"Introduction: A Treaty to Fight Hunger: Past Negotiations, Present Situation, and Future Challenges"

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ABSTRACT

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Chapter 1

Introduction

A Treaty to Fight Hunger – Past Negotiations, Present Situation and Future Challenges

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This introduction provides readers with a general overview on the content and structure of the book, the context in which the major issues related to plant genetic resources for food and agriculture (PGRFA) emerged, its relevance for humankind and some interesting details of the negotiating and implementation process of the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA – the Treaty). The authors have taken this opportunity to express their personal views on some of the major challenges ahead of the Treaty, which will be further developed in the concluding chapter of this volume.

About the book

This book touches upon wide-ranging issues, such as international food policies and governance, economic and social aspects of food and seed trade, conservation and sustainable use of agricultural biodiversity, hunger alleviation, ecological concerns, consumer protection, fairness and equity between nations and among generations, plant breeding techniques and climate change adaptation. It provides for an extensive overview of the ITPGRFA negotiating and implementation process, undertaken by the stakeholders themselves. The authors identified challenges faced by the ITPGRFA and its community of stakeholders during this new and exciting phase of implementation, and explained the different interests and views of the major players in the global food chain.

Chapters have been grouped into three parts. Part I provides the views and standpoints of a number of protagonists that were part of national delegations during the negotiating and implementation process. They stand for the seven regional groups of the Food and Agriculture Organization of the United Nations (FAO): Africa, Asia, Europe, Latin America and the Caribbean, Near East, North America and South West Pacific (Chapters 2 to 9). Part II brings together the opinions of key stakeholders involved in the food chain worldwide: farming communities, plant breeders, gene banks, the Consultative Group on International Agricultural Research (CGIAR), the Global Crop Diversity Trust, the seed industry, civil society organizations (CSOs) and consumers (Chapters 10 to 17). Finally, Part III puts forward the opinions of highly recognized experts regarding key aspects of the implementation of the Treaty (Chapters 18 to 20). Five annexes complement information on the ITPGRFA and its negotiation. Annex 1 lists the meetings held at the FAO Commission on Genetic Resources for Food and Agriculture for the negotiation of the Treaty (1983–2001), as well as the meetings that took place since the signature and entry into force of the Treaty (2002–2011). Annex 2 provides the list of all contracting parties to the Treaty, by FAO regional groups. Annex 3 details the main components of the Treaty. Annex 4 gives a national perspective on the implementation of the treaty by Brazil; while Annex 5 comes back to specific anecdotes from the inception of the Treaty negotiations which express well the atmosphere in which the discussions on an international instrument for PGRFA began.

With a concern for unity, the authors were requested to focus on specific issues, following essentially the guidelines below:

- Analyse the regions' and stakeholders' positions during the negotiation process and the early implementation phase.
- Analyse the merits and drawbacks of the Treaty.
- Examine the practical legal, political, environmental and economic issues that have arisen between all involved regions and stakeholders in the negotiation and implementation, focusing on the obstacles that have been overcome.
- Identify the main challenges ahead and summarize some of the options and views on how these could be met as already expressed by regions and stakeholders.

Given the nature of the book and the heterogeneity of stakeholders, their different interests and personalities, the chapters differ in style, content and conclusions. It has been the role of the editors to harmonize them, minimize the overlaps, make the appropriate cross-references and include tables, annexes and reference material, in an attempt to ease the book's consultation and use. Every contribution bears in common the invaluable output to provide crucial information on stakeholders' positions regarding the Treaty, information that has not yet been published elsewhere. The book shows that despite the conflicting interests, which are duly highlighted, all players manage to come to an agreement to share and help conserve PGRFA for the sake of global food security and hunger alleviation. This

volume also assesses the prospects for an effective and rapid implementation of the Treaty, in some cases by rescuing some old aspirations that were left behind during the negotiation process and by tabling new ideas and innovative solutions.

World food context: Plant genetic resources, food security, sustainability and equity

States have repeatedly reiterated the fundamental right of everyone to be free from hunger and the right to adequate food. In 1996, world leaders stated that: 'We consider it intolerable that more than 800 million people throughout the world, and particularly in developing countries, do not have enough food to meet their basic nutritional needs. This situation is unacceptable' (Rome Declaration on World Food Security, 1996). This assertion led to more than just the inclusion of this fundamental human right within the international legal order as such. Indeed, these states committed to implement policies aimed at eradicating poverty and inequality while improving physical and economic access by all to sufficient, nutritionally adequate and safe food. They pledged to eradicate hunger in all countries, with an immediate view to reducing the number of undernourished people to half of their present level no later than 2015.[2] A similar commitment was made at the United Nations Millennium Summit in 2000, and is included in the First Millennium Development Goal (MDGs).

Despite these pledges, the situation has worsened. Today, hunger and malnutrition reaches almost 1000 million people. As a consequence, 15 million people die every year, that is to say, more than 41,000 every day, the majority of whom are children. In addition, the world population is expected to reach 8.3 billion by 2030 and the Earth will have to feed an additional two billion people, of whom 90 per cent come from developing countries (SoW2-PGRFA, 2010).[3] It is therefore crucial to ensure not only that enough food can be produced reliably to feed this expanding population, but also that it is accessible to all.

Within this context, one should recall that food security greatly depends on the conservation, exchange and wise use of agricultural biodiversity and the genetic resources that constitute such diversity. PGRFA are essential for sustainable agriculture and food production. They provide the building blocks for farmers, breeders and biotechnologists to develop new plant varieties necessary to cope with unpredictable human needs, growing food demands and changing environmental conditions.

From a socio-economic perspective, the importance of agriculture varies by region. Only 1.9 per cent of the population in North America is dependent on agriculture whereas this number reaches 50 per cent in Africa and Asia. Agricultural production remains the major source of income for about half of the world's population (SoW2-PGRFA, 2010, p192). In spite of its vital importance for human survival, PGRFA are being lost at an alarming rate. Hundreds of thousands of farmers' heterogeneous plant varieties and landraces, which have been developed for generations in farmers' fields until the beginning of the 20th

century, have been substituted by a very small number of modern and highly uniform commercial varieties. In the USA alone, more than 90 per cent of the fruit trees and vegetables that were grown in farmers' fields at the beginning of the 20th century can no longer be found. Today only a few of them are maintained in gene banks. In Mexico, only 20 per cent of the maize varieties described in 1930 are now known. In China, in 1949 nearly 10,000 weed varieties were known and used. By the 1970s, only about 1000 remained in use. A similar picture is reported for melon varieties in Spain. In 1970, one of the authors of this chapter collected and documented over 350 local varieties of melons; today no more than 5 per cent of them can still be found in the field. The picture is much the same throughout the world (SoW1-PGRFA, 1996). This loss of agricultural biological diversity has not only affected small farmers' livelihoods, but has also drastically reduced the capability of present and future generations to adapt to changing conditions.

In addition, many neglected crops and many wild relatives are expected to play a critical role in food, medicine and energy production in the near future. The FAO's first report on the State of the World on Plant Genetic Resources (SoW1-PGRFA, 1996) estimated that some 7000 species had been used by mankind to satisfy human basic needs, while today no more than 30 cultivated species provide 90 per cent of human calorific food supplied by plants. Furthermore, 12 plant species alone provide more than 70 per cent of all human calorific food and a mere 4 plant species (potatoes, rice, maize and wheat) provide more than half of all human calorific food.

Countries' reliance on foreign PGRFA is one of the oldest forms of interdependence (Frison & Halewood, 2005), which goes right back to the Neolithic when the first crops spread from their centres of origins to the rest of the world. It can be said that today no country is self-sufficient with respect to the genetic resources for food and agriculture they rely on. Indeed, the average degree of interdependence among countries with regard to the most important crops is around 70 per cent (Table 1.1). Paradoxically, many economically poor countries happen to be among the richest in terms of genetic diversity needed to ensure human survival.

Table 1.1 *Estimated range of interdependency (percentage) for regions' agricultural development on genetic resources from elsewhere*

Region	*Minimum*	*Maximum*
Africa	67.24	78.45
Asia and the Pacific region	40.84	53.30
Europe	76.78	87.86
Latin America	76.70	91.39
Near East	48.43	56.83
North America	80.68	99.74
Mean	65.46	77.28

Source: Flores Palacios (1997)

This table shows, for each region, the mean of countries' degree of dependency on crop genetic resources which have their primary centre of diversity elsewhere. The indicator used is the food energy supply in the national diet provided by individual crops. On the basis of the primary area of diversity of each crop, the estimated dependency, with maximum and minimum indices, has been calculated, showing that there is a high rate of dependency in practically all cases.

Interdependence between generations is also strong. Agricultural biodiversity is a precious inheritance from previous generations. We have the moral obligation to pass it on intact to coming generations and allow them to face unforeseen needs and problems. However, up to now, the interests of future generations who neither consume, nor have the opportunity to speak or vote for themselves have not been adequately taken into account by our political and economic systems.

Although matters related to the conservation and sustainable use of genetic resources and the management of related technologies may appear to be technical, they have, in reality, strong socio-economic, political, cultural, legal, institutional and ethical implications. Problems in these fields can put at risk the future of humanity. International cooperation in this area is therefore not a choice but a must and should focus on the fair and equitable sharing of the benefits derived from the use of genetic resources, providing an essential incentive to ensure that countries, local farmers and breeders continue developing, conserving and making their genetic diversity available to humanity. Today, the Treaty is the legal and technical instrument specifically designed for this purpose.

To accomplish this task, the United Nations, as a universal intergovernmental forum, has a fundamental role to play in the facilitation of the necessary intergovernmental negotiations. In the 1970s, worldwide systematic actions began within the FAO, resulting in the adoption the International Undertaking on Plant Genetic Resources for Food and Agriculture in 1983 and the establishment of the intergovernmental Commission on Genetic Resources for Food and Agriculture (CGRFA), the forum within which the Treaty was negotiated. Stakeholders in the field have also played, and continue to play an important role in the common commitment of alleviating poverty and promoting food security. By their continuous practices of exchanging crops, farmers and researchers have set the ground for the formal realization of the global crop commons (Esquinas-Alcázar, 1991; Halewood and Nnadozie, 2008; Byerlee, 2010). International organizations active in the field, such as the CGIAR (see Chapter 11) also contributed to pave the road for such an open approach in the management of PGRFA for research and breeding (SGRP, 2003; CGIAR, 2009). Box 1.1 illustrates the history of the development and exchange of PGRFA from the dawn of agriculture to nowadays with special details in the last decades.

The negotiations of the Treaty were not alien to, but strongly influenced by the historical and geo-political context in which they were developed. In the 1970s and 1980s, when a utopian socialism was still believed to be possible, the almost romantic concept of plant genetic resources, seen as 'heritage of mankind' to be made 'available without restriction', was defended with passion by most of the developing countries and some developed countries. This idealistic vision was

Box 1.1 History of genetic resources' development and exchange: A history of agriculture and of cooperation and dialogue among cultures

10,000 years ago: Domestication and geographic spread of crops

- Humans start their transition from nomad hunters to sedentary farmers.

In the last millennia: Development of agriculture and agricultural biodiversity

- Cultural contacts and interactions result in crop diffusion and global transfer of PGRFA.
- Sumerians and Egyptians actively collect PGRFA.
- The discovery of America boosts intercontinental exchange.

Since the 19th century: Science realizes the value and potential of genetic diversity

- Charles Darwin's and Gregor Mendel's discoveries prove the importance of genetic diversity for biological evolution and adaptation.
- In 1845, the European famine dramatically demonstrates the need for genetic diversity in agriculture.
- Between 1920s and 1930s, Nikolai Vavilov identifies the main areas of crop origin and their genetic diversity.

By the mid 20th century: Scientific and institutional developments; concerns regarding genetic erosion and vulnerability

- In the 1960s and 1970s, the Green Revolution boosts productivity but contributes to the loss of genetic diversity.
- FAO starts technical work on PGRFA collection and conservation, including through a series of international technical conferences.
- In 1972, the UN Stockholm Conference on Human Environment called for strengthening of PGRFA conservation activities. The US National Academy of Sciences raises concern over crops genetic vulnerability after a major maize epidemic.
- In 1974, what is now the International Plant Genetic Resources Institute was established to support and catalyse collection and conservation efforts.

In the last decades: First major policy developments

- In 1961, the International Union for the Protection of New Varieties of Plants was established, and revised in 1978 and 1991. National legislation restricts access to PGRFA, including through intellectual property rights.
- In 1979, FAO member countries start policy and legal discussions, leading in 1983, to the first permanent intergovernmental forum on PGRFA – the Commission on Genetic Resources for Food and Agriculture (CGRFA) – and to the adoption of the non-binding International Undertaking on PGR (IU).
- From 1989 and 1991 NGOs promote an International Dialogue on PGRFA, reaching common understandings that feed into the CGRFA's negotiations.

In the 1990s: An era of global instruments and legally binding agreements

- In 1992, the first international binding agreement on biological diversity, the CBD, is adopted. Its members recognize the special nature of agricultural biodiversity and support the negotiations in FAO.
- In 1993, the CGRFA agrees to renegotiate the IU, resulting in the adoption in 2001 of the legally binding ITPGRFA.
- In 1994, the Marrakech Agreement on Trade-related Aspects of Intellectual Property Rights (TRIPS) is adopted.
- From 1993 to 1996, the CGRFA develops the Leipzig Global Plan of Action on PGR and the 1st report on the State of the World's PGRFA.
- In 1995, the CGRFA broadens its mandate to all components of biodiversity for food and agriculture.
- In 2001, the ITPGRFA is signed (for details on the achievements of the Treaty since its inception, see Annex 1 of this book).
- In 2004, the ITPGRFA enters into force on 29 June.
- In 2006, the 1st meeting of the Governing Body of the Treaty is held in Spain. The ITPGRFA becomes operative with the adoption of the SMTA.
- In 2010, the Conference of the Parties of the CBD adopts the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization to the Convention on Biological Diversity.

Source: Esquinas-Alcázar (2005), updated with the authorization of the author

reflected in the 1983 International Undertaking (IU). After the fall of the Berlin wall and the start of an era of the so called 'real politics', neoliberal economic theories prevailed. These concepts of 'heritage of mankind' to be made 'available without restriction' were consequently downgraded by those of 'global concern', 'state's sovereignty' and 'facilitated access', as reflected in the 1992 Convention on Biological Diversity (CBD) and the 2001 ITPGRFA.

A history of the Treaty's negotiating process

The negotiating process

The ITPGRFA is the end product of a long period of international debates and negotiations in the FAO (Cooper, 2002; Mekouar, 2002; Rose, 2003; Esquinas and Hilmi, 2008). Indeed, the first technical and scientific discussions in the FAO in this area started in the 1950s. Discussions focusing on the economic and social implications started in the 1970s (see Chapters 2 and 10 for more details). While formal mandate to negotiate a binding agreement did not happen until 1993, the political discussion and negotiating process had begun in the FAO Conference (the main decision-making body in the organization) in November 1979, when the Spanish delegation, later supported by numerous countries, proposed the development of an international agreement on PGRFA and a germplasm

bank under the jurisdiction of the United Nations. In the 1981 FAO Conference, this proposal became a draft resolution written by Mexico and presented by the GRULAC region on behalf of the G-77. As a result, the next FAO Conference (November 1983) approved the first intergovernmental agreement on this subject – the 'International Undertaking on Plant Genetic Resources' (IU) – with the reservation of eight countries[4] (Canada, France, Germany, Japan, New Zealand, Switzerland, UK and USA). The same conference established an intergovernmental body – the FAO Commission on Plant Genetic Resources (today the Commission on Genetic Resources for Food and Agriculture, which includes 167 member countries and the European Community) to monitor its implementation. The IU is a non-binding agreement based on the principle that 'plant genetic resources are a heritage of mankind' that 'should be available without restriction'. More problematically, its definition of PGRFA included commercial varieties and other products of biotechnologies, which was considered by some countries to be incompatible with intellectual property rights (IPR). This particular issue explains why the IU was approved with eight reservations. To resolve this conflict, a number of 'agreed interpretations' of its text were negotiated in the FAO Commission between 1983 and 1991. Through these interpretations, the concepts of plant breeders' rights and farmers' rights were simultaneously recognized, while the expression 'heritage of mankind' was combined with 'subject to national sovereignty' and new concepts such as global concern and fair and equitable sharing of benefits were introduced.[5]

International non-governmental organizations (INGOs) played an essential role in this part of the process (for the civil society viewpoint, see Chapter 10). One particularly important initiative was the Keystone International Dialogue Series on Plant Genetic Resources, convened and facilitated by a neutral, non-governmental entity, between 1988 and 1991, during which several points of consensus were identified in a series of informal meetings. The process was chaired by Dr M. S. Swaminathan, who brought together key individuals from government, the private sector, research community, civil society, international organizations, and others in their individual capacity, to systematically discuss and seek consensual solutions to a range of critical issues. This initiative was very useful in paving the road for the formal intergovernmental negotiations in the Commission.

From 1988 to 1992, the CBD,[6] which aimed to become the first binding international agreement covering all biological diversity, was negotiated by the United Nations Environment Programme (UNEP) and presented for signature at the Río Earth Summit in June 1992 (Nairobi Final Act).[7] However, this agreement, which also includes agricultural biodiversity, did not sufficiently take into account the uniqueness of agricultural biodiversity and the specific needs of the agricultural sector (see Box 1.2), partly because agricultural experts were barely represented during the negotiation process. Indeed, countries' representatives related to the agricultural sector were only able to unite during the final session of the negotiations in Nairobi in May 1992. This group was able to develop and introduce a resolution at the very last minute on agricultural biodiversity that was then adopted together with the text of the CBD as Resolution 3 of the Nairobi Final Act.[7] This

Box 1.2 Uniqueness of plant genetic resources for food and agriculture and the need for multilateralism

The uniqueness of PGRFA, when compared with wild biodiversity, is based on the following:

- They are crucial to satisfying basic human needs.
- They are man-made biological diversity being developed since the origins of agriculture.
- Because of the degree of human management of PGRFA, its conservation in production systems is inherently linked to sustainable use.
- They are not randomly distributed throughout the world, but concentrated in the so-called 'centres of origin and diversity' of cultivated plants.
- There is much greater interdependence among countries for PGRFA than for any other kind of biodiversity.
- The target for conservation and use are not the species as such, but genetic diversity within each species.

The 'special nature of agricultural biodiversity, its distinctive features and problems needing distinctive solutions' was formally recognized by the Conference of the Parties of the CBD in 1995 (Decision CBD II/15), which supported negotiations within FAO for the IT.

During the FAO negotiations, the need for distinct solutions became especially apparent, particularly in relation to the application of any bilateral mechanisms for access, to and sharing of benefits derived from the use of PGRFA.

The high transaction costs (Visser, 2003) and the technical and legal difficulties (Hardon et al, 1994) in bilateral access systems such as those provided under the CBD, finally led negotiating countries to the multilateral solution: the multilateral system of access and benefit-sharing adopted in the ITPGRFA.

resolution stressed the importance of the agreements reached within FAO and called for the IU to be revised in harmony with the CBD.

The adoption of the CBD, and two years later that of the TRIPS agreement in the context of the World Trade Organization (WTO) Uruguay Round, as binding international agreements, was a wake-up call for the agricultural sector. With compliance being voluntary, the IU lacked sufficient weight to defend the specificities and interests of agriculture. Increasing pressure from other sectors, especially the commercial and environmental spheres, made possible what seemed unimaginable not so long ago. Developing and developed countries, the seed industries and non-governmental organizations (NGOs) joined together with one common political objective to transform the IU into a binding agreement that would allow (i) for equal footing cooperation with the trade and environment sectors, and (ii) guarantee conservation and access to agriculturally important plant genetic resources for research and plant breeding through a fair system for access and benefit-sharing. Consequently, the new phase of the negotiations – specifically aimed at the development of the Treaty – commenced in a highly constructive atmosphere.

These formal negotiations took place between 1994 and 2001. The FAO Commission met in three regular sessions and six extraordinary sessions. In order to speed up negotiations by reducing the number of active negotiators, the Commission appointed a regionally balanced contact group composed of 47 countries. Between 1999 and 2001, the contact group held six meetings to discuss controversial issues and to pave the road for the Commission negotiation. The 6th extraordinary session of the Committee (see Annex 1 of this publication) intended to conclude the negotiations, but its delegates could not reach agreement on several points. These pending issues were resolved during the 121st session of the FAO Council (October 2001).[8]

In a euphoric atmosphere, the negotiations were completed during the 31st Conference of FAO, on 3 November 2001, with the adoption of the Treaty (see Annex 3 of this book for a table giving an overview of the main provisions of the Treaty) by consensus with only two abstentions: Japan and the USA.[9] With an expression of disbelief and exultation after the vote, Director-General of FAO, Dr Jacques Diouf, qualified the Treaty as a milestone on North–South relationship.

The Treaty entered into force in June 2004, and became operative with the first session of its Governing Body (Madrid, June 2006). This meeting resolved important issues and resulted in the adoption of a standard material transfer agreement[10] that, through the Treaty's multilateral system of access and benefit-sharing (MLS), determines the quantity, method and terms of payment related to commercialization. During this first meeting, the Governing Body (GB) made great advances towards the resolution of other issues, such as the mechanisms to promote compliance with the Treaty and the funding strategy. An agreement between the Governing Body of the Treaty and the Global Crop Diversity Trust (GCDT) was also signed. The second (GB-2/07/REPORT, 2007) and third (GB-3/09/REPORT, 2009) sessions of the Governing Body achieved great progress on issues such as the implementation of the funding strategy, cooperation with the FAO Commission, cooperation with the CGIAR and on the sustainable use of genetic resources. It also adopted inter alia resolutions on Farmers' Rights and on the MLS. The fourth session took place in Bali, Indonesia, in March 2011. GB 4 adopted procedures and mechanisms on compliance, reached consensus on the long-standing item of the financial rules of the Governing Body, and adopted, among others, resolutions on the multilateral system, Farmers' Rights, sustainable use, cooperation with other organizations, and implementation of the Funding Strategy.

So far, the Treaty has been ratified by 127 countries and the European Union (see Annex 2 of this volume for the list of contracting parties). Significant progress has been made in the implementation of some of its provisions: countries committed to raise US$116 million to support activities for the implementation of the funding strategy during a period of five years, and during the first year US$14 million was raised. In addition, as one of the essential elements of the funding strategy, the GCDT, which focuses on activities related to ex situ conservation, had received US$136 million up to March 2010, and another US$32 million are committed. This includes contributions from public and private sources. With

regard to non-financial resources, 444,824 samples of Annex I material from the CGIAR centres were transferred under the SMTA between August 2007 and July 2008, representing more than 8500 samples transferred per week.

Behind the scenes

This book is not intended to present a comprehensive history of the negotiating process. We recognize that the true story of these long and difficult negotiations took place behind the scenes and includes many interesting unpublished anecdotes and semi-clandestine contacts (see Sukhwani, 2003, Chapter 10 and Annex 4 of this book for some stories on the inception of the ITPGRFA negotiations). While it was countries that were sitting around the negotiating tables, the actual negotiators were human beings who sometimes went beyond their own mandates and occasionally in spite of them. The deep and human history which reflects the real soul of the negotiations (Sukhwani, 2003) is only partially captured in this volume.

The actual negotiations were technically complex and politically controversial. They were often based on short-term national interests that varied from country to country or within a country over a different period of time (see illustrative example in Box 1.3). However, a number of key negotiators and many observers from INGOs were moved by ideals. The dialogue between all those involved was much easier when taking into account the perspective of future generations, an issue where all interest and ideals converged.

Only some of the main protagonists of this long and fascinating process have participated as authors of chapters of this book. We therefore consider it a duty and an obligation to pay tribute in this introduction to some of those that are missing, without whose involvement, courage and perseverance the Treaty would have never been possible. Among the countries' ambassadors and representatives are: José Ramón López Portillo and Francisco Martínez Gómez from Mexico, real pioneers of the political negotiations, Carlos di Motola from Costa Rica, M. S. Swaminathan from India, Javier Gazo from Peru, Mercedes Fermín Gómez from Venezuela, Ulf Svenson from Sweden, Jaap Hardon from The Netherlands, Henry Shands from the USA, Melaku Worede from Ethiopia, Juan Noury from Cuba, Mohamed Zehni from Libya and Jan Borring from Norway. We also would like to extend our appreciation and tribute to many representatives of civil society and INGOs that often have been the real engines of the process, moved by ideals that had the privilege to call things by their name without the handicap resulting from the diplomatic language. Among them and together with Pat Mooney, pioneer and excellent thinker, were Henk Hobbelink, Patrick Mulbany, Rene Salazar, Camila Montecinos, Hope Shands and many others. We also wish to highlight the political realism and the broad vision of some of the members of the private sector such as Don Duvick and John Deusing. They all collaborated with generosity and enthusiasm in this process, facilitating a balanced result and a final consensus. Last but not least, our tribute goes to colleagues in the secretariat of FAO and its negotiating Commission on PGRFA such as Erna Bennet, Clive Stannard, Murthi Anishetty and David Cooper, as well as colleagues from IPGRI (now Bioversity Interna-

Box 1.3 Illustration of how unexpected international political events may condition the outcome of negotiations

This anecdote illustrates better than a textbook the strategic importance of genetic resources and the influence of international political developments in the negotiation of the Treaty. One of the most complex and controversial subjects in the formal process of negotiations was the selection of genera or crops to be included in the multilateral system and listed in Annex I of the Treaty. In order to provide a sound scientific and technical negotiating basis to decide which crops should be included in the multilateral system, the following two criteria were agreed: importance of the crop for global food security and countries' interdependence on the crop. After years of negotiations, countries had shortlisted 67 genera. On 1 April 2001, when negotiations on this issue were closing with the aforementioned 67 genera, a conflict over the occupation of China airspace by an aircraft of the United States[11] muddied the negotiations. China is the primary centre of diversity of soybean. The morning following this political conflict, China withdrew soy from the Treaty's list, since the United States is one of the leading soy producers and highly depends on China for this crop genetic resource. As a reaction, Latin American countries, some of which such as Brazil were among the countries most affected by this decision, withdrew peanut and tomato. Brazil and Bolivia indeed contain peanut's maximum diversity; while the Andean region is the centre of diversity for tomato. By retrieving peanuts from the list, these countries tried to force the position of China, where these products are of great importance. This explains why, instead of 67 genera, there are only 64 crops and forages included in the multilateral system of the Treaty. Although the list of crops of the multilateral system can be modified in the future, this would entail the reopening of negotiations, which would have a high economic and political cost, since any change in the text of the Treaty requires a new process of parliamentary ratification by all contracting parties.

tional) and the FAO Legal Office. All of them facilitated the negotiating process all the way through with professionalism, generosity and enthusiasm, keeping always in mind that while our duty was to serve all member countries of FAO, our heart and our ideals had to stay with the weakest. Our apologies to the many we have not cited here due to lack of space and memory. Without them the utopia of the Treaty would have never become a reality.

Challenges ahead

The Treaty is a starting point to meet new challenges posed by the 21st century to food and agriculture. Challenges ahead have technical, scientific, socio-economic, legal and institutional dimensions.

Technical and scientific challenges: The need for a Road Map with specific targets and time-table to meet the technical provisions of the Treaty

Technical provisions of the Treaty, especially those under Article 5 'Conservation, exploration, collection, characterization, evaluation and documentation for PGRFA' and Article 6 'Sustainable use of PGRFA' need to be applied at the national level. Many technical and scientific priorities and challenges for PGRFA today have largely to do with the ways in which we need to adjust our thinking on conservation and utilization methods to cope with climate change, environmental sustainability and food security. This could be facilitated by the development and adoption of a road map with specific and verifiable targets and a realistic time-table. International assistance to meet these targets should be facilitated as needed.

Various aspects should be taken into account when defining priorities and targets for a full and efficient implementation of the Treaty, including maintenance and management of genetic diversity, use of genetic resources, climate changes and food security.

Maintenance and management of genetic diversity

The following includes a number of priorities identified by countries and the FAO during the preparatory process of the 2nd report on the State of the World on PGRFA (2009):

- To carry out systematic surveys and to publish inventories to identify existing GRFA both in the field and in germplasm banks.
- To develop methods for reliably estimating plant genetic diversity and to adopt standardized definitions of genetic vulnerability and genetic erosion (FAO, 2002; Brown, 2008).
- To give greater attention to the in situ management of wild relatives; neglected crops and promising species, as well as diversity in threatened ecosystems.
- To develop a more rational global system of ex situ collections.
- To develop and implement national strategies and to strengthen national capacities to manage and use genetic resources, including a greater use of scientific methods and technologies.
- To broaden the genetic basis in crop improvement.
- To develop appropriate policies, legislation and procedures for collecting crop wild relatives, maybe by revising the 1993 FAO International Code of Conduct for Plant Germplasm Collecting (FAO, 2003).
- To carry out ethno botanical and socio-economic studies, including indigenous and local knowledge, to better understand the role of farming communities in the management of PGRFA.

Utilization challenges for food security and environmental sustainability and to face climate change

Changes in agricultural production methods, in the environment, and in consum-

ers' demands are all likely to require a larger use of genetic resources (see Chapter 17). The utilization of a wide range of PGRFA is therefore crucial for food security, environmental sustainability and to face climate change.

Food security

The main challenge to increase food security is not just food production, but access to food. In addition, it is not simply a matter of delivering more calories to more people. It should be noted that most hungry people in the world (over 70 per cent) live in rural areas. Solutions are needed to improve stability of production at the local level, to provide increased options for small-scale farmers and rural communities and to improve quality as well as quantity of available food. Nutritional security, where dietary diversity plays an important role, is a vital component of food security.

To ensure that the benefits derived from plant genetic resources reach all those who need them, public-sector research is needed in areas in which the private sector does not invest. Most commercial crop varieties are not adapted to the needs of poor farmers, especially in many developing countries, who have limited or no access to irrigation, fertilizers and pesticides. A new environmentally friendly, socially acceptable and ethically sound agricultural model is necessary to meet their needs. This could be achieved by publicly supported programmes to breed crops that are able to withstand adverse conditions, including drought, high salinity and poor soil fertility and structure, and that provide resistance to local pests and diseases. Such programmes are likely to build on farmers' existing varieties and local crops, which often contain these traits. This is especially important at times when international prices of major crops have dramatically increased (e.g. world food crisis in 2008) and continue to be volatile and unpredictable.

Research emphasis needs to be put at the local level, often on local and underutilized crops, to support breeding and improve performance of a wide range of crops and varieties well adapted to local conditions and needs rather than just seeking uniform 'universal genotypes'. This can only be achieved by a systematic and participatory process of cooperation between breeders, farmers and consumers.

Environmental sustainability and climate change[12]

Reducing the negative impact that agriculture may have on the environment (e.g. water, energy, pesticides and herbicides) should become an absolute priority. This requires increased use of diversity in production systems through the deployment of a wider range of varieties and crops to ensure better ecosystem service provision. A good example would be the use of diversity-rich strategies to reduce damage by pests and diseases. Research is needed on how to make diversity-rich strategies more effective in terms of reaching better agriculture productivity and management.

Each predicted scenario of the Intergovernmental Panel on Climate Change (IPCC) will have major consequences for the geographic distribution of crops, individual varieties and crop wild relatives (see Chapter 7). Some recent studies

have used current and projected climate data to predict the impact of climate change on areas suitable for a number of staple and cash crops (Fischer et al, 2002; Jarvis et al, 2008).

The challenges we face with PGRFA owing to climatic changes are twofold. First, climate change will accelerate genetic erosion and create a critical need to collect and conserve endangered PGRFA and wild relatives before it is too late. Second, the magnitude of change will require significant adaptation. The use of a wide range of PGRFA will thus become vital in the development of varieties able to adapt to new and unstable environmental conditions; that is to withstand conditions that are not only hotter or drier but also more variable (Hawtin et al, 2010). This will increase the need for adaptability and resilience, properties that have not been usually embedded in traditional breeding. New and innovative breeding approaches would consequently be required. Also, new genetic diversity within and between species is likely to be needed, increasing therefore the potential of underutilized crops and new promising species. All these will drastically increase countries' dependency on foreign PGRFA and therefore the need for international cooperation, in particular by facilitating access to PGRFA.

It should be emphasized that for all these areas, the question is not limited to the pursuit and discovery of specific traits from a pool of PGRFA. The research needs to be concerned with functional diversity and with diversity deployment in agricultural systems from farm fields to landscape, watershed and regional scales.

Financial and socio-economic challenges

The funding strategy of the Treaty needs to become fully operative. Indeed, it aims at developing ways and means by which adequate resources are available for the implementation of the Treaty, in accordance with Article 18. The cost of conserving plant genetic diversity is high, but the cost of not taking action is much higher. Economic resources for the conservation and sustainable use of agricultural genetic resources are well below adequate levels. This problem is particularly serious in the case of in situ conservation of traditional farmers' varieties and, increasingly, of cultivated plants' wild relatives, which are largely found in developing countries. The scarcity of economic resources in these countries is not only an obstacle to the protection of wild species, but also a major cause of genetic erosion, as people search for fuel-wood or convert virgin areas into farmland. It is estimated that conserving 1000 accessions of rice generates an annual income stream for developing countries that has a direct use value of US$ 325 million at a 10 per cent discount rate (SoW2-PGRFA, 2010).

The establishment of the GCDT (see Chapter 16), as an important element of the funding strategy of the ITPGRFA, is a step forwards in this direction. However, this fund remains specifically dedicated to ex situ conservation, maintaining the need for complementary initiatives or elements to support other aforementioned pressing priorities.

At the Third Governing Body of the Treaty in 2009, a target of US$ 116 million was agreed to be raised for the Treaty's funding strategy within the next

five years. Projects have also been developed in a bottom–up, country driven process. However, most of these funds are not available yet and might be difficult to obtain. In this context, it should be recalled that only 4 per cent of Overseas Development Assistance (ODA) goes to agriculture, when more than 70 per cent of hungry people live in rural areas. The conservation and use of GRFA should, however, be seen not only as part of developmental assistance, but also as a matter of relevance to national development and food security.

The benefit-sharing fund is crucial to develop a healthy, balanced and self-financed multilateral system. The future of the Treaty may depend on it (see Chapter 18 on the importance of 'closing the circle of access-benefit sharing'). In this context and in order to ensure transparency and compliance by the users of PGRFA with the obligations established under Article 13.2(d)(ii) of the Treaty, it is important to further explore and promote the 'crop-related' royalty payment modality established by Article 6,11 of the SMTA, as adopted by the Governing Body of the Treaty. The 'crop-related' modality provides an innovative, predictable, verifiable alternative, far less bureaucratic, and much easier to administer and enforce than 'the product-related' payment scheme (see Chapter 19). There are indications that some seed industry circles are interested in investigating more deeply the potential advantages of the crop-related modality as the preferred alternative (see Chapter 12 on the seed industry). This should be taken into account by the Governing Body of the Treaty when renegotiating the level of mandatory payments established in the SMTA, in order to make the 'crop-related' modality more attractive. Other problems that could be identified with the implementation of Article 12 should be addressed by the Governing Body to ensure that there are not disincentives for its use.

From a macroeconomic perspective, PGRFA have been considered as an unlimited capital. However, PGRFA are limited resources to be used by all future generations, and their full future value continues to be ignored in market prices. In accordance with Agenda 21 of the United Nations Conference on Environment and Development (UNCED), a sustainable economic solution to the problem should be the internalization of the conservation cost of the resource into the production cost of the product. For example, when buying an apple, we could pay not only for the cost of production, but we could also contribute to the conservation cost in order to allow future generations to continue eating apples. The ITPGRFA provisions concerning benefit-sharing, including the sharing of monetary benefits that are derived from commercialization, represent a first step in that direction. Taking all the above into account, it is easy to ascertain that there is an urgent need for economic research in terms of a better understanding, description and quantification of the true value of genetic resources. Indeed, while conceptual frameworks in terms of use, future and option values exist, there is a definite lack of adequate quantification mechanisms, which would efficiently drive investment decisions and research planning.

Legal and institutional challenges

Following a country's ratification, the ITPGRFA provisions ought to be implemented at the national level, which requires the revision and development of national measures and regulations. In many cases, additional legislation is also needed to prevent genetic erosion, promote the conservation, characterization and documentation of local genetic resources, implement Farmers' Rights, facilitate access to genetic resources for research and plant breeding, and promote an equitable sharing of benefits.

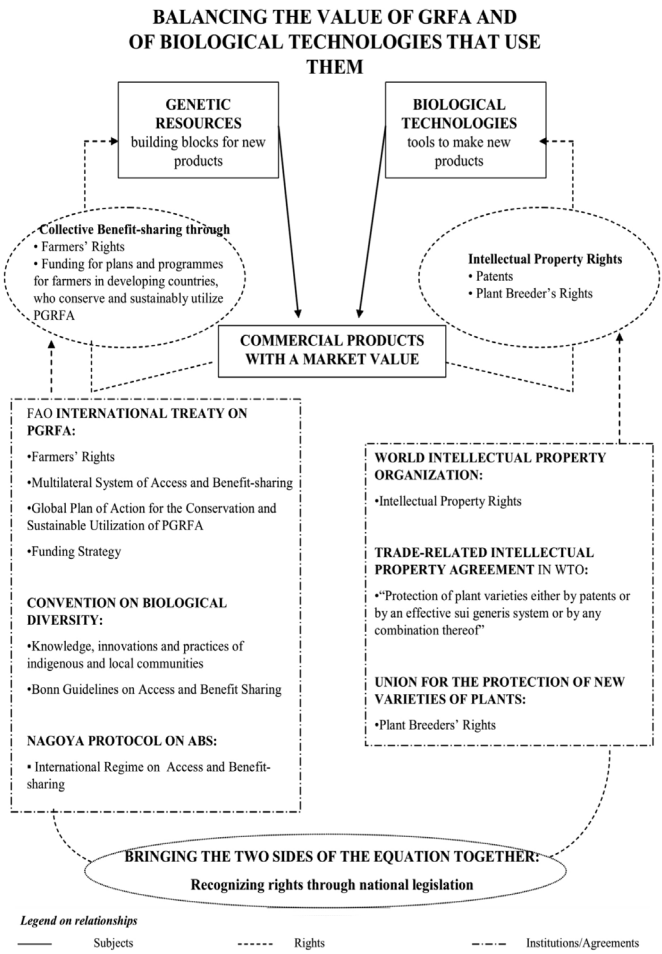
Access to genetic resources and related biotechnologies is threatened by the increasing number of national laws that restrict access to and use of genetic resources, as well as by the proliferation of intellectual property rights and the expansion of their scope (Correa, 1994, 2003). In this context the adoption of the Treaty represents an important step to facilitate access to PGRFA for research and breeding. However, the Treaty cannot be seen in isolation from other relevant national and international legislation on biodiversity and related technologies. Complementarities and synergies in the implementation of existing legal instruments related to GRFA in the agricultural (ITPGRFA), environmental (CBD) and trade (WTO/TRIPS) sectors need to be ensured, possibly through the development of national *sui generis* provisions in line with the requirements of these three international agreements (see Box 1.4) (Esquinas-Alcázar, 2005). In particular, since the adoption of the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilization in October 2010 (COP 10, Decision X/1), coordination with this new instrument would be of utmost importance. The text of the decision adopting the Nagoya Protocol recognizes the Treaty as a complementary instrument to the international regime on Access and Benefit Sharing (ABS), as well as the special nature of PGRFA and their importance to achieve food security worldwide. It also recognizes its role for sustainable agricultural development taking into account the particular contexts of poverty alleviation and climate change.

In addition, the interests of the agricultural sector need to be well represented during the implementation processes of those instruments. The effectiveness of the Treaty in halting or reversing the tendency towards access restriction will depend on how its provisions are interpreted and implemented by individual countries and the international community.

However, there are some shortcomings: some of the provisions of the Treaty were left deliberately ambiguous in order to get consensus during the negotiating process (e.g. 'Recipients shall not claim any intellectual property or other right that limited the facilitated access to plant genetic resources for food and agricultural, or their parts or components, in the form received from the Multilateral System' (Article 12.3(d)). This ambiguity allows for different and sometimes incompatible interpretations. The development of new technologies that allows for uses of PGRFA in ways that were not foreseen when the Treaty was negotiated is an added complication in this context.

Regarding the implementation of the MLS of the Treaty, the full realization of the expected benefits might facilitate future negotiations in reaching consensus in

Box 1.4



Genetic resources provide the building blocks that allow classical plant breeders and biotechnologists to develop new commercial varieties and other biological products. Although nobody can deny their importance, neither genetic resources nor the biological technologies that apply to them have an appropriate market value by themselves, while a clear market value often exists for the commercial products obtained through them. Since the 1960s, a number of international bodies and agreements (the Trade Related Intellectual Property Agreement (TRIPS/WTO), the World Intellectual Property Organization (WIPO) and the Union for the Protection of New Varieties of Plants (UPOV), have included provisions setting minimum standards for, or conferring on the developers of biological technologies, individual rights (IPRs such as plant-breeders' rights and patents) that allow the right-holders to appropriate part of the profits from any commercial products that may result from the use of those technologies. Since the 1990s, other international agreements (the CBD, the Treaty, and, more recently, the Nagoya Protocol on Access and Benefit-

sharing) have conferred equivalent but collective rights (Farmers' Rights and benefit-sharing) on the providers of the genetic resources. This allows for a symmetrical and balanced system of incentives to promote, on the one hand, the developments and application of new biotechnologies and to ensure, on the other hand, the continued conservation, development and availability of genetic resources to which these technologies apply (Frison et al, 2010). It is now up to national governments to implement these provisions, including the development, as appropriate, of national legislation that takes fully into account the two 'pillars' of the system represented in the diagram, thereby allowing for harmony and synergy in the implementation of the various binding international agreements.

Source: Esquinas-Alcázar (2005), updated with the authorization of the author

other controversial and challenging issues, such as broadening the Treaty's scope by increasing the number of crops that are exchanged through the multilateral system. This is especially important at a time when climatic changes are increasing countries' interdependency on PGRFA and many so-called minor and until now neglected crops are becoming increasingly important for food security.

Therefore, there is an increasing need to ensure coherence in the implementation of the Treaty and fill in possible legal gaps. To achieve this without having to modify the Treaty's text, 'agreed interpretations' of some of its provisions may need to be developed and negotiated in due time.

The full implementation and further development of the International Treaty could be facilitated by a more active, systematic and possibly institutional participation of civil society, especially farmers and other stakeholders' organizations.

Training and public awareness

Although regulatory aspects remain crucial, legal provisions alone are not sufficient as they need to be understood, accepted and implemented. Indeed, it is of the utmost importance that provisions of the Treaty become better known by as many stakeholders and citizens as possible. Training in this area, as well as raising public awareness on the importance of genetic diversity and the dangers of its loss are very important challenges.[13]

One should recall that genetic erosion is just one consequence of mankind's exploitation of the planet's natural resources. The fundamental problem is a lack of respect for nature, and any lasting solution will have to involve establishing a new relationship with our planet and an understanding of its limitations and fragility. If mankind is to have a future, it is imperative that children learn this at school, and that adults adapt by integrating this new understanding in their everyday life.

Conclusion

The history of the exchange of PGRFA represents somewhat the history of humanity. The struggle to obtain new plants for food and agriculture has been one of the main motivations of human travel from the earliest times, and has often

led to alliances and partnerships, but also to conflicts and wars between different civilizations and cultures.

The Treaty provides a universally accepted legal framework for PGRFA and an important innovative cooperating instrument in the fight against hunger. It marks a historic milestone in international cooperation. However, many things still need to be done to fully implement the Treaty, both at national and international levels. To this end, solid mechanisms to promote compliance have to be adopted.

The purpose of this book is to allow stakeholders to express their views on where we are coming from, where we are nowadays and where we should go. We are convinced that drawing this picture will help/contribute to a better understanding and implementation of the Treaty, which remains crucial to face current challenges including climate change, food security and environmental sustainability.

Notes

1 This chapter only represents the opinions of its authors. Christine Frison conducts PhD research as junior affiliated researcher at the Université catholique de Louvain and at the Katholieke Universiteït Leuven (Belgium) on international law and governance of plant genetic resources for food and agriculture. Francisco López is Treaty Support Officer for the International Treaty on Plant Genetic Resources for Food and Agriculture and is based at the FAO, Rome, Italy. José T. Esquinas-Alcázar is Director of the 'Catedra' of Studies on Hunger and Poverty at the University of Cordoba in Spain. Professor at the Politechnical University of Madrid, José Esquinas has worked as Secretary of the FAOs intergovernmental Commission on Genetic Resources for Food and Agriculture, and interim Secretary of the Treaty for 30 years. Email: jose.esquinas@upm.es.

2 Plan of Action of the Rome Declaration on World Food Security, § 7, available at www.fao.org/docrep/003/w3613e/w3613e00.HTM

3 Agricultural production in general and crop production in particular, must increase substantially in order to meet the rising food demand of a population that is projected to expand by some 40 per cent over the period from 2005 to 2050. According to a projection by FAO, an additional billion tonnes of cereals will be needed annually by 2050 (SoW2-PGRFA, 2010).

4 The delegations from Canada, France, Germany (The Federal Republic of Germany) Japan, Switzerland, the United Kingdom and the United States of America made reservations with respect to Resolution 8/83 (the International Undertaking on Plant Genetic Resources) adopted in the 22nd Conference of FAO in Rome, November 1983. New Zealand expressed reservations regarding the IU text since it did not take into consideration breeders' rights. The same seven countries and The Netherlands expressed reservations concerning Resolution 9/83 (Establishment of a Plant Genetic Resources Commission), also adopted in the 22nd Conference of FAO.

5 For additional information on this process see Esquinas-Alcázar and Hilmi (2008), available at www.bioversityinternational.org/fileadmin/bioversity/documents/themes/policy_and_law/the_treaty/publications/Recursos_Naturales_y_Ambiente_N.53/Las_negociaciones_del_Tratado_Esquinas_y_Hilmi_RNA53_2008.pdf (last accessed November 2010).

6 See www.cbd.int/convention/text/ (last accessed December 2010).
7 Resolution 3 from the Nairobi Final Act (the relationship between the Convention on Biological Diversity and the promotion of sustainable agriculture) was adopted 22 May 1992 in Nairobi. Available at www.cbd.int/doc/handbook/cbd-hb-09-en.pdf (last accessed December 2010).
8 FAO Council, 121st session, Rome, 30 October to 1 November 2001. International Undertaking on Plant Genetic Resources, Information Pursuant to Rule XXI.1 of the General Rules of the Organization, Doc. CL 121/5-Sup.1; see also Appendix III, Doc. CL 121/5, the International Convention on Plant Genetic Resources for Food and Agriculture, as adopted at the 6th extraordinary session of the Commission on Genetic Resources for Food and Agriculture, Rome, 25–30 June 2001, and reviewed by the 72nd session of the Committee on Constitutional and Legal Matters, Rome, 8–10 October 2001. See also www.fao.org/waicent/faoinfo/agricult/cgrfa/docswg.htm (last accessed November 2010).
9 The two abstentions were Japan and the USA. See 31st session of the Conference of FAO, 2–13 November 2001, verbatim records of plenary meetings of the Conference, 4th plenary meeting, 3 November 2001, Doc. C 2001/PV, p73. See also Resolution 3/2001 (Approval of the International Treaty on Plant Genetic Resources for Food and Agriculture and provisional resolutions for its application) adopted in the 31st session of the Conference of FAO, Rome, November 2001, available at ftp://ftp.fao.org/unfao/bodies/conf/C2001/Y2650e.doc (last accessed November 2010).
10 Resolution 2/2006 (the standard material transfer agreement) adopted in the 1st session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, Madrid, June 2006. See Doc IT/GB-1/06, report of the meeting, at ftp://ftp.fao.org/ag/agp/planttreaty/gb1/gb1repe.pdf (last accessed November 2010).
11 This incident appeared in the news such as CNN USA, available at http://articles.cnn.com/2001-04-01/us/us.china.plane.02_1_spy-plane-chinese-fighter-chinese-island?_s=PM:US (last accessed December 2010), or on the 'History Commons' journalism website at www.historycommons.org/timeline.jsp?us_military_specific_cases_and_issues=us_military_tmln_spy_plane_crash_in_china&timeline=us_military_tmln (last accessed December 2010).
12 We are thankful to Toby Hodgkin and Nicole Demers for sharing their ideas on these issues, some of which are reflected and feed the content of this paragraph.
13 Chapters 9 and 13 devote a large part to public awareness and training.

References

Brown, A. H. D. (2008) 'Indicators of genetic diversity, genetic erosion and genetic vulnerability for plant genetic resources' Report to the Food and Agriculture Organization, Rome, 26 January 2009

Byerlee, D. (2010) 'Crop improvement in the CGIAR as a global success story of open access and international collaboration', *International Journal of the Commons*, vol 4, no 1, pp452–480

CGIAR (2009) 'CGIAR Joint Declaration', Consultative Group on International Agricultural Research, Washington DC, 8th December

Cooper, H. D. (2002) 'The International Treaty on Plant Genetic Resources for Food and Agriculture', *Review of European Community and International Environmental Law*, vol 11, no 1, p2

Correa, C. M. (1994) 'Sovereign and property rights over plant genetic resources', FAO background study paper no 2, Commission on Plant Genetic Resources, 1st extraordinary session, Rome, 7–11 November 1994

Correa, C. M. (2003) 'The access regime and the implementation of the FAO International Treaty on Plant Genetic Resources in the Andean group countries', *Journal of World Intellectual Property Rights*, vol 6, pp795–806

Esquinas-Alcàzar, J. (1991) 'Un sistema globale per la difesa delle risorse genetiche vegetali', in F. Angeli (ed) *La Questione Agraria, Rivista dell'Associazione Manlio Rossi-Doria*, Rome, Italy, no 44, p53

Esquinas-Alcàzar, J. (2005) 'Protecting crop genetic diversity for food security: Political, ethical and technical challenges', *Nature*, vol 6, pp946–953

Esquinas-Alcázar, J. and Hilmi, A. (2008) 'Las negociaciones del Tratado Internacional sobre los Recursos Fitogenéticos para la Alimentación y la Agricultura', *Recursos Naturales y Ambiente*, no 53, pp20–29, available at www.bioversityinternational.org/fileadmin/bioversity/documents/themes/policy_and_law/the_treaty/publications/Recursos_Naturales_y_Ambiente_N.53/Las_negociaciones_del_Tratado_Esquinas_y_Hilmi_RNA53_2008.pdf, last accessed November 2010

FAO (2002) 'Review and development of indicators for genetic diversity, genetic erosion and genetic vulnerability (GDEV)', summary report of a joint FAO/IPGRI workshop, Rome, 11–14 September

FAO (2003) *International Code of Conduct for Plant Germplasm Collecting and Transfer*, FAO Conference, November 2003, Rome

Fischer, G., Shah, M. and van Velthuizen, H. (2002) 'Impacts of climate on agro-ecology', Chapter 3 in *Climate Change and Agricultural Vulnerability*, Report by the International Institute for Applied Systems Analysis, Contribution to the World Summit on Sustainable Development, Johannesburg, 2002

Flores Palacios, X. (1997) 'Contribution to the estimation of the interdependence of countries in the field of plant genetic resources', FAO background study paper of the CGRFA, no 7, rev.1

Frison, C. and Halewood, M. (2005) 'Annotated bibliography addressing the international pedigrees and flows of plant genetic resources for food and agriculture SGRP', Information document submitted by the System-wide Genetic Resources Programme of the CGIAR to the 8th Conference of the Parties to the Convention on Biological Diversity (COP 8) and the Ad Hoc Open-ended Working Group on Access and Benefit-sharing, International Plant Genetic Resources Institute (IPGRI), Jan. 2006, Rome, Italy, available at http://old.bioversityinternational.org/publications/publications/search.html#results

Frison, C., Dedeurwaerdere, T., and Halewood, M. (2010) 'Intellectual property and facilitated access to genetic resources under the International Treaty on Plant Genetic Resources for Food and Agriculture', Opinion Note, *European Intellectual Property Review*, vol 32, no 1, pp1–8, available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1576823

GB-2/07/REPORT (2007) 'Report of the Second Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture', available at www.planttreaty.org/meetings/gb2_en.htm, accessed December 2010

GB-3/09/REPORT (2009) 'Report of the Third Session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture', available at

www.planttreaty.org/meetings/gb3_en.htm, accessed December 2010

Halewood, M., and Nnadozie, K. (2008) 'Giving priority to the commons: The international treaty on plant genetic resources', in G. Tansey and T. Rajotte (eds) *The Future Control of Food: A Guide to International Negotiations and Rules on Intellectual Property, Biodiversity and Food Security*, Earthscan, London, pp115–140

Hardon, J. J., Vosman, B. and Van Hintum, T. J. L. (1994) 'Identifying genetic resources and their origin: The capabilities and limitations of modern biochemical and legal systems', CGRFA background study paper no 4, FAO, Rome

Hawtin, G., Acosta Moreno, R., Swaminathan, M. S., Sekhara Pillai, B. R. and Hegwood, D. (2010) 'Expert advice on the Second Call for Proposals, including a strategy and programme for the Benefit-sharing Fund', Rome, FAO ftp://ftp.fao.org/ag/agp/planttreaty/funding/experts/bsf_exp_p01_en.pdf, accessed November 2010

Jarvis, A., Upadhyaya, H., Gowda, C. L. L., Aggerwal, P. K. and Fujisaka, S. (2008) 'Climate change and its effect on conservation and use of plant genetic resources for food and agriculture and associated biodiversity for food security', Report to the International Crops Research Institute for the Semi-Arid-Tropics (ICRISAT) and FAO

Mekouar, A. M. (2002) 'A global instrument on agrobiodiversity: The International Treaty on Plant Genetic Resources for Food and Agriculture', FAO legal papers online, 24 January 2002, pp3–5

Rome Declaration on World Food Security and Plan of Action (1996), World Food Summit, 13–17 November 1996, Rome, Italy, available at www.fao.org/DOCREP/003/W3613E/W3613E00.HTM)

Rose, G. (2003) 'International law in the 21st century: The International Treaty on Plant Genetic Resources for Food and Agriculture', *Georgetown International Environmental Law Review*, Summer 2003, pp583–632

SGRP (2003) 'Policy Instruments, Guidelines and Statements on Genetic Resources, Biotechnology and Intellectual Property Rights', Version II, produced by the System-wide Genetic Resources Programme (SGRP) with the CGIAR Genetic Resources Policy Committee, Rome, July 2003

SoW1-PGRFA (1996) 'The First Report on the State of the World's Plant Genetic Resources for Food and Agriculture', FAO Commission on Genetic Resources for Food and Agriculture, Rome

SoW2-PGRFA (2010) 'The Second Report on the State of the World's Plant Genetic Resources for Food and Agriculture', FAO Commission on Genetic Resources for Food and Agriculture, Rome, available at www.fao.org/docrep/013/i1500e/i1500e00.htm, accessed November 2010

Sukhwani, A. (2003) 'Interview with the Secretary of the FAO intergovernmental Commission on Genetic Resources for Food and Agriculture, José T. Esquinas–Alcázar', originally published in *Revista de comunicación interna: Marchamos* (magazine of the Spanish Patent and Trademark Office - OEPM)), no 16, pp13–21; English version by Helen Keefe. Both versions available at www.oepm.es. / Section Conócenos / Gabinete de Comunicación (www.oepm.es/cs/Satellite?c=Page&cid=1144260495163&classIdioma=_es_es&idPage=1144260495163&pagename=OEPMSite%2FPage%2FtplListaMarchamos&numPagActual=1)

Visser, B., Eaton, D., Louwaars, N. and Engels, J. (2003) 'Transaction costs of germplasm exchange under bilateral agreements', Proceedings of the GFAR-2000 Conference, Dresden