly difficult for the CGIAR Centres to obtain access to germplasm for inclusion in their gene banks or breeding programs.” Some countries – including contracting Parties – are choosing not to share much PGRFA beyond their borders. In addition, the CGIAR study notes that some private companies and universities have expressed reservations about receiving materials under the SMTA. Among the complaints cited by the private sector with respect to the SMTA is the obligation to pay back to a ‘benefit-sharing fund’ in the event that a product derived from the use of the received germplasm is subject to intellectual property and commercialized.⁸⁶

⁸⁴ With the exception provided for in Treaty Article 12.3(g), there is no legally-binding obligation to do so under the Treaty, while other benefit-sharing obligations are directly binding on recipients of PGRFA. Treaty Article 12.3(g) states that: “[PGRFA] accessed under the Multilateral System and conserved shall continue to be made available to the Multilateral System by the recipients of those [PGRFA], under the terms of this Treaty.”

⁸⁵ For instance, “with regard to the inclusion of material in the Multilateral System, Mr. Nnadozie [from the Treaty Secretariat ... reported] that the activities of the round of projects under the First Call of the Benefit-sharing Fund had been concluded and that material resulting from those projects was being incorporated in the Multilateral System, including those from Peru, Morocco and Costa Rica. Discussions were also underway with other projects on the modalities for inclusion, including the option of depositing the relevant material in national genebanks.” See IT/GB-5/13/Inf. 3, paragraph 9.

⁸⁶ See, for instance, López-Noriega et al. (2012), pp.55 and 18, supra note 10. In 2009, CGIAR gene banks distributed 29,441 samples. Of these, 59% went to developing countries; 2% economies in transition; 29% to developed countries; 10% to other CGIAR Centers. In terms of the types of recipients, samples were distributed as follows: 47% to national agricultural research organizations (NAROs); 34% to universities; 5% to commercial companies; 10% to other CGIAR Centres. The remaining 4% was sent to a combination of germplasm networks, regional organizations and farmers.

There are many factors that contribute to the suboptimal implementation of the Multilateral System and its ABS obligations. It is important to note that the private sector is not the only stakeholder that has failed to contribute PGRFA to the MLS.⁸⁷ Some Contracting Parties are also failing to meet obligations to share Annex I PGRFA in the MLS.⁸⁸

The possible expansion of the list of crops and forages to be added to the FAO Multilateral System (which is strongly supported by ISF), and proposals for transferring certain responsibilities for non-Annex I crops from the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA) to the International Treaty, are the subject of ongoing debate⁸⁹ (especially in the context of

the upcoming entry into force of the Nagoya Protocol on ABS under the Convention on Biological Diversity and its uncertain implications for access to PGRFA, particularly for crops not included in Annex I of the Treaty.)⁹⁰

In sum, most seed companies have chosen not to participate in our survey. Many of the respondents indicate that information about the size and contents of private sector *ex situ* PGRFA collections, and specific contributions to the MLS are confidential. Overall, our findings point to a remarkable discrepancy between the seed industry's professed support for the MLS of the FAO International Treaty as a global public good, and the current level of participation by private sector seed companies.

⁸⁷ However, given the seed industry's wish to secure predictable and transparent rules for PGRFA and access and benefit sharing, it is the seed industry's best interest to support and participate in the MLS, including both benefit sharing and direct sharing of PGRFA. We argue that Contracting Parties should carefully consider the proposals made by Syngenta and other seed companies that would place the private sector's vegetable seed traits licensing platform under the governance structure of the Treaty (see: IT/ACFS-7 RES/13/Report, paragraphs 7–9 and 19). This proposal concerns voluntary benefit sharing by vegetable crop breeders based on intellectual property licensing. However, it also accepts the notion that patents are necessary to trigger such form of voluntary benefit sharing. By doing so, it undermines the Treaty's prevalent approach of facilitated access to PGRFA as a global public good. See: François Meienberg, Pat Mooney, Nori Ignacio and Teshome Hunduma Mulesa, "Letter on concerning the proposal to bring the vegetable seed trait licensing platform under the governance of the Treaty", Berne Declaration, ETC Group, Searice and Development Fund (2013), available at: http://www.evb.ch/cm_data/Letter_Treaty_patent_licensing_platform_Final_d.pdf accessed on 1 August 2013.

⁸⁸ One of the reasons why some governments have reservations to including PGRFA into the Multilateral System is that, to date, "[...] no benefit-sharing payments resulting from the use of the current SMTA – either mandatory or voluntary – were [ever] received." See IT/GB-5/13/5, paragraph 52.

⁸⁹ Edward Hammond (2013), "What Future for Access and Benefit Sharing for Agricultural Genetic Resources?" TWN Info Service on Biodiversity and Traditional Knowledge (May13/01), 20 May 2013, Third World Network.

⁹⁰ See, for instance, C. Chiarolla, S. Louafi and M. Schloen (2013), "Genetic Resources for Food and Agriculture and Farmers' Rights: an analysis of the relationship between the Nagoya Protocol and related instruments" and C. Chiarolla (2013), 'The Role of Private International Law under the Nagoya Protocol' in *The Nagoya Protocol in Perspective: Implications for International Law and Implementation Challenges* (Brill/Martinus Nijhoff).

6. Conclusions and recommendations

At the very time the Multilateral System of the International Treaty is most needed, it is urgent to re-assess and ask how all Contracting Parties and the seed industry can contribute to ensuring that the system works – and that there are reciprocal benefits to farming communities, particularly in the global South. While this study has focused on the seed industry's participation in the FAO Multilateral System and, in particular, on the private sector's *ex situ* seed collections, it also acknowledges that there are concerns about the continued flow of plant genetic resources via facilitated access. The Multilateral System depends on shared responsibility that involves all Contracting Parties, their national agricultural research institutions, the Consultative Group on International Agricultural Research as well as the private seed sector. In the event that PGRFA flows are further restricted, everyone loses, including industry.

It is important to stress that although private sector seed companies have their own PGRFA *ex situ* collections, these collections are limited in scope, they are generally not designed for long-term conservation and are not managed in the public interest. Long-term conservation of crop diversity to ensure sustainable agriculture and global food security is the essential, irreplaceable role being played by the public sector and many farming communities, especially in the global South. If the private sector favours the Multilateral System of the Treaty, it must be supported with real and transparent participation, not bilateral deal-making that undermines the Treaty's multilateral approach. The private sector's "business as usual" approach to exclusive rights over PGRFA, especially through patents and secrecy over related information, while benefiting from facilitated access under the Multilateral System, demonstrates a flagrant disregard for the principle of equity and reciprocity enshrined in the Treaty.

Should the Governing Body take action to deny facilitated access to the private sector seed industry? At this stage, we do not recommend that natural and legal persons be denied facilitated access through the Multilateral System. Among other reasons, such restrictions could be easily circumvented. We believe that restrictive measures should only be envisaged as a last resort, in the event of persistent non-respect for the desired standards of participation, the principle of reciprocity and/or non-compliance with the Treaty's obligations (including those contained in the SMTA).

We propose a multi-step approach that may be considered by the Governing Body with the view to improving the private sector's participation in the Multilateral System, expanding its scope and increasing international equity through the sharing of PGRFA. Such measures include the following three components:

- A survey assessment to be conducted by the Secretariat of the FAO International Treaty;
- The development and adoption of time-bound guidelines for the assessment, identification and reporting of PGRFA held by natural and legal persons; and
- Remedies and other measures.

The rationale underpinning these measures is explained below, followed by recommendations that the Governing Body may wish to consider.

We conclude that the private sector should be actively involved in the implementation of the FAO Treaty's Multilateral System, not only as a beneficiary of global public goods, but through meaningful and proactive forms of participation. In addition to promoting benefit-sharing as outlined in our previous study,⁹¹ one important way to show that private seed companies are committed to the management of PGRFA as a global public good is to make available Annex I PGRFA in their *ex situ* collections in accordance with the International Treaty.

Survey Assessment to be conducted by the Secretariat of the FAO International Treaty

In order to properly assess the implementation of Treaty obligations, the Governing Body needs information about Annex I PGRFA held in private *ex situ* seed collections by legal and natural persons. Therefore, we suggest that the Secretariat conduct a survey of those legal and natural persons that hold PGRFA collections, along the lines of the survey undertaken for this study (see Annex III).

Time-bound guidelines for the assessment, identification and reporting of PGRFA held by natural and legal persons

Because of the current lack of transparency and information on PGRFA collections held by private sector companies, and the corresponding implementation gap

⁹¹ C. Chiarolla and S. Jungcurt (2011), *supra* note 1.

of the Treaty obligations under Articles 11.3, 11.4 and 12.2, the recommendations that follow should be considered, *inter alia*, with the view to developing clear time-bound guidelines for the assessment, identification and reporting of PGRFA held by natural and legal persons. The objective of such guidelines should be to help promote compliance by Contracting Parties with their relevant obligations (under the above Treaty Articles) as well as the eventual inclusion, to the maximum extent possible, of PGRFA held by natural and legal persons in the MLS.

Remedies and other measures

In accordance with Treaty Article 11.3, Contracting Parties have the obligation “[...] to take appropriate measures to encourage natural and legal persons within their jurisdiction who hold [PGRFA] listed in Annex I to include such plant genetic resources for food and agriculture in the Multilateral System.” Such measures should consider not only enabling the direct

provision of PGRFA to the MLS by natural and legal persons, but also other possible ways and mechanisms through which companies may support the Multilateral System (e.g. sharing of characterization data within the MLS, etc.).

Remedies are primarily envisaged to redress a persistent lack of cooperation by relevant natural and legal persons in accordance with the above voluntary guidelines, and may eventually include a decision to discontinue facilitated access to PGRFA. Under Treaty Article 12.3(b), “Access shall be accorded expeditiously, without the need to track individual accessions and free of charge, or, when a fee is charged, it shall not exceed the minimal cost involved.” However, the Governing Body may also wish to consider providing (non-facilitated) access to the MLS upon the payment of fees above the minimal costs involved – an option which does not violate the Treaty’s obligations. Such exception to the general rule would be in accordance with the Treaty since the latter envisages the possibil-

⁹² In a different case, an analogous exception to the general rule is provided for PGRFA under development. Articles 5(c) and 6.5 of the SMTA implement the principle that “developers” have the discretionary right not to release breeding materials under development. Article 6.6 further elaborates this concept by conferring upon the parties the right to attach additional conditions to the transfer of PGRFA under Development. SMTA Article 6.6 states that: “Entering into a material transfer agreement under paragraph 6.5 shall be without prejudice to the right of the parties to attach additional conditions, relating to further product development, including, as appropriate, the payment of monetary consideration”. See C. Chiarolla (2008), *supra* note 77, footnotes 38 and 42 and accompanying text.

⁹³ Under Agenda item 8 on “implementation of the Multilateral System.” See: IT/GB-5/13/1, in particular, sub-item 8.2 on “Review and assessment under the MLS, and of the implementation and operation of the SMTA.”

ity to discontinue facilitated access. This means that non-facilitated access can be provided subject to additional conditions.⁹²

Recommendations

With the view to improving the private sector's participation and reducing the free-rider problem in the FAO Multilateral System, while enhancing facilitated access and equitable benefit sharing for all stakeholders, we suggest the following elements for consideration by the Governing Body:⁹³

The Governing Body should:

- *Request* the Contracting Parties to provide information to the Secretary on the measures that they have taken to fulfill their obligations under Treaty Article 11.3 in order to encourage natural and legal persons within their jurisdictions to include PGRFA in the Multilateral System; [Incentive measures and reporting]
- *Request* the Secretary to compile a report, and for this purpose to request, in particular, information from Contracting Parties on the measures taken to fulfill the obligations under Treaty Article 11.3, in order to provide it to its sixth Session; [Monitoring the implementation of incentive measures]
- *Request* the Secretary to conduct a survey study on private *ex situ* collections of PGRFA within the purview of the Multilateral System that are held by natural and persons; [Survey assessment of private *ex situ* collections of PGRFA]
- *Request* the *Ad Hoc* Advisory Technical Committee on the Standard Material Transfer Agreement and the Multilateral System to develop guidelines to support natural and legal persons, who “use” and / or benefit from the Multilateral System, in identifying and reporting PGRFA that may be voluntarily included into the Multilateral System and the related information referred to in SMTA Article 5b. [Time-bound guidelines]

Additional elements concerning the elaboration of time-bound guidelines and their implementation:

- Assessment, identification and reporting of PGRFA: the guidelines should allow for the provision of information on (Annex I) PGRFA held by natural and legal persons available to the Governing Body through the Secretary (under specific circumstances, the confidentiality of commercially sensitive information may be envisaged);
- Remedies for lack of cooperation: natural and legal persons who decline to make such information available after a set deadline may no longer be provided facilitated access to PGRFA in the MLS.
- Incentive measures and voluntary inclusion of PGRFA: following the collection and assessment of the above information, a minimum amount of PGRFA (per company) and suitable criteria⁹⁴ need to be identified for the inclusion of Annex I PGRFA held by natural and legal persons;
- Remedies for lack of cooperation: natural and legal persons who decline to make the set amount of PGRFA (and / or the related information referred to in SMTA Article 5b) available in the MLS after the established deadline may no longer be provided facilitated access to PGRFA in the MLS.
- Non-facilitated access: possibly, some form of partnership contributions, such as the ones envisaged by the WHO Pandemic Influenza Preparedness Framework for the sharing of influenza viruses and access to vaccines and other benefits,⁹⁵ could be envisaged for natural and legal persons who are denied facilitated access, but continue to be interested in using the Multilateral System. In such case, the Governing Body should *request* the *Ad Hoc* Advisory Technical Committee on the Standard Material Transfer Agreement and the Multilateral System to propose amendments to the SMTA in order to implement relevant remedies and to provide non-facilitated access to PGRFA in the event that natural and legal persons decline to make relevant information and PGRFA available to the MLS.

⁹⁴ See, for instance, in the related field of the World Health Organization (WHO) Pandemic Influenza Preparedness Framework for the sharing of influenza viruses and access to vaccines and other benefits (PIP Framework), the formula established to determine list of potential contributors and the distribution of annual partnership contributions between entities that use the WHO Global Influenza Surveillance and Response System. See: WHO (2012), Pandemic Influenza Preparedness Framework: Distribution of partnership Contributions Among Companies (22 November 2012) and WHO EB132/16, Annex II.

⁹⁵ *Ibid.*

Annex I – List of Companies Selected for the Survey

Major seed companies in OECD countries

- 1) Monsanto (USA)
- 2) Dupont Pioneer (USA)
- 3) Syngenta (Switzerland)
- 4) Limagrain (France)
- 5) KWS SAAT AG (Germany)
- 6) Bayer CropScience (Germany) /
Nunhems Netherlands B.V. (a subsidiary of Bayer)
- 7) Dow AgroSciences (USA)
- 8) DLF-TRIFOLIUM (Denmark)
- 9) Sakata (Japan)
- 10) Takii (Japan)
- 11) Land O' Lakes (Winfield Solutions) (USA)
- 12) Saaten-Union GmbH (Germany)
- 13) Royal Barenbrug Group (Barenbrug Holding BV)
(Netherlands)
- 14) Enza Zaden Beheer BV (Netherlands)
- 15) Florimond Desprez (France)
- 16) Rijk Zwaan De Lier (Netherlands)
- 17) RAGT Semences (France)
- 18) In Vivo (France)

South-based Independent seed companies in selected countries

- 19) Nuziveedu Seeds (India)
- 20) Rasi Seeds (India)
- 21) Ankur Seeds (India)
- 22) JK Agri Genetics (India)
- 23) Vibha Agrotech Limited (India)
- 24) Shriram Bioseeds (India)
- 25) Metahelix (India)
- 26) Seed Company International (Botswana)
- 27) Klein Karoo Seed Ltd. (South Africa)
- 28) East Africa Seed Co. (Kenya)
- 29) Coodetec (Brazil)
- 30) Sementes Balu (Brazil)

Annex II – Consolidated survey results on the private sector's participation in the Multilateral System of the FAO International Treaty

As of 1 July 2013, only *five* seed companies responded to the confidential survey. The authors are particularly grateful to all respondents for their cooperation. Of these, three South-based independent seed companies and one company from developed countries responded to the questionnaire. Another North-based company also contributed by proving useful information by email, but did not directly respond to the questionnaire. Whenever such information is directly relevant to the survey questions it will be aggregated and presented jointly with the general survey results. In some cases, such information is supplemented with information that has been found in the Annual Report 2012 of its parent company. In other cases, no response to a specific question is assimilated to the standard response "I do not know."

In addition to the feedback received from individual companies, the International Seed Federation (ISF) also sent a letter of response "[...] on behalf of the seed industry" (received 4 July 2013). The ISF describes itself as the organisation that "[...] represents the interests of the mainstream of the seed industry at a global level. [...] The national seed associations of 47 countries are members of ISF in addition to around 100 companies many of whom are from countries where there is no national association." According to ISF, its members collectively "[...] account for about 96% of the international Trade in seed."

Since the information provided in the ISF's letter is highly relevant to some survey questions (see Annex IV – ISF Letter of response), it is aggregated and presented jointly with the survey results. In such cases, the elements of response collectively provided by the ISF "on behalf of the seed industry" will be clearly attributed to ISF in connection with the relevant survey questions.

The numbers that appear before each answer (on the left) indicate the number of respondents that have chosen that particular answer. On the right-hand side, more detailed information may be provided by respondents that have chosen particular sub-options in connection with a main answer. The number of respondents that have chosen specific sub-options is also indicated.

Questions related to the respondent's company:

Questions 1 and 2 provide details about the company name and the respondents. Such information is confidential.

Question 3: All respondents reported that the answers they provided to the survey relate to both the parent company and its subsidiaries.

Question 4: In how many countries does your company have branches or subsidiary operations?

- 1 one country
- 1 2–10 countries
- 2 11–25 countries
- 1 more than 50 countries

Question 5: In how many countries are the seeds/propagating materials of your company marketed (only plant genetic resources for food and agriculture, excluding, inter alia, ornamental plants)?

- 2 1–10 countries
- 1 11–25 countries
- 1 51–100 countries
- 1 more than 100 countries

Questions related to the company's *ex situ* collection of PGRFA:

Question 6: All five respondents reported that their companies maintain their own collection of crop varieties – i.e. plant genetic resources for food and agriculture. ISF also emphasized that: "Private sector plant breeders have their own collections of genetic resources [...]".

Question 7: Does your company have a policy on the conservation of its plant genetic resources, for instance, overseeing which material it conserves and which not, and specifying conservation methodologies?

- 3 Yes, our company has a policy
 - 1: Further information: Plant genetic resources are characterized, stored in the genebank and rejuvenated as needed
 - 2: Further information on the policy is not available
- 2 No, our company does not have such a policy

Question 8: If your answer to question 6 is yes, what is the approximate size of the company's collection of plant genetic resources for food and agriculture?

- 1 500–5000 accessions
- 2 5000–25,000 accessions
- 2 I do not know

Question 9: Which are the four most important species/genera of plant genetic resources for food and agriculture in your company's collection (in terms of number of accessions)?

- 3 Respondents have reported that their companies' most important collections include accessions of the following crops: maize, wheat, soybeans, cotton (not a PGRFA), lolium, festuca, poa, trifolium, rice and tomato.
- 2 Respondents have reported that such information is confidential:
 - > 1 respondent further reported that his company works in almost 30 crops and has more than 50 breeding teams all over the globe

No company has reported information on the estimated number of accessions per crop species/genus. Such information is confidential.

Question 10: Estimated share of the material under question # 8 that is evaluated, characterized and documented:

- 1 90% (of an unknown number of accessions)
- 1 More than 70% (of 5000–25,000 accessions)
- 2 I do not know
- 1 This information is confidential

Question 11: Estimated share of the material under question # 8 that is under development:

- 1 20% (of 5000–25,000 accessions)
- 2 I do not know
- 2 This information is confidential

Question 12: Estimated share of the material under question # 8 which is currently on the market:

- 1 50% (of an unknown number of accessions)
- 1 2% (of 5000–25,000 accessions)
- 1 I do not know
- 1 This information is confidential
- 1 The number of commercial materials is miniscule compared to the total collection (of approximately between 5000 and 25,000 accessions)

Question 13: Estimated share of the material under question # 8 which was previously marketed, but is no longer commercially marketed by your company:

- 1 5% (of an unknown number of accessions)
- 3 I do not know
- 1 This information is confidential

Question 14: Estimated share of the material under question # 8 which has never been on the market:

- 1 10% (of an unknown number of accessions)
- 2 I do not know
- 1 This information is confidential
- 1 Most of the materials in our collection fall in this category (reference collection of approximately between 5000 and 25,000 accessions)

Questions regarding access to plant genetic resources for research and breeding:

Question 15: Is it possible for external researchers and breeders to obtain plant genetic resources from your company's collection?

- 4 Yes
- 1 No (if your answer is no, please continue with question 19)

ISF reported that private sector PGR collections “[...] are made available to others through various mechanisms that have evolved over time and in keeping with advances in commercial plant breeding.”

Question 16: If your answer to question 15 is yes, is some portion of the material excluded from this access? (Multiple answers to this question are allowed)

- 0 No, all material of the collection can be accessed.
- 2 Yes, *patented material* cannot be accessed.

ISF further specified that “proprietary material – the availability of which is normally restricted for further breeding – may [...] be generally available at the end of the period of protection. This material is in highly demand by other breeders.”

- 3 Yes, *material under development* cannot be accessed.

ISF also emphasized that [aside from commercialized varieties and materials acquired from genebanks and other public institutions] “the rest of a breeder’s collection consists of non-commercial, working material (material under development as recognized by the International Treaty) that is managed at the discretion of the breeder. This part of the collection may not be available to the general public.”

- 2 Yes, *parent generations of hybrids* cannot be accessed.
- 2 Yes, the following material cannot be accessed:
 - 1: Other factors may apply
 - 1: Conditions are defined by the project and by the material transfer agreement (MTA) that is attached to the material in question

ISF further specified that: “breeders often exchange material under development under licensing agreements or other mutually agreed terms. The transfer of such material also depends on the material itself, the purpose for which the material is requested, the conditions to which the breeders is bound and which may need to be transferred to subsequent users, as well as on the person requesting the material (research institute, a seed company or a competitor). Transfers, therefore, occur on a case-by-case basis and the terms and conditions may differ per case.”

- 1 N/A because the answer to question 15 is no

Question 17: If your answer to question 15 is yes, how can an applicant find out which material is accessible?

- 3 Respondents highlighted that applicants may find out which materials are accessible by contacting the company’s breeders
- 1 Respondent reported that materials under plant variety protection (PVP) is accessible to researchers under the breeder’s exemption

ISF also stressed that: “Part of [private sector plant breeders’ collection] consists of commercialized varieties that may be available to any other party for further breeding under the so-called breeders’ exemption, which is a cornerstone of the UPOV-type plant variety protection system.^[96]”

⁹⁶ See: ISF (2012), ISF View on Intellectual Property, Adopted in Rio de Janeiro, Brazil, on 28 June 2012, available at: http://www.worldseed.org/cms/medias/file/PositionPapers/OnIntellectualProperty/View_on_Intellectual_Property_2012.pdf accessed on 05 July 2013.

- 1 Respondent further stressed that:
- most of our commercial products are released unrestricted and can be accessed for further research and breeding without conditions;
 - we are also contributing seeds to an educational project, where students can learn the laws of Mendel (we hand out seeds to schools without any terms and conditions);

ISF highlighted that: “[...] part of a breeder’s collection is material that the breeder has acquired from genebanks and other public institutions. This material is [...] available to the general public through the very same genebanks and institutions. The use of this material depends on the conditions applied by the supplying institution.”

- 1 N/A because the answer to question 15 is no

Question 18: If your answer to question 15 is yes, under which conditions does your company transfer its materials?

- 0 According to the Standard Material Transfer Agreement (SMTA) of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.
- 3 According to another contract (please provide more details: ad hoc MTA)
- 1 Respondent further highlighted that:
- we engage in multilateral projects in which the participants contribute material and where conditions are defined by the project and by the MTA that is attached to the material in question;
 - we contribute material to gene bank collections in several countries under conditions primarily defined by the MTA that is attached to the material in question, or a document drawn up by our legal counsel;
- 1 Respondent provided no answer
- 1 N/A because the answer to question 15 is no

Question 19: Has your company included some of its plant genetic resources in the national gene banks of its host country, or any other public collection, to facilitate access to external researchers and breeders?

- 0 Yes, it has included its entire collection

- 3 Yes, it has included the following estimated share of our collection:

1: “Very small numbers as required by relevant regulations” in the following gene bank: NBPGR, India

1: The estimated share of included materials in unknown or confidential in the following gene bank: Nordic Gene Bank

1: The estimated share of included materials in unknown or confidential in the following gene banks: in several countries, including CGN in the Netherlands, IPK in Germany, INRA, AVRDC

ISF reported that: “[...] several breeders deposit (older) commercial varieties in a genebank so they can be included in the genebank’s collections. By doing so, commercial varieties are conserved, are used to optimize / expand the genetic diversity of a collection and can be used for further breeding. The conditions under which these commercial varieties are made available depend on those applied by the genebank.”

- 1 No, but it would envision to do so under the following conditions:
“Fear of security of germplasm”
[that needs to be duly addressed]
- 1 No

Questions regarding the Multilateral System of the FAO International Treaty:

Question 20: Does your company use material from the Multilateral System of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (including the collections of the CGIAR centres)?

- 4 Yes

- 1 No

ISF Stated that:

Members of *ISF* support the principle that the major benefit of any germplasm exchange system, including the Multilateral System (MLS) under the International Treaty (IT), is facilitated access, as it promotes the use of genetic resources in breeding and leads to improved varieties that generate benefits for farmers, consumers and the wider public.

As such, we view a successful germplasm exchange system, incorporating all forms and avenues of access, as a cycle in which there are opportunities to access diverse plant genetic resources with potentially interesting characteristics and traits, and include incentives to characterize, develop and commercialize

products. These products expand the pool of material available for further improvement through R&D and breeding. The entire system of access, innovation, development and commercialization producing new plant genetic resources constitutes the major form of non-monetary benefit sharing.

The members of ISF are committed to complying with ABS rules and are of the view that the specific ABS arrangement of the IT, the MLS and its sMTA, provides a predictable, harmonized and workable system for plant breeding activities. They, therefore, support the MLS and use the material therein to the extent applicable. However, the coverage of the MLS needs to be improved not only through extending the Annex I but also through Contracting Parties placing their material into it.

Question 21: If your answer to question 20 is no, why not?

- 1 Not necessary
- 4 N/A because the answer to question 20 is yes

Question 22: Has your company been encouraged by your government to include your plant genetic resources for food and agriculture into the Multilateral System? If yes, in which way?

- 0 Yes (please explain in which way: N/A)
- 4 No
- 1 Respondent provided no answer

Question 23: Is your company considering making available some portion of its collection directly through the Multilateral System of the FAO International Treaty in the near future (by 2014)⁹⁷?

- 0 Yes (please elaborate)
- 0 No, due to the additional administrative burden.
- 1 No, due to the legal uncertainties.
- 2 No, due to the following reasons:
 - 1: "Strength of our collection, a lot of which is proprietary, gives us the competitive advantage in the market"
 - 1: reasons not specified by the respondent

- 2 No, it is preferable for our company to include plant genetic resources in a national / public gene bank to facilitate access to external researchers and breeders (see question 19).

1: respondent further stated that:

- our company donates material on request of national gene banks (CGN in the Netherlands, IPK in Germany, INRA, AVRDC);
- we finance collection missions of CGN, so in this way we also contribute to the development of the MLS;
- we cooperate with CGN in characterization projects, where we do not contribute seeds but data to the MLS;
- we help several gene banks by doing multiplication of material for them (in kind contribution to the conservation of material in the MLS).

ISF stated that: "Private company collections are sometimes placed under the MLS [through national / public genebanks] and to give an example, in the Netherlands 6% of the national genebank collection consists of such material. Another example is the inclusion in 2009 of a wheat and maize collection that INRA maintained together with the private sector. Collections of radish and cabbage germplasm have been donated to the USDA [the US Department of agriculture] and to the North Carolina State University, respectively." (However, the US is not a Party to the FAO International Treaty.)

ISF further noted that: "it is also very common that seed companies contribute to the conservation of material in genebanks through various activities such as financial support, assistance in characterization and maintenance of collections, and collaboration in diverse projects."

Question 24: If your answer to question 23 is yes, which plant genetic resources will be made available?

- 5 N/A because the answer to question 23 is no

⁹⁷ By means of an official notification letter (ftp://ftp.fao.org/ag/agp/planttreaty/agreements/models/inclu_e.doc) to the Secretary of the FAO International Treaty, with detailed information on the included plant genetic resources and where they can be obtained according to the SMTA.

Annex III – Survey Template

Questionnaire on Access to Plant Genetic Resources for Food and Agriculture

Thank you for answering the questionnaire to the best of your knowledge. In the event you are not able to provide answers to the entire questionnaire, please answer those questions to which you are able to respond. If you do not have the requested data at hand, please provide estimates.

Questions related to your company

1. Basic information about your company:

Company name:

Company website:

2. Please provide the contact details of the person within your company to whom we can refer for further enquiries regarding this questionnaire:

Name:

Position:

E-mail:

Phone:

3. Do the answers provided hereafter relate to your company and all its subsidiaries, or only to your company at this location?

- The company including all its subsidiaries.
 The company at this location.

4. In how many countries does your company have branches or subsidiary operations?

- one country
 2–10 countries
 11–25 countries
 26–50 countries
 more than 50 countries

5. In how many countries are the seeds/propagating materials of your company marketed (only plant genetic resources for food and agriculture, excluding, inter alia, ornamental plants)?

- 1–10 countries
 11–25 countries
 26–50 countries
 51–100 countries
 more than 100 countries

Questions related to your company's collection

6. Does your company maintain its own collection of crop varieties – i.e. plant genetic resources for food and agriculture?

- Yes
 No
 (if your answer is no, please answer questions 20 and 21)

7. Does your company have a policy on the conservation of its plant genetic resources, for instance, overseeing which material it conserves and which not, and specifying conservation methodologies?

- Yes, our company has a policy
 (please attach a copy of the policy, if possible – or provide more details).

- No

8. If your answer to question 6 is yes, what is the approximate size of the company's collection of plant genetic resources for food and agriculture?

- < 500 accessions
 500–5000 accessions
 5000–25,000 accessions
 25,000–200,000 accessions
 200,000–500,000 accessions
 > 500,000 accessions
 I do not know
 This information is confidential

9. Which are the four most important species/genera of plant genetic resources for food and agriculture in your company's collection (in terms of number of accessions)?

Species/genus:

Estimated number of accessions:

- I do not know
 This information is confidential

10. Estimated share of the material under question #8 that is evaluated, characterized and documented:

-
- I do not know
 This information is confidential

11. Estimated share of the material under question #8 that is under development:

Click here to insert text

-
- I do not know
 This information is confidential

12. Estimated share of the material under question #8 which is currently on the market:

Click here to insert text

-
- I do not know
 This information is confidential

13. Estimated share of the material under question #8 which was previously marketed, but is no longer commercially marketed by your company:

-
- I do not know
 This information is confidential

14. Estimated share of the material under question #8 which has never been on the market:

-
- I do not know
 This information is confidential

Questions regarding access to plant genetic resources for research and breeding

15. Is it possible for external researchers and breeders to obtain plant genetic resources from your company's collection?

- Yes
 No

(if your answer is no, please continue with question 19)

16. If your answer to question 15 is yes, is some portion of the material excluded from this access?

- No, all material of the collection can be accessed.
 Yes, patented material cannot be accessed.
 Yes, material under development cannot be accessed.
 Yes, parent generations of hybrids cannot be accessed.
 Yes, the following material cannot be accessed:

17. If your answer to question 15 is yes, how can an applicant find out which material is accessible?

18. If your answer to question 15 is yes, under which conditions does your company transfer its materials?

- According to the Standard Material Transfer Agreement (SMTA) of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture.
 According to another contract (please attach a copy or provide more details, if possible).

19. Has your company included some of its plant genetic resources in the national gene banks of its host country, or any other public collection, to facilitate access to external researchers and breeders?

- Yes, it has included its entire collection in the following gene bank(s):
.....
 Yes, it has included the following estimated share of its collection:

in the following gene bank(s):

- No, but it would envision to do so under the following conditions:
.....

- No

Questions regarding the Multilateral System of the FAO International Treaty

20. Does your company use material from the Multilateral System of the FAO International Treaty on Plant Genetic Resources for Food and Agriculture (including the collections of the CGIAR centres)?

- Yes
 No

21. If your answer to question 20 is no, why not?

.....

22. Has your company been encouraged by your government to include your plant genetic resources for food and agriculture into the Multilateral System? If yes, in which way?

Yes, please explain in which way:

.....

No

23. Is your company considering making available some portion of its collection directly through the Multilateral System of the FAO International Treaty in the near future (by 2014)⁹⁸?

- Yes
 No, due to the additional administrative burden.
 No, due to the legal uncertainties. Please elaborate:
-

No, due to the following reasons:

.....

No, it is preferable for our company to include plant genetic resources in a national / public gene bank to facilitate access to external researchers and breeders (see question 19).

24. If your answer to question 23 is yes, what plant genetic resources will be made available?

Please indicate the total estimated number of accessions that will be made available:

.....

What are the four most important species / genera of plant genetic resources for food and agriculture held by your company that will be made available through the Multilateral System (in terms of number of accessions):

Species / genus:

Estimated number of accessions:

Species / genus:

Estimated number of accessions:

Species / genus:

Estimated number of accessions:

Species / genus:

Estimated number of accessions:

Additional comments and information regarding access to your company's collection

25. Please provide any additional comments and relevant information regarding access to your company's collection of plant genetic resources that may not have been addressed or properly reflected in this questionnaire.

.....

⁹⁸ By means of an official notification letter (ftp://ftp.fao.org/ag/agp/planttreaty/agreements/models/inclu_e.doc) to the Secretary of the FAO International Treaty, with detailed information on the included plant genetic resources and where they can be obtained according to the SMTA.

Annex IV – ISF Letter of Response



International Seed Federation

Chemin du Reposoir 7
1260 Nyon, Switzerland
Phone: +41 22 365 44 20
Fax: +41 22 365 44 21
E-mail: isf@worldseed.org
<http://www.worldseed.org>

3 July 2013

Dr. Claudio Chiarolla
Research Fellow
41, rue du Four
75006 Paris – France

Ref: Survey on the private sector's participation in the MLS of the IT PGRFA

Dear Dr. Chiarolla,

Following your request to seed companies to participate, through a survey on access to plant genetic resources for food and agriculture, in the study conducted by the Berne Declaration and the Development Fund, ISF would like to respond on behalf of the seed industry.

The International Seed Federation (or ISF) represents the interests of the mainstream of the seed industry at a global level. It is the main body that interacts with public and private institutions at the international level on matters that impact the plant breeding industry. The national seed associations of 47 countries are members of ISF in addition to around 100 companies many of whom are from countries where there is no national association. The members of ISF together account for about 96% of the international trade in seed.

Private sector plant breeders have their own collections of genetic resources that are made available to others through various mechanisms that have evolved over time and in keeping with advances in commercial plant breeding. Part of this collection consists of commercialized varieties that may be available to any other party for further breeding under the so-called breeders' exemption, which is a cornerstone of the UPOV-type plant variety protection system (see ISF's view on intellectual property (www.worldseed.org/isf/on_intellectual_property.html)). Another part of a breeder's collection is material that the breeder has acquired from genebanks and other public institutions. This material is also available to the general public through the very same genebanks and institutions. The use of this material depends on the conditions applied by the supplying institution.

The rest of a breeder's collection consists of non-commercial, working material (material under development as recognized by the International Treaty) that is managed at the discretion of the breeder. This part of the collection may not be available to the general public. However, breeders often exchange material under development under licensing agreements or other mutually agreed terms. The transfer of such material also depends on the material itself, the purpose for which the material is requested, the conditions to which the breeder is bound and which may need to be transferred to subsequent users, as well as on the person requesting the material (research institute, a seed company or a competitor). Transfers, therefore, occur on a case-by-case basis and the terms and conditions may differ per case.

It is to be noted that several breeders deposit (older) commercial varieties in a genebank so they can be included in the genebank's collections. By doing so, commercial varieties are conserved, are used to optimize/expand the genetic diversity of a collection and can be used for further breeding. The conditions under which these commercial varieties are made available depend on those applied by the genebank. Lastly, proprietary material - the availability of which is normally restricted for further breeding - may also be generally available at the end of the period of protection. This material is in high demand by other breeders.

Members of ISF support the principle that the major benefit of any germplasm exchange system, including the Multilateral System (MLS) under the International Treaty (IT), is facilitated access, as it promotes the use of genetic resources in breeding and leads to improved varieties that generate benefits for farmers, consumers and the wider public. As such, we view a successful germplasm exchange system, incorporating all forms and avenues of access, as a cycle in which there are opportunities to access diverse plant genetic resources with potentially interesting characteristics and traits, and include incentives to characterize, develop and commercialize products. These products expand the pool of material available for further improvement through R&D and breeding. The entire system of access, innovation, development and commercialization producing new plant genetic resources constitutes the major form of non-monetary benefit sharing.

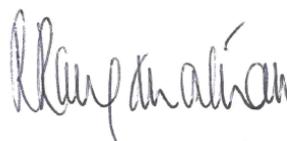
The members of ISF are committed to complying with ABS rules and are of the view that the specific ABS arrangement of the IT, the MLS and its sMTA, provides a predictable, harmonized and workable system for plant breeding activities. They, therefore, support the MLS and use the material therein to the extent applicable. However, the coverage of the MLS needs to be improved not only through extending the Annex I but also through Contracting Parties placing their material into it.

Private company collections are sometimes placed under the MLS and to give an example, in the Netherlands 6% of the national genebank collection consists of such material. Another example is the inclusion in 2009 of a wheat and maize collection that INRA maintained together with the private seed sector. Collections of radish and cabbage germplasm have been donated to the USDA and to North Carolina State University, respectively. It is also very common that seed companies contribute to the conservation of material in genebanks through various activities such as financial support, assistance in characterization and maintenance of the collections, and collaboration in diverse projects.

To sum up, ISF wishes to assure you of the support of its members for the International Treaty and its specific ABS regime. ISF members believe that the major benefit of the MLS is the continuous and guaranteed facilitated access to plant genetic resources. And to repeat a point made above, members of ISF use material from the MLS to develop ever better plant varieties for the benefit of farmers, consumers and the wider society.

We remain available to review a draft of the study that you will be preparing on this subject matter.

Yours sincerely



Radha Ranganathan
Director, Technical Affairs

