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FAO Global System for Conservation and Utilization of Plant Genetic Resources

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Introduction

World interest in plant genetic resources has grown rapidly in recent years, because they represent both the raw material used in the production of new cultivars - either through traditional plant breeding or the use of biotechnology - and a reservoir of genetic adaptability that acts as a buffer against harmful environmental change. It has been recognized that the erosion of these resources severely threatens world food security. The urgent need to conserve and utilize plant genetic resources as a safeguard against an unpredictable future is clear. The advent of new biotechnologies, able to use a wider range of plant genetic resources, has also stimulated great interest in both public and private research institutions. The prospect of dwindling plant genetic diversity, coupled with dramatically increased demands on the resource, has propelled them into the centre of global discussions on the environment and sustainable development.

The last few years have seen a growing realization of the greatly increased value of plant germplasm, due to the fact that rapid genetic erosion has shown that it is not an unlimited or replenishable resource, and that the new biotechnologies have greatly expanded the frontiers of its utilization. This has already resulted in a number of formal or practical restrictions on the availability of germplasm. Since the relative value of plant genetic resources will continue to grow rapidly in the near future, it has become clear that plant germplasm needs to be protected for the use of future generations, and its availability for scientific purposes ensured through equitable agreements at an international level.

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The FAO Global System on Plant Genetic Resources

Development and Components

As germplasm of major crops was collected and stored in genebanks, questions of the safety of the material, the ownership of collections, the development of national laws restricting the availability of germplasm, and intellectual property rights over new varieties, became the subject of continuing debate. Such discussions were already significant during the Twentieth Session of the FAO Conference, in 1979. As the number of activities related to plant genetic resources increased, the need was recognized to establish ways of coordinating intergovernmental action at a global level, in order to avoid duplication, and foster complementarity among the national, regional and international organizations involved. It was also recognized that, to be successful, any system to be developed should benefit all participants, and fully take into account the rights of the donors of germplasm, funds and technology, and the obligations of the recipients. As a result of these discussions, FAO has, since 1983, developed a Global System on Plant Genetic Resources.

The objectives of the Global System are to ensure the safe conservation, and promote the unrestricted availability and sustainable utilization of plant genetic resources for present and future generations, by providing a flexible frameword for sharing the benefits and burdens. The System covers the conservation (*ex situ* and *in situ*) and utilization of plant genetic resources - genes, genotypes and genepools - at molecular, population, species and ecosystem level.

The basic institutional components of the system are (i) a flexible framework, the International Undertaking; (ii) a unique intergovernmental forum, the Commission; and (iii) the beginning of a financial mechanism, the International Fund for Plant Genetic Resources.

To date, 128 countries are formally part of the Global System, by becoming members of the Commission, or adhering to the International Undertaking, or taking both steps.

The Commission on Plant Genetic Resources

The Commission on Plant Genetic Resources was established following Resolution 9/83 of the Twenty-second Session of the FAO Conference. It is a unique intergovernmental global forum, where countries that are donors or users of germplasm, information, technology and funds, can discuss, on an equal footing, matters related to plant genetic resources, and monitor the implementation of the principles contained in the International Undertaking. The Commission functions on the basis of "one country, one vote". As of July 1991, 111 countries had joined the Commission.

During the first two Sessions of the Commission, in March 1985 and 1987, the major reservations raised regarded: (i) the compatibility of the Undertaking with national

laws related to Plant Breeders' Rights; (ii) the need to compensate the donors of germplasm; and (iii) the possible overlap between the Commission and other organizations dealing with plant genetic resources.

The Third Session of the Commission, in April 1989, greatly contributed to resolving such questions. It achieved an Agreed Interpretation of the International Undertaking that recognizes the rights of both donors of technology and donors of germplasm to be compensated for their contribution, through the simultaneous and parallel recognition of Plant Breeders' and Farmers' Rights. This was endorsed by the Twenty-fifth Session of the FAO Conference in two resolutions (Resolution 4/89 on the Agreed Interpretation and Resolution 5/89 on Farmers' Rights) which are now Annexes to the International Undertaking. The third Session of the Commission also clarified the unique intergovernmental role of the Commission in monitoring the implementation of the Undertaking, and in ensuring the comprehensiveness and efficiency of the Global System, in coordination with the various national, regional and international organizations dealing with plant genetic resources.

During this process, new questions have been raised resulting in the identification of problems regarding (i) the availability of plant breeder's lines; (ii) the implementation of Farmers' Rights; and (iii) the sovereign rights over plant genetic resources. The fourth Session of CPGR has discussed these points and attempted to resolve the emerging problems through a draft Resolution which may become a third Annex to the International Undertaking.

The International Undertaking on Plant Resources

The International Undertaking was established by Resolution 8/83 of the Twenty-second Session of the FAO Conference. It is a non-binding agreement, the objective of which is to ensure that plant genetic resources, especially species of present or future economic and social importance, are explored, collected, conserved, evaluated, utilized and made available, for plant breeding and other scientific purposes. It is based on the principle that plant genetic resources, as part of the heritage of mankind, should be conserved for future generations. This principle, which is subject to the overriding sovereign rights of nations over their genetic resources, has been qualified by FAO Conference Resolutions which are Annexes to the International Undertaking. These Resolutions have enabled a number of countries to remove their original reservations to the Undertaking. As of July 1991, 102 countries had adhered to the International Undertaking. The USSR adhered to it during the last Session of the Commission.

The International Fund for Plant Genetic Resources

The International Fund for Plant Genetic Resources was established by FAO in 1988 pursuant to Article 6 of the Undertaking. It provides a channel for countries, intergovernmental and non-governmental organizations, private industry, and individuals to support the conservation, and promote the use of plant genetic resources on a sustainable basis, at world level. Donors to the Fund may maintain their identity by

earmarking their contributions for individual projects. The nature, scope and procedures of the Fund will evolve with the guidance of the Commission. It is expected to become a critical element in ensuring the equitability of the Global System, and the implementation of Farmers' Rights. The expenditure of funds, on a project and programme basis, might then be through national and regional institutions, or, where appropriate, through FAO Programmes or those of other institutions with technical competence in this field.

Other Components of the Global System Under Development

A number of other components of the Global System are being developed on the basis of decisions the Commission has taken in implementing the International Undertaking. These are described below. They are at varying stages of development. It must be noted that the financial constraints under which FAO has laboured in recent years have limited its ability to go forward with the range of activities necessary to put the Global System into full operation.

International Agreements and Arrangements

The Commission has considered one of its most important tasks to be the development of international agreements and arrangements to facilitate the conservation and use of plant genetic resources. Apart from the Annexes to the International Undertaking mentioned above, two codes of conduct are presently being developed: a code of conduct for collecting and transfer of plant germplasm and another on plant biotechnology. The codes were requested by the Third Session of the Commission. In order to prepare them, questionnaires were circulated to a large number of experts working in the field, seeking advice and recommendations on the objectives and contents of the codes. Experts from IBPGR and other relevant organizations were also consulted.

The International Code of Conduct for Plant Germplasm Collecting and Transfer

The Fourth Session of the Commission considered a draft Code of Conduct, prepared by the Secretariat in consultation with the Working Group of the CPGR, and endorsed in principle its provisions. The Commission, however, made a number of minor proposals, and suggested that member countries and observers send any further comments to the Secretariat before 1 July 1991.

The code which is independent of the International Undertaking, will form an important tool in regulating the collection and transfer of plant genetic resources, with the aim of facilitating access to these resources, and promoting their utilization and development. The Code includes provisions for reporting, to enable the Commission to monitor its implementation.

Towards a Code of Conduct for Biotechnology, as it affects the conservation and use of plant genetic resources

The Fourth Session of the Commission generally agreed that the Code could address *inter alia* matters related to the promotion of the sustainable use of biotechnology in the conservation and utilization of plant genetic resources; the promotion of biosafety so as to minimize environmental risks throughout the world; and the equitable sharing of the benefits of biotechnology between the developers of that technology and the donors of the germplasm it uses. The Commission recognized the need for expert consultations to elaborate the various aspects of the draft Code. The Council agreed that the draft Code of Conduct on Biotechnology should be prepared in a step-by-step manner, in close collaboration with the appropriate organizations.

Mechanisms to Facilitate the exchange of germplasm, information and technology

The network of *ex situ* base collections

The Fourth Session of the Commission considered a progress report, which includes the draft basic agreements between States and FAO for the establishment of a network of *ex situ* base collections in genebanks under the auspices and/or jurisdiction of FAO. The Council welcomed the offers made by a number of governments and institutions to contribute with their base collections or with space in their genebanks to the establishment of the network, including an offer of the Government of Norway for the establishment of an International Seedbank under permafrost conditions at Svalbard, Norway. It noted that progress has been made in this matter and supported the Commission's request that the Director-General initiate or continue negotiations with the governments and institutions involved.

The Fourth Session of the Commission endorsed the convening of a panel of technical experts, to work in collaboration with FAO and IBPGR in order to develop appropriate standards for genebanks operating within the international network. This joint exercise should lead to recommendations for seed storage and management standards that might then be endorsed by the Commission. In order to achieve maximum complementarity between the FAO network of base collections and the IBPGR register of base collections, efforts are under way to merge them to the extent possible.

The network of *in situ* conservation

The Council recognized the complementarity of the *in situ* and *ex situ* strategies for the conservation of plant genetic resources. It noted the discussion of the Commission on the possible establishment of a network of *in situ* conservation areas and recognized the main responsibility of FAO in *in situ* conservation of wild relatives of cultivated plants, as well as in promoting "on farm" conservation and utilization of landraces while recognizing the importance of cooperation with other relevant organizations. It welcomed the offer of Indonesia and the Islamic Republic of Iran in the establishment of well-focused pilot-scale activities on *in situ* conservation. Primary

emphasis would be laid on intra-specific diversity of plant genetic resources of actual or potential socio-economic value for food and agriculture.

The Council also supported the Commission's recommendation that information on the needs for, and benefits of, *in situ* conservation be made available at policy-making, technical and grassroot levels, and that increased effort be made to help build up and strengthen the national and local institutes involved. An absolute priority was the training of national expert personnel, in the countries in which the resources to be conserved occurred. Management strategies should be flexible, and be able to incorporate new research and improved techniques.

The Global Information and Early Warning System on Plant Genetic Resources

The fourth Session of the Commission agreed that the purpose of the Global Information and Early Warning System on Plant Genetic Resources (PGR/GIS) will be to collect and disseminate data and facilitate the exchange of information on plant genetic resources and related technologies. A main component will be a constantly updated database of databases, covering economically important species. Another basic component of the system would be the information provided by periodic national reports, pursuant to Article 11 of the International Undertaking, through questionnaires prepared by the Secretariat. The cooperation of the countries in providing the national reports and filling in the questionnaires would be essential for the success of the System. The Commission also agreed that the PGR/GIS include an Early Warning System (PGR/EWS) to draw rapid attention to hazards threatening the operation of genebanks holding base collections, and to the danger of the extinction of plant species and the loss of genetic diversity throughout the world.

The Council noted the Commission's discussions on "mechanisms to facilitate the exchange of germplasm information and technology", including the Global Information and Early Warning System on PGR and endorsed the Commission's recommendation to reorganize the FAO Seed Laboratory as the Plant Information and Exchange Unit, and to expand the Seed Information System into the Global Information and Early Warning System on Plant Genetic Resources.

The State of the World's Plant Genetic Resources

The Commission discussed the preparation of a periodic report on the "State of the World's Plant Genetic Resources" (PGR/SW) and agreed that the report will describe the state of the art, and cover all aspects of the conservation and utilization of plant genetic resources, as well as activities and programmes being carried out by regional, international and non-governmental organizations, with the aim of identifying gaps, constraints, and emergency situations.

The Council agreed that PGR/SW should be an authoritative document that would guide international discussions regarding plant genetic resources. The document should concentrate on plant genetic resources of interest to agriculture and forestry, and agreed that a small independent experts group, with balanced regional repre-

sentation, be established to assist in its preparation. It will be prepared in cooperation with IBPGR and other relevant organizations and it will provide the basis for the preparation of a Global Action Plan.

The Global Plan of Action on Plant Genetic Resources

The Fourth Session of the Commission agreed on the need to develop a Global Action Plan on Plant Genetic Resources aimed at rationalizing and coordinating efforts in this area. The Commission stressed that the major national and international agencies and institutions expected to be involved in the implementation and financing of the plan should be involved in its preparation in order to:

(i) promote the most adequate use of the available funds, whether provided bilaterally or multilaterally;
(ii) ensure coordination of the activities and programmes of the Global Plan of Action within a clear global framework; thereby avoiding duplication of effort;
(iii) discuss the division of responsibilities in the Plan of Action among prospective implementating institutions; and
(iv) identify priorities, emergency situations, and gaps in the work.

The Council stressed that the major parties to be involved in the implementation of the Plan, should also be involved in its preparation, thereby ensuring effective coordination, and avoiding duplication of activities and waste of resources. The Council recognized the importance of regional participation in the preparation of the PGR Global Plan of Action and the State of The World's PGR.

Financing the Global Plan of Action through the Implementation of Farmers' Rights

The Council agreed that the best way to implement Farmers' Rights could be through an international fund to finance a PGR Global Plan of Action. It also agreed that as conservation and sustainable use of PGR was a continuing need, the international fund should be sustainable and transparent.

Pursuant of this subject, the proposed third Annex to the International Undertaking presented as a draft resolution (see paras 11 and 43 and Appendix II) state in its executive paragraphs that:

(i) Farmers' Rights will be implemented through an international fund on plant genetic resources which will support plant genetic conservation and utilization programmes;
(ii) the international fund as well as other funding mechanisms should be substantial, sustainable and based on the principles of equity and transparency; and
(iii) through the Commission on Plant Genetic Resources, the donors of genetic resources, funds and technology will determine and oversee the policies, programmes and priorities of the fund and other funding mechanisms, with the advice of the appropriate bodies.

The Fourth International Technical Conference

The Commission and the Council supported that FAO convene the Fourth International Technical Conference on Plant Genetic Resources to follow on the three previous conferences convened by FAO in 1967, 1973 and 1981. It was also agreed that the proposed Conference be funded through extra-budgetary contributions by countries, preferably through the International Fund for Plant Genetic Resources, and that, the drafts of the first State of the World's Plant Genetic Resources, and the first Global Plan of Action for Plant Genetic Resources should be prepared through preparatory technical meetings within the framework of this Technical Conference. The Commission also recommended that the Technical Conference be followed by a meeting to define the financial commitments needed for the implementation of the Global Plan of Action, and the terms and conditions of financing.

The Council noted that the cost of the International Technical Conference, including the technical meetings for the preparation of the first State of the World's PGR and the Plan of Action on PGR were estimated at about US$ three million. During the meeting, a number of countries expressed their willingness to explore supporting the costs of, and providing technical assistence for the Conference, and the Council joined the Commission in requesting the Director-General to initiate consultations with potential donor countries, so as to secure the necessary extra-budgetary funds.

Future Programme and Activities

In order to strengthen global activities on the conservation and utilization of plant genetic resources, the programmes and activities of the FAO will emphasize the following:

- *At regional and global levels*: the promotion of collaboration with regional and international organizations including other UN agencies, CGIAR institutes (especially IBPGR), and NGOs, in order to ensure the conservation and rational utilization of genetic resources; and the setting-up of global and regional networks.

- *At country level*: the establishment, or the strengthening of, national capabilities and capacities to conserve, manage, enhance and utilize plant genetic diversity, including crop diversification and the promotion and use of under-utilized species, multi-purpose species, and orphan crops, (especially those species which are not covered by CGIAR mandates) for enhanced and sustainable production.

FAO is preparing a rolling medium-term plan. The concerns of sustainable development and plant genetic resources conservation and utilization have been fully taken into account in this planning process.

Support to the Commission

In line with the principles outlined in the International Undertaking, the FAO programme on Plant Genetic Resources will:

(i) provide the Secretariat for the Commission;
(ii) continue to develop mechanisms and means for the implementation of the Farmers' Rights concept;
(iii) promote the further development and completion of the Global System;
(iv) assist in the preparation of a Plan of Action and International Technical Conference (should these be recommended by the Commission and endorsed by Council and/or Conference);
(v) periodically prepare the State of the World's Plant Genetic Resources; and
(vi) promote regional cooperation.

In addition to support to the Commission, and following the recommendation of the Commission, the Regular and Field Programme activities will continue to address conservation and sustainable use; information and documentation; implications of biotechnology; support for national programmes in their utilization of genetic resources; and the establishment of collaborative networks.

Conservation

There are plans for strengthening *ex situ* conservation in fruit trees, especially locally important species, in Thailand; *ex situ* facilities for *in vitro* conservation, and the establishment of field genebanks for fruits in Yugoslavia; and integrating plant genetic resources activities within the Botanic Garden in St. Vincent and the Grenadines (and many others).

In the field of forest genetic resources, studies will be continued on the compatibility of *in situ* conservation and management for the sustainable use of wood and non-wood products, complemented by pilot and demonstration areas established on the ground, covering a range of ecosystems and utilization regimes. Research and monitoring of these will be a necessary complement. Studies will be continued and intensified in collaboration with other institutes active in this field, on the *ex situ* conservation of long-lived perennial species.

Action should be taken to establish a small number of *in situ* networks to serve as pilot studies and to help develop methodologies for more wide-ranging action. Such action should be accompanied by efforts in related research, carried out through national institutes in the area of the occurrence of the species included. Efforts should be made to develop or strengthen national genetic resources units in individual countries, dealing with both *ex situ* and *in situ* genetic conservation, and to improve information flow between such centres.

Information and Documentation

The planned AGP activities on Information and Exchange of Plant Genetic Resources, Conservation and Utilization will be strengthened by grouping of activities related to information and database management. This will allow an integration of available information on plant genetic resources. At the request of the Commission, a 'Global Information and Early Warning System on Plant Genetic Resources' will be established. The FAO Seed Information System, the FAO seed and plant material introduction and exchange, and the FAO Plant Quarantine database will continue to provide information essential to the international exchange of germplasm. Full use will be made of existing databases, including the Current Agricultural Research Information System (CARIS), the International Information System for the Agricultural Sciences and Technology (AGRIS) , and, under terms of the Memoradum of Understanding with IBPGR, through access to the various IBPGR databases. Periodical publication of the Seed Review, FAO/IBPGR Plant Genetic Resources Newsletter, and the Forest Department Newsletter, 'Forest Genetic Resources Information' will be continued. These publications will also include information on new developments in biotechnology and their possible impact.

At its Seventh Session in 1989, the FAO Panel of Experts on Forest Gene Resources recommended that FAO help elaborate a list on the status of forest genetic resources (including also vulnerable ecosystems), in addition to the priority lists elaborated over the years. This complements the recommendation of the Commission on Plant Genetic Resources regarding the report on the State of the World's Plant Genetic Resources and activities have been initiated accordingly.

Biotechnology and Plant Genetic Resources

Following the FAO/CTA Symposium on Plant Biotechnologies for Developing Countries (June, 1989) and the recommendations of the FAO Conference in 1989, AGP initiated the process of formulating a comprehensive policy towards plant biotechnology. FAO is also in the process of issuing a comprehensive policy paper on biotechnology. The development of modern techniques such as recombinant DNA technology, protoplast fusion, and cell and tissue culture, have wide implications for the conservation, propagation and utilization of genetic resources. The emphasis will be to promote the use of new biotechnologies to best accomplish sustainable and enhanced agricultural production.

The Forestry Department keeps abreast of new developments in genetics and breeding, including biotechnologies with a potential in forestry development. An Andre Meyer fellowship on the application of biotechnologies in forestry, will be sponsored and guided by the Department in 1991.

Strengthening National and Regional Programmes

Close contacts will be maintained in all fields with countries for the identification of priorities and formulation and implementation of projects in the area of genetic

resource collection, conservation, evaluation and utilization through plant breeding (conventional and through biotechnology), and seed production. With an increased awareness of the importance of genetic resources, there is an increase in requests from member countries for support. The many emerging national genetic resource conservation and utilization programmes need an increased level of support, and FAO has the mandate and broad experience to carry out this task.

The Forestry Department's field programme related to the conservation and sustainable use of forest genetic resources, has greatly expanded over the past few years, and lays emphasis on (i) strengthening of national institutions, including national seed centres; and (ii) sub-regional or ecological networking and the promotion of Technical Cooperation among Developing Countries (TCDC) for countries with similar environmental conditions and socio-economic needs, which can be furthered through sustainable use of natural renewable resources compatible with *in situ* conservation, as well as through selection and improvement of the genetic materials they contain.

Other projects currently under consideration include: assistance in setting-up a seed storage facility for genetic resources in Tanzania and *in vitro* conservation of sugar cane germplasm in Cuba. Germplasm utilization projects include: root and tuber multiplication in the Caribbean; a global project for seed production of pastures and fodder plants; a global tropical soybean project; date palm research in the Near East and North Africa and germplasm introduction of oil palm in Africa. At the request of Member Nations, there are very many other similar projects in the planning phase.

Collaboration with other organizations

In the fields of genetic resources and biodiversity FAO will continue to collaborate with a wide range of intergovernmental, governmental and non-governmental organizations, UNDP, UNESCO, UNEP, World Bank, IUCN, the World Wide Fund for Nature (WWF), and CGIAR (with IBPGR). FAO has cooperated with both the Secretariat and the Preparatory Committee of the United Nations Conference on Environment and Development (UNCED) on matters concerning biological diversity and will continue to take an active part in matters related to the biological diversity component of UNCED. Duplication of effort is minimized both through formal contacts (reciprocal membership in task forces, Panels and Working Groups), and informal, working-level contacts and joint activities.

There are plans to strengthen technical collaboration between FAO and the IARCs. FAO's main contribution to cooperative effort would be through development projects, but where appropriate, FAO would follow its mandate to promote research. Emphasis will be on problem and opportunity identification, research and technology generation, and better technology transfer. The IARCs with crop and pasture mandates hold and utilize major germplasm collections. In particular, FAO will seek to enhance complementarity of effort with IBPGR.

The importance of assigning conservation priorities to species of value for food and forestry is now being widely recognized by many agencies, including NGO's, IARCs and a wide range of conservation organizations. There is a growing recognition of the need to identify populations, provenances and species for conservation, with the clear objective of their sustainable utilization for food and agriculture. This recognition provides a new role for FAO in addressing the needs of Member States as they identify the need to include food and forestry concerns into their conservation policies.
