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C 83/REP/8
22 November 1983
Revision of
C 83/II/REP/4 and 5

conference

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

E

Twenty-second Session

Rome, 5-24 November 1983

DRAFT REPORT OF PLENARY - Part 8 (from Commission II)

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Plant Genetic Resources (Follow up of Conference Resolution 6/81) 1/ Item 15

1. The Conference commended the Director-General for the comprehensive report contained in document C 83/25, which he had prepared as requested in Resolution 6/81 adopted by the Twenty-first Session of the Conference. It fully supported the basic principles contained therein, according to which plant genetic resources should be considered as a common heritage of mankind and be available without restrictions for plant breeding, scientific and development purposes to all countries and institutions concerned.

2. The Conference noted that the report incorporated many suggestions of the Working Party of 13 Member Nations which the Director-General had convened during June and July 1983 as requested by the Committee on Agriculture (COAG) at its Seventh Session in March 1983. It recognized that the proposals contained in the Director-General's report had been formulated with a view to achieving a consensus and the widest possible participation of Member Nations.

3. The Conference undertook a careful review of the Director-General's proposal for an International Undertaking on Plant Genetic Resources presented in the form of a Conference Resolution with a detailed annex. The Conference recognized that at the heart of the International Undertaking was an internationally coordinated network of national, regional and international centres which had assumed or would in the future assume responsibility for holding base collections of plant genetic resources. Furthermore, governments and institutions which agreed to participate in the Undertaking, could notify the Director-General that they wished the base collection or collections for which they were responsible to form part of the international network under the auspices or jurisdiction of FAO.

4. The Conference noted that the Director-General's proposals also envisaged the establishment, within the framework of FAO, of an intergovernmental committee or other body open to all interested States. The main functions of such a body could be:

(a) a review of the operation of the conservation network, including the international information system as well as of plant genetic resource activities in general, including the examination of the reports of the IBPGR which are received by FAO as a member of the CGIAR and reports which the regional committees might be invited to provide to FAO;

(b) the discussion of questions of particular concern to governments, and the formulation of related recommendations to be made, through FAO, to the GCIAR and the IBPGR;

(c) the adoption by governments of the priorities and standards developed under the auspices of the IBPGR; and

(d) the coordination of the support that States may, individually or collectively, be able to provide to overcome problems encountered, especially those related to the conservation network and to conservation and plant breeding activities in developing countries.

1/ C 83/25; C 83/25-Corr.1 (French only); C 83/LIM/2; C 83/II/PV/15; C 83/II/PV/16; C 83/II/PV/17; C 83/II/PV/18; C 83/II/PV/19.

5. The Conference recalled the effective role played by FAO over the last two decades in promoting the activities of collecting, preserving, documenting and exchanging plant genetic resources, and its active contribution to the development of activities related to plant genetic resources within the CGIAR system, particularly the IBPGR. It recognized that the IBPGR had developed a considerable range of activities in the field of genetic resources, and commended these efforts and their achievements.

6. Some members considered that the present scientific and technical activities of plant genetic resources conservation and exchange as promoted by the IBPGR in collaboration with FAO were satisfactory; and that possible improvements should be sought within the existing system.

7. The majority of members however considered that present activities were not sufficient and that they should be complemented in order to develop a global system on plant genetic resources. Such a system should enable Governments to fully collaborate in all aspects of plant genetic resources activities and to monitor new developments in this important field, and should include an international network of base collections in gene banks, under the auspices or the jurisdiction of FAO. Several members welcomed the offers made by some countries to make available to the international network their plant genetic resources banks.

8. The Conference stressed the need for expanded assistance to developing countries in the strengthening of national plant survey and identification and plant breeding capabilities with regard to training, facilities and equipment, and the improvement of national infrastructures for the establishment and maintenance of plant genetic resources centers, in order to enable them to ensure a more effective participation in plant genetic resources activities.

9. The Conference noted with concern the absence in general of a firm long-term commitment for the financing of essential plant genetic resources activities. It was therefore recommended that the Director-General seek the views of donor governments and financing agencies with respect to strengthening existing funding mechanisms through the allocation of funds specifically for in situ and ex situ conservation activities at national and international levels.

10. The Conference stressed the importance of evaluation and documentation of plant genetic resources and agreed that a central focus for plant genetic rosources information would be desirable in order to provide all users with the most recent plant genetic resources data necessary for the improvement of their most important crops. It consequently recommended that the Director-General initiate the adoption of measures aimed at establishing an International Information System on Plant Genetic Resources, under the coordination of FAO, including an analysis of its financial implications.

11. On this basis, the Conference adopted the following Resolution:1/

Resolution /83 2/

INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

THE CONFERENCE

Recalling its Resolution 6/81 on plant genetic resources;

Recognizing that:

(a) plant genetic resources are a heritage of mankind to be preserved, and to be freely available for use, for the benefit of present and future generations;

(b) full advantage can be derived from plant genetic resources through an effective programme of plant breeding, and that, while most such resources in the form of wild plants and old land races are to be found in developing countries, training and facilities for plant survey and identification and plant breeding are insufficient or even not available in many of those countries;

(c) plant genetic resources are indispensable for the genetic improvement of cultivated plants, but have been insufficiently explored and are in danger of erosion and loss;

Considering that:

(a) the international community should adopt a concrete set of principles designed to promote the exploration, preservation, documentation, availability and full use of relevant plant genetic resources essential to agricultural development;

(b) it is the responsibility of governments to undertake such activities as are needed to ensure the exploration, collection, conservation, maintenance, evaluation, documentation and exchange of plant genetic resources in the interest of all mankind; to provide financial and technological support to institutions engaged in such activities; and to ensure the equitable and unrestricted distribution of the benefits of plant breeding;

(c) progress in plant breeding is essential to the present and future development of agriculture; and the establishment or strengthening of plant breeding and seed production capabilities, at the national, sub-regional and regional levels, is a prerequisite to making efficient use of international cooperation in the exploration, collection, conservation, maintenance, evaluation, documentation and exchange of plant genetic resources;

1. Adopts the International Undertaking on Plant Genetic Resources attached hereto;

2. Requests the Director-General to transmit this Resolution and the attached International Undertaking to Member Nations of FAO, to non-Member Nations which are members of the United Nations, any of its Specialized Agencies or the International Atomic Energy Agency, and to autonomous international institutions having responsibilities with respect to plant genetic resources, and to invite them to inform him whether or not they are interested in the Undertaking and to what extent they are in a position to give effect to the principles contained in the Undertaking.

3. Urges Governments and the aforesaid institutions to give effect to the principles of the Undertaking and to support and participate in the international arrangements outlined therein;

4. Endorses the Director General's proposal for the establishment as soon as possible, within the framework of FAO, of an intergovernmental committee or other body on plant genetic resources open to all States, interested in the Undertaking.

1/ The Government of New Zealand reserved its position on the text of the International Undertaking on Plant Genetic Resources because there was no provision which took account of plant breeders' rights.

2/ The Governments of Canada, Japan, Switzerland and the United States of America reserved their positions with respect to the Resolution and the International Undertaking on Plant Genetic Resources.

Annex

INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

I. GENERAL

Article 1 - Objective

1. The objective of this Undertaking is to ensure that plant genetic resources of economic and/or social interest, particularly for agriculture, will be explored, preserved, evaluated and made available for plant breeding and scientific purposes. This Undertaking is based on the universally accepted principle that plant genetic resources are a heritage of mankind and consequently should be available without restriction.

Article 2 - Definitions and Scope

2.1 In this Undertaking:

(a) "plant genetic resources" means the reproductive or vegetative propagating material of the following categories of plants:

(i) cultivated varieties (cultivars) in current use and newly developed varieties;

(ii) obsolete cultivars;

(iii) primitive cultivars (land races);

(iv) wild and weed species, near relatives of cultivated varieties;

(v) special genetic stocks (including elite and current breeders' lines and mutants);

(b) "base collection of plant genetic resources" means a collection of seed stock or vegetative propagating material (ranging from tissue cultures to whole plants) held for long-term security in order to preserve the genetic variation for scientific purposes and as a basis for plant breeding;

(c) "active collection" means a collection which complements a base collection, and is a collection from which seed samples are drawn for distribution, exchange and other purposes such as multiplication and evaluation;

(d) "institution" means an entity established at the international or national level, with or without legal personality, for purposes related to the exploration, collection, conservation, maintenance, evaluation or exchange of plant genetic resources;

(e) "centre" means an institution holding a base or active collection of plant genetic resources, as described in Article 7.

2.2 This Undertaking relates to the plant genetic resources described in para 2.1(a), of all species of economic and/or social interest, particularly for agriculture at present or in the future, and has particular reference to food crops.

Article 3 - Exploration of Plant Genetic Resources

3.1 Governments adhering to this Undertaking will organize or arrange for missions of exploration, conducted in accordance with recognized scientific standards, to identify potentially valuable plant genetic resources that are in danger of becoming extinct in the country concerned, as well as other plant genetic resources in the country which may be useful for development but whose existence or essential characteristics are at present unknown, in particular:

(a) known land races or cultivars in danger of becoming extinct due to their abandonment in favour of the cultivation of new cultivars;

(b) the wild relatives of cultivated plants in areas identified as centres of genetic diversity or natural distribution;

(c) species which are not actually cultivated but may be used for the benefit of mankind as a source of food or raw materials (such as fibres, chemical compounds, medicine or timber).

3.2 Special efforts will be made, in the context of Article 3.1, where the danger of extinction of plant species is certain, or is likely, having regard to circumstances such as the clearance of vegetation from tropical rain forests and semi-arid lands with a view to the expansion of cultivated areas.

Article 4 - Preservation, Evaluation and Documentation of Plant Genetic Resources

4.1 Appropriate legislative and other measures will be maintained and, where necessary, developed and adopted to protect and preserve the plant genetic resources of plants growing in areas of their natural habitat in the major centres of genetic diversity.

4.2 Measures will be taken, if necessary through international cooperation, to ensure the scientific collection and safeguarding of material in areas where important plant genetic resources are in danger of becoming extinct on account of agricultural or other development.

4.3 Appropriate measures will also be taken with respect to plant genetic resources held, outside their natural habitats, in gene banks or living collections of plants. Governments and institutions adhering to this Undertaking will, in particular, ensure that the said resources are conserved and maintained in such a way as to preserve their valuable characteristics for use in scientific research and plant breeding, and are also evaluated and fully documented.

Article 5 - Availability of Plant Genetic Resources

5. It will be the policy of adhering Governments and institutions having plant genetic resources under their control to allow access to samples of such resources, and to permit their export, where the resources have been requested for the purposes of scientific research, plant breeding or genetic resource conservation. The samples will be made available free of charge, on the basis of mutual exchange, or on mutually agreed terms.

II. INTERNATIONAL COOPERATION

Article 6 - General

6. International cooperation will, in particular, be directed to:

(a) establishing or strengthening the capabilities of developing countries, where appropriate on a national or sub-regional basis, with respect to plant genetic resource activities, including plant survey and identification, plant breeding and seed multiplication and distribution, with the aim of enabling all countries to make full use of plant genetic resources for the benefit of their agricultural development;

(b) intensifying international activities in preservation, evaluation, documentation, exchange of plant genetic resources, plant breeding, germ plasm maintenance, and seed multiplication. This would include activities carried out by FAO and other concerned agencies in the UN System; it would also include activities of other institutions, including those supported by the CGIAR. The aim would be to progressively cover all plant species that are important for agriculture and other sectors of the economy, in the present and for the future;

(c) supporting the arrangements outlined in Article 7, including the participation in such arrangements of governments and institutions, where appropriate and feasible;

(d) considering measures, such as the strengthening or establishment of funding mechanisms, to finance activities relating to plant genetic resources.

Article 7 - International Arrangements

7.1 The present international arrangements, being carried out under the auspices of FAO and other organizations in the United Nations system, by national and regional institutions and institutions supported by the CGIAR, in particular the IBPGR, for the exploration, collection, conservation, maintenance, evaluation, documentation, exchange and use of plant genetic resources will be further developed and, where necessary, complemented in order to develop a global system so as to ensure that:

(a) there develops an internationally coordinated network of national, regional and international centres, including an international network of base collections in gene banks, under the auspices or the jurisdiction of FAO, that have assumed the responsibility to hold, for the benefit of the international community and on the principle of unrestricted exchange, base or active collections of the plant genetic resources of particular plant species;

(b) the number of such centres will be progressively increased so as to achieve as complete a coverage as necessary, in terms of species and geographical distribution, account also being taken of the need for duplication, of the resources to be safeguarded and preserved;

(c) the activities of the centres that are related to the exploration, collection, conservation, maintenance, rejuvenation, evaluation and exchange of plant genetic resources will be carried out with due account being taken of scientific standards;

(d) sufficient support in funds and facilities will be provided, at the national and international levels, to enable the centres to carry out their tasks;

(e) a global information system, under the coordination of FAO, relating to plant genetic resources maintained in the aforementioned collections, and linked to systems established at the national, subregional and regional levels, will be developed on the basis of relevant arrangements that already exist;

(f) early warning will be given to FAO, or to any institution designated by FAO, of any hazards that threaten the efficient maintenance and operation of a centre, with a view to prompt international action to safeguard the material maintained by the centre;

(g) the IBPGR pursues and develops its present activities, within its terms of reference, in liaison with FAO;

(h) (i) the general expansion and improvement of related professional and institutional capability within developing countries, including training within appropriate institutions in both developed and developing countries, is adequately funded; and (ii) the overall activity within the Undertaking ultimately ensures a significant improvement in the capacity of developing countries for the production and distribution of improved crop varieties, as required to support major increases in agricultural production, especially in developing countries.

7.2 Within the context of the global system any Governments or institutions that agree to participate in the Undertaking, may, furthermore, notify the Director-General of FAO that they wish the base collection or collections for which they are responsible to be recognized as part of the international network of base collections in gene banks, under the auspices or the jurisdiction of FAO. The centre concerned will, whenever requested by FAO, make material in the base collection available to participants in the Undertaking.

Article 8 - Financial Security

8.1 Adhering Governments, and financing agencies, will, individually and collectively, consider adopting measures that would place activities relevant to the objective of this. Undertaking on a firmer financial basis, with special consideration for the need of developing countries to strengthen their capabilities in genetic resource activities, plant breeding and seed multiplication.

8.2 Adhering Governments, and financing agencies, will, in particular, explore the possibility of establishing mechanisms which would guarantee the availability of funds that could be immediately mobilized to meet situations of the kind referred to in Article 7.1(f).

8.3 Adhering Governments and institutions, and financing agencies, will give special consideration to requests from FAO for extra-budgetary funds, equipment or services needed to meet situations of the kind referred to in Article 7.1(f).

8.4 The funding of the establishment and operation of the international network, insofar as it imposes additional costs on FAO, in the main will be funded from extra-budgetary resources.

Article 9 - Monitoring of Activities and Related Action by FAO

9.1 FAO will keep under continuous review the international situation concerning the exploration, collection, conservation, documentation, exchange and use of plant genetic resources.

9.2 FAO will, in particular, establish an intergovernmental body to monitor the operation of the arrangements referred to in Article 7, and to take or recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operations in line with the Undertaking.

9.3 In the performance of its responsibilities outlined in Part II of this Undertaking, FAO will act in consultation with those Governments that have indicated to FAO their intention to support the arrangements referred to in Article 7.

III. OTHER PROVISIONS

Article 10 - Phytosanitary Measures

10. This Undertaking is without prejudice to any measures taken by Governments - in line with the provisions of the International Plant Protection Convention, adopted in Rome on 6 December 1951 - to regulate the entry of plant genetic resources with the aim of preventing the introduction or spread of plant pests.

Article 11 - Information on the Implementation of this Undertaking

11. At the time of adhering, Governments and institutions will advise the Director-General of FAO of the extent to which they are in a position to give effect to the principles contained in the Undertaking. At yearly intervals, they will provide the Director-General of FAO with information on the measures that they have taken or propose to take to achieve the objective of this Undertaking.

12. The Conference further recommended the establishment, within the framework of FAO, of an intergovernmental committee or other body open to all interested governments, which would, in particular, monitor the operation of the international arrangements proposed in the Undertaking.

13. The Conference adopted the following Resolution:

Resolution /83 1/

ESTABLISHMENT OF A
SUB-COMMITTEE ON PLANT GENETIC RESOURCES
OF THE COMMITTEE ON AGRICULTURE

THE CONFERENCE

Having adopted Resolution .../83 "International Undertaking on Plant Genetic Resources" which includes the text of the International Undertaking on Plant Genetic Resources (hereby referred to as "the Undertaking") as an Annex to that Resolution, and

Having noted that Article 9.2 of "the Undertaking" states that FAO will establish an intergovernmental body to monitor the operation and arrangements referred to in Article 7 of "the Undertaking" and take or recommend measures that are necessary or desirable to ensure the comprehensiveness of the global system and the efficiency of its operations in line with "the Undertaking",

Requests the Council and the COAG at its next session to establish a subsidiary body of COAG on Plant Genetic Resources which would meet at the time of the Committee's regular sessions and the membership and terms of reference of which would be as follows:

1. Membership - The Sub-Committee on Plant Genetic Resources shall be open to all Member Nations of the Organization whether or not they are members of the Committee. The Council may, as provided for in Rule XXXII.13(b) of the General Rules of the Organization, admit to membership of that body interested non-Member Nations of FAO that are members of the United Nations, a Specialized Agency or the IAEA.

2. Terms of Reference - The Terms of Reference of the Sub-Committee shall be:

   (a) to monitor the operation of the arrangements referred to in Article 7 of "the Undertaking";

   (b) to recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operation in line with "the Undertaking", and in particular

   (c) to review all matters relating to the policy, programmes and activities of FAO in the field of plant genetic resources, and to give advice to the Committee on Agriculture or, where appropriate, to the Committee on Forestry.

(Adopted November 1983)

1/ The Governments of Canada, Japan, Switzerland and the United States of America reserved their positions with respect to this Resolution.

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CL 85/7
November 1983

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

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Eighty-fifth Session
Rome, 24 November 1983

ESTABLISHMENT OF A COMMISSION ON PLANT GENETIC RESOURCES

1. At its Twenty-second Session, the FAO Conference considered the Report of the Director-General on Plant Genetic Resources 1/. In the light of recommendations set forth in the Director-General's report, the Conference adopted Resolution 8/83 entitled "International Undertaking on Plant Genetic Resources". The Conference further adopted Resolution 9/83 entitled "Establishment of a Commission on Plant Genetic Resources" attached herewith as Appendix A of this Document.

2. In Resolution 8/83 the Conference adopted the text of the International Undertaking on Plant Genetic Resources, which, inter alia, provides for the establishment of an intergovernmental body within the framework of FAO to monitor the operation of the arrangements referred to in Article 7 of the Undertaking and to take or recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operations in line with the Undertaking.

3. In Resolution 9/83 the Conference requested the Council to establish at its next Session (85th Session), an intergovernmental body on Plant Genetic Resources under Article VI.1 of the FAO Constitution. The relevant part of this Article reads as follows:

> "1. The Conference or Council may establish commissions, the membership of which shall be open to all Member Nations and Associate Members, or regional commissions open to all Member Nations and Associate Members whose territories are situated wholly or in part in one or more regions, to advise on the formulation and implementation of policy and to coordinate the implementation of policy."

1/ C 83/25

W/M6558/c

4. In accordance with the decision of the Conference, the Council is requested to consider, with a view to adoption, the following Resolution for the establishment of the Commission on Plant Genetic Resources. This Resolution reflects the decisions of the Conference and reproduces in full the Statutes of the Commission. These Statutes are in the customary form used when the Conference or Council establishes a Commission under Article VI of the Constitution, and incorporate in paragraphs 4 to 8 the standard provisions required by the Basic Texts of the Organization.

Resolution ... /85

ESTABLISHMENT OF A COMMISSION ON PLANT GENETIC RESOURCES

THE COUNCIL

Having noted Conference Resolution 8/83 on an International Undertaking on Plant Genetic Resources and,

Having further noted Conference Resolution 9/83 on the Establishment of a Commission on Plant Genetic Resources, and

Having considered the relevant provisions of the Basic Texts of the Organization and in particular Article VI.1 of the Constitution and the "Principles and Procedures which should govern Conventions and Agreements concluded under Articles XIV and XV of the Constitution, and Commissions and Committees established under Article VI of the Constitution", set out in Appendix R of the Basic Texts of the Organization,

Decides to establish, under Article VI.1 of the Constitution, a Commission to be known as "the Commission on Plant Genetic Resources" the Statutes of which shall be as follows:

1. Membership

The Commission shall be open to all Member Nations and Associate Members of the Organization. It shall be composed of those Member Nations or Associate Members which notify the Director-General of their desire to be considered as Members.

2. Terms of Reference

The terms of reference of the Commission shall be:

(a) to monitor the operation of the arrangements referred to in Article 7 of "The International Undertaking on Plant Genetic Resources", hereinafter referred to as "the Undertaking";

(b) to recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operation in line with "the Undertaking"; and in particular,

(c) to review all matters relating to the policy, programmes and activities of FAO in the field of plant genetic resources, and to give advice to the Committee on Agriculture or, where appropriate, to the Committee on Forestry.

3. Sessions

Sessions of the Commission shall normally be held at the Headquarters of the Organization at the time of regular sessions of the Committee on Agriculture (COAG). The first session shall be convened by the Director-General and thereafter in consultation with the Chairman of the Commission.

4. Subsidiary bodies

(a) The Commission may establish such subsidiary bodies as may be required for the effective discharge of its functions;

(b) the establishment of any subsidiary body shall be subject to the determination by the Director-General that the necessary funds are available in the relevant chapter of the budget of the Organization or from extra-budgetary sources. Before taking any decision involving expenditure in connexion with the establishment of subsidiary bodies, the Commission shall have before it a report from the Director-General on the programme, administrative and financial implications thereof.

5. Reporting

At the conclusion of each session, the Commission shall submit to the Director-General a report on its activities and recommendations taking into account the need for the Director-General to be in a position to take such reports into consideration when preparing the draft Programme of Work and Budget of the Organization or other submissions to the Organization's governing bodies. The Director-General shall bring to the attention of the Conference through the Council any recommendations adopted by the Commission which have policy implications or which affect the programme or finances of the Organization. As soon as they become available, copies of each report of the Commission will be circulated to Member Nations and Associate Members of the Organization and also to international organizations and agencies that are concerned with Plant Genetic resources.

6. Secretariat and Expenses

(a) The Secretary of the Commission shall be appointed by the Director-General and shall be administratively responsible to him. The expenses of the Secretariat of the Commission shall be determined and paid by the Organization within the limits of the relevant appropriations in the approved budget of the Organization;

(b) expenses incurred by representatives of members of the Commission, their alternates or advisers, when attending sessions of the Commission or its subsidiary bodies, as well as the expenses of observers at sessions, shall be borne by the respective governments or organizations.

7. Observers

The participation as observers of Member Nations and Associate Members that are not members of the Commission, of states which are not Members or Associate Members of the Organization, and of international organizations shall be governed by the relevant provisions of the principles adopted by the Conference.

8. Rules of Procedure

The Commission may adopt and amend its own rules of procedure, which shall be in conformity with the Constitution and the General Rules of the Organization and with the statement of principles governing commissions and committees adopted by the Conference. 1/ The rules of procedure and amendments thereto shall come into force upon approval by the Director-General.

1/ See Basic Texts, Section R.

APPENDIX A

Resolution 9/83 1/

ESTABLISHMENT OF A

COMMISSION ON PLANT GENETIC RESOURCES

THE CONFERENCE

Having adopted Resolution 8/83 "International Undertaking on Plant Genetic Resources" which includes the text of the International Undertaking on Plant Genetic Resources (hereinafter referred to as "the Undertaking") as an Annex to that Resolution, and

Having noted that Article 9.2 of "the Undertaking" states that FAO will establish an intergovernmental body to monitor the operation and arrangements referred to in Article 7 of "the Undertaking" and take or recommend measures that are necessary or desirable to ensure the comprehensiveness of the global system and the efficiency of its operations in line with "the Undertaking",

Requests the Council to establish at its next session a Commission on Plant Genetic Resources in accordance with Article VI, paragraph 1, of the Constitution, open to all Member Nations and Associate Members, which would meet at the same time as the regular sessions of the Committee on Agriculture. The Terms of Reference of the Commission shall be as follows:

(a) to monitor the operation of the arrangements referred to in Article 7 of "the Undertaking";

(b) to recommend measures that are necessary or desirable in order to ensure the comprehensiveness of the global system and the efficiency of its operation in line with "the Undertaking", and in particular,

(c) to review all matters relating to the policy, programmes and activities of FAO in the field of plant genetic resources, and to give advice to the Committee on Agriculture or, where appropriate, to the Committee on Forestry.

(Adopted 23 November 1983)

1/ The Governments of Canada, France, Germany (Federal Republic of), Japan, Netherlands, Switzerland, United Kingdom and the United States of America reserved their positions with respect to this Resolution.

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C 83/II/REP/5
22 November 1983

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

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Twenty-second Session

Rome, 5-24 November 1983

DRAFT REPORT OF COMMISSION II - Part 5

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W/M6534/c

Plant Genetic Resources (Follow up of Conference Resolution 6/81) 1/ Item 15

1. The Conference commended the Director-General for the comprehensive report contained in document C 83/25, which he had prepared as requested in Resolution 6/81 adopted by the Twenty-first Session of the Conference. It fully supported the basic principles contained therein, according to which plant genetic resources should be considered as a common heritage of mankind and be available without restrictions for plant breeding, scientific and development purposes to all countries and institutions concerned.

2. The Conference noted that the report incorporated many suggestions of the Working Party of 13 Member Nations which the Director-General had convened during June and July 1983 as requested by the Committee on Agriculture (COAG) at its Seventh Session in March 1983. It recognized that the proposals contained in the Director-General's report had been formulated with a view to achieving a consensus and the widest possible participation of Member Nations.

3. The Conference undertook a careful review of the Director-General's proposal for an International Undertaking on Plant Genetic Resources presented in the form of a Conference Resolution with a detailed annex. The Conference recognized that at the heart of the International Undertaking was an internationally coordinated network of national, regional and international centres which had assumed or would in the future assume responsibility for holding base collections of plant genetic resources. Furthermore, governments and institutions which agreed to participate in the Undertaking, could notify the Director-General that they wished the base collection or collections for which they were responsible to form part of the international network under the auspices or jurisdiction of FAO.

4. The Conference noted that the Director-General's proposals also envisaged the establishment of an intergovernmental committee or other body which would make a regular review of the activities of the international network, those carried out by FAO and other concerned agencies of the UN system, and those supported by the CGIAR, particularly the IBPGR.

5. The Conference recalled the effective role played by FAO over the last two decades in promoting the activities of collecting, preserving, documenting and exchanging plant genetic resources, and its active contribution to the development of activities related to plant genetic resources within the CGIAR system, particularly the IBPGR. It recognized that the IBPGR had developed a considerable range of activities in the field of genetic resources, and commended these efforts and their achievements.

6. Some members considered that the present scientific and technical activities of plant genetic resources conservation and exchange as promoted by the IBPGR in collaboration with FAO were satisfactory; and that possible improvements should be sought within the existing system.

1/ C 83/25; C 83/25-Corr.1 (French only); C 83/LIM/2; C 83/II/PV/15; C 83/II/PV/16; C 83/II/PV/17; C 83/II/PV/18.

7. The majority of members however recommended that present activities should be expanded in order to develop a global system on plant genetic resources. Such a system should be within a legal framework under the auspices or jurisdiction of FAO, enabling Governments to fully collaborate in all aspects of plant genetic resources activities and to monitor new developments in this important field.

8. The Conference stressed the need for expanded assistance to developing countries in the strengthening of national plant breeding capabilities with regard to training, facilities and equipment, and the improvement of national infrastructures for the establishment and maintenance of plant genetic resources centers, in order to enable them to ensure a more effective participation in plant genetic resources activities.

9. The Conference noted with concern the absence in general of a firm long-term commitment for the financing of essential plant genetic resources activities. It therefore recommended that the Director-General seek the views of donor governments and financing agencies with respect to strengthening existing funding mechanisms through the allocation of funds specifically for conservation activities at national and international levels.

10. The Conference stressed the importance of evaluation and documentation of plant genetic resources and agreed that a central focus for plant genetic resources information would be desirable in order to provide all users with the most recent plant genetic resources data necessary for the improvement of their most important crops. It consequently recommended that the Director-General initiate the preparation of a study on the feasibility of an International Information System on Plant Genetic Resources including an analysis of its financial implications.

11. On this basis, the Conference adopted the following Resolution:

Resolution /83

INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

Please see C 83/II/REP/4

12. The Conference further recommended the establishment, within the framework of FAO, of an intergovernmental committee or other body open to all interested governments, which would, in particular, monitor the operation of the international arrangements proposed in the Undertaking.

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November 1983

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

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Eighty-fifth Session

Rome, 24 November 1983

ESTABLISHMENT OF A COMMISSION ON PLANT GENETIC RESOURCES

1. The Director-General proposed in his Report 1/ to the Conference the establishment of a subsidiary body.

2. The establishment of a Commission as requested by the Conference in Resolution 9/83 would involve changes from this proposal in the status and membership, but not in regard to the matters referred to in the provisions of Resolution 12/79 of the Twentieth Session of the Conference 2/ concerning Procedures for the Establishment and Abolition of Statutory Bodies. The details of the matters referred to in Resolution 12/79 were described in the Director-General's report and approved by the Conference in its report and in Resolution 9/83.

3. The financial implications would not involve any addition to the approved Programme of Work and Budget 1984-85. Secretariat, interpretation and documentation costs for the Commission would be absorbed within existing approved provisions, by adjusting if and where necessary provisions for meetings, first within Programme 2.1 and, if essential, by transfers in accordance with the Financial Regulations. (Interpretation and documentation costs are estimated at between $25 000 and $60 000 for the forseeable future.)

1/ C 83/25, paras. 172-175.
2/ Addendum III to the Appendix: to Section R, Basic Texts.

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FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS ROME

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Twenty-second Session

Rome, 5-24 November 1983

PLANT GENETIC RESOURCES

Report of the Director-General

CONTENTS

I. INTRODUCTION

1. At its Twenty-first Session, in November 1981, the FAO Conference adopted the following Resolution:

Resolution 6/81

PLANT GENETIC RESOURCES

THE CONFERENCE,

Recognizing that plant genetic resources are indispensable for the genetic improvement of cultivated plants, and that they are in danger of erosion and loss,

Recalling that work on plant genetic resources was begun in FAO as the result of a recommendation made by the First Session of the Advisory Committee on Agriculture in 1946,

Recalling further that in 1974 with the support of the Consultative Group on International Agricultural Research, the International Board for Plant Genetic Resources (IBPGR) was set up for which FAO provides the Secretariat,

Noting that a joint FAO/IBPGR programme is promoting the international collaboration of national, regional and international plant genetic centres in which plant genetic resources are collected, maintained, evaluated, exchanged and distributed,

Considering that there is no international agreement for ensuring the conservation, maintenance and free exchange of the genetic resources of agricultural interest contained in existing germplasm banks,

Convinced of the need for such an agreement,

Recalling the proposal made by some members during the Seventy-ninth Session of the Council in June 1981 that consideration be given to the establishment of an international bank of plant genetic resources under the auspices of FAO to ensure the free exchange of plant genetic resources between countries,

1. Requests the Director-General to examine and prepare the elements of a draft international convention, including legal provisions designed to ensure that global plant genetic resources of agricultural interest will be conserved and used for the benefit of all human beings, of this and future generations, without restrictive practices that limit their availability or exchange, whatever the source of such practices.

2. Requests the Director-General to prepare a study on the establishment of an international bank of plant genetic resources of agricultural interest under the auspices of FAO, taking into account the provisions of the proposed international convention as well as ongoing national, regional and international efforts in this field in particular those of the IBPGR.

3. Requests the Director-General to present proposals based on the studies mentioned to the Committee on Agriculture for consideration at its Seventh Session in 1983, which shall report thereon to the Council with a view to consideration by the Twenty-second Session of the FAO Conference.

2. In accordance with the Resolution, the Director-General submitted to the Committee on Agriculture, in March 1983, a Proposal for the establishment of an international gene bank and the preparation of a draft international convention for plant genetic resources. This Proposal was contained in document COAG/83/10, which has, for convenience, been reissued as document C 83/LIM/2.

3. The Committee on Agriculture was not able to reach a consensus on the Proposal. It made certain suggestions concerning a further study of aspects of the Proposal, with a view to enabling governments to reach a consensus on the matter, and concluded that the Director-General should be assisted by a working party of Member Nations to help him prepare his report to the Council so that the latter could elaborate the proposals to be submitted to the Twenty-second Session of the Conference. The relevant part of the Committee's Report is set out in paragraphs 219 to 238 of document CL 83/9.

4. The Report was considered by the Council at its Eighty-third Session in June 1983, shortly after the first meeting of the Working Party, which the Director-General had established in accordance with the recommendation of COAG. The Council welcomed the establishment of the Working Party and made various suggestions for the preparation of the Director-General's Report (see document CL 83/REP, paras. 107 to 109).

5. The Working Party met in June 1983 and again in July. It consisted of Representatives of Australia, Cameroon, Cyprus, El Salvador, India, Kenya, Libya, Malaysia, Mexico, Spain, Sweden, the United Kingdom and the United States of America. As a result of the general discussion of the Working Party at its first meeting, the Director-General prepared a draft outline of the present Report, as well as draft provisions of an international agreement on plant genetic resources. At the second meeting of the Working Party, the main aspects of both drafts were the subject of detailed suggestions and comments.

6. Since some members of the Committee on Agriculture had considered that various points had not been sufficiently covered in the Director-General's Proposal, the Director-General, at the beginning of this year, had requested Member Nations to provide him with information relating to such points, as well as to difficulties in obtaining plant genetic resources and gaps in the present system for the conservation of such resources. This request was repeated to the members of the Council and of the Working Party. Information and suggestions were subsequently received from seven Member Nations and a number of international institutions.

7. The present Report takes account as far as possible of the wide range of differing suggestions that have been made since the Twenty-first Session of the Conference, but represents the Director-General's judgement and is submitted on his sole responsibility.

8. The following Sections of this Report start (Section II) by setting out the context of Resolution 6/81 and seeking to identify the basic principles and concerns underlying it. Section II then develops those principles into a proposed international system relating to plant genetic resources. Section III and Appendix A suggest a text for an international agreement that would form the legal basis of the system proposed. Section IV examines, both from a scientific and technical and a legal and institutional point of view, the present international arrangements relating to plant genetic resource activities. The main purpose is to ascertain how far the present arrangements correspond to the principles developed in Section II. Section V discusses the various measures that could be taken, in the light of the present arrangements, to satisfy the principles and concerns underlying Resolution 6/81. Finally, Section VI sets out proposals for specific measures on which, in the Director-General's opinion, a consensus of governments could be reached.

II. PRINCIPLES AND OBJECTIVES RELEVANT TO PLANT GENETIC RESOURCES

Basic Considerations

9. The first paragraph of the Preamble to Resolution 6/81 recognizes the importance of plant genetic resources and refers to the danger of their erosion and loss. They are indispensable to plant breeding, on which the development of agriculture depends. The danger to the irreplaceable diversity of plant genetic resources is essentially presented by modern agro-technology, urbanization and changes in land use.

10. Restrictions on the availability of plant genetic resources, and inadequate measures to protect the diversity of those resources, would not merely prejudice further progress in plant breeding; it could also render plant breeding incapable of responding to serious threats to the production of food or other agricultural goods.

The nature and significance of plant genetic resources

11. The whole plant kingdom as developed through evolution on earth, on which human life depends, can be considered to represent plant genetic resources in the widest sense. However, man has used only a fraction of all the plant species, with an increasing concentration on a reduced number of particularly promising species that were suitable for domestication and cultivation. Today, the main food supply of mankind is determined by only twenty crop species, and only eight forest species provide most of the world's wood and timber. A much larger variety of plant species are used, in addition, for food, such as oil, vegetables, fruit and animal feed, and for other purposes, such as spices, beverages, pharmaceuticals and ornamentals and for various industrial processes. Many plants known to earlier generations have been lost or are no longer used, and a large part of the plant kingdom is in need of exploration (on the basis of earlier knowledge, where it exists) with a view to discovering possible future uses. The protection of important natural habitats of the world's flora is a precondition to such exploration if mankind is not to be deprived on one of the most precious resources that it depends on. A decision adopted in May 1983 by the Governing Council of the United Nations Environment Programme refers to this in situ conservation of genetic resources.

12. The plant species that are now cultivated have developed - in a large number of cases, since prehistoric times - as a result of selection by man to take advantage of specific useful characteristics, and also by reason of the environment in which they have been cultivated. They originated either from a single wild species or from natural crosses of the species, the discovery of which forms part of the scientific advances in crop plant evolution. Plant breeding, and particularly its use of the rapid scientific progress in genetics, has considerably accelerated the process of evolution of crop plants in modern times, constantly increasing their adaptation to various human needs in yield, harvest index and quality.

13. Plant breeders in modern times soon recognized that the development of crop varieties with specific characteristics, particularly high yields, called for uniformity in each variety, and that this tended to narrow the genetic base of cultivated crops. They became increasingly aware of the importance of the wide genetic variability existing in the material of land races and even in the ancestors of crop plants. They thus realized the need for systematic measures to explore, collect and preserve such material, which is of interest particularly as a source of gene combinations resulting in adaptability to adverse environmental conditions, valuable quality characteristics or resistance to pests and diseases. Systematic efforts in exploring and collecting the wide variety of crop plants dates as far back as the 1920s and 1930s; this partly explains the concentration today of some of the large collections in certain countries.

14. Since then, advances in genetics, such as the inducement of mutations, polyploidization and, recently, genetic engineering, have opened up new avenues to an increase in genetic variability. Nevertheless, the variability that has arrived from the evolutionary and selective process by natural and human forces must still be considered as the prime source for crop plant breeding at present and in the future; therefore, it is the central object of plant genetic resource activities today, especially after the United Nations Conference on the Human Environment held at Stockholm in 1972.

Micro-organisms

15. While genetic resources of the (higher) plants used for crop production are in the foreground of this Report, attention should also be given, in parallel, to the genetic resources of micro-organisms associated with crops, which may have beneficial effects or be a source of important diseases. In breeding programmes relating to leguminous plants, the variability of Rhyzobium-bacteria needs to be considered in conjunction with the genetic variability of the host legume. The same applies to the screening and evaluation of disease resistance of crop genotypes, for which a whole range of identified genetic variability in the respective disease organisms should be available. Parallel efforts should therefore be envisaged for the exploration, collection, documentation and preservation of micro-organisms of major importance to crop plants.

Use of plant genetic resources

16. In isolation from the concept of plant breeding, the term "plant genetic resources" is practically meaningless. In the absence of capability in plant breeding and plant genetics, such resources can, at the most, only be of limited use to any given country. The strength of a plant breeding programme, in terms of its human and physical assets, determines the level of importance that genetic resources can receive.

Documentation and evaluation

17. The use of plant genetic resources in plant breeding depends, in addition, on the information available concerning each sample, identifying its nature, its characteristics and ideally its genetic composition. This task of evaluation, and the related documentation work, are a formidable undertaking that remains to be performed for a large part of the genetic resources that have now been collected, let alone those that have still to be explored and collected.

Centres of genetic diversity

18. Twelve geographical areas have been recognized as primary centres of genetic diversity for individual crop plants. These centres are situated in five continents, mainly in developing countries. There are other areas that have been recognized as secondary centres of genetic diversity for various crops which have developed, through natural adaptation and subsequent selection work, in environments different from that in which they originated. A list of the regions of diversity of major crop plants and their wild relatives is contained in Appendix 8 of document COAG/83/10.

Categories of plant genetic resources

19. There are various kinds of plant genetic resources of importance for the breeding of new crop cultivars. The following categories have been recognized:

(a) Cultivated varieties (cultivars) in current use. These are varieties that are often released under a particular government scheme as varieties of recognized value and performance. Successful cultivars are widely used in plant production in a given country or in several countries having similar cropping conditions. Uniformity of characteristics is a feature of this category.

(b) Obsolete cultivars. These are varieties that were cultivated in the past, but have now been replaced by the cultivars referred to in (a). Uniformity is also, to a certain degree, a feature of this category.

(c) Primitive cultivars or land races. These are varieties that have been used for centuries in traditional agricultural systems. They were the product of selection by man, but have not undergone modern improvements by way of plant breeding. Variability in characteristics as observed in the field is a feature of this category.

(d) Wild species and weedy species closely related to cultivated varieties. These ancestors of cultivars are species of crop plants that have not been cultivated, but possess characteristics that might be usefully transferred to cultivated varieties through plant breeding. This category also covers species of direct economic value, such as forest trees.

(e) Wild species of potential value to man. These are species which are not cultivated and whose importance has not yet been assessed, but may be identified through exploration.

(f) Special genetic stocks. This is material that has normally been developed by man and is or has been used in ongoing breeding programmes. It includes mutants, "breeders' lines" and lines with identified genes or gene combinations. Material of this type is particularly useful because of the identification of special characteristics or even of genes.

20. All of the above categories of the resources of higher plant species are or may be useful, depending on the particular crop and the aims of the breeding programme concerned. Moreover, as mentioned above, other genetic resources, particularly those of micro-organisms, should also receive consideration, in parallel to those of crop plants.

The need to preserve plant genetic resources

21. Plant genetic resources are in serious danger of being lost in a rapidly developing world. Land races and primitive cultivars are condemned to replacement by higher yielding varieties that meet better the pressing need for higher outputs from agriculture. Weed control measures in support of crop production may eliminate important ancestors of crop plants. Forest clearings opening up new lands for settlement are endangering the centres of genetic diversity of important tree crops or may destroy the habitat of potentially new crops. Valuable breeding lines, mutants or other genetic stocks resulting from active plant breeding programmes may be discarded because their maintenance is a burden to plant breeding institutions occupied by the development of new varieties.

22. The aim of future plant breeding must be to preserve the genetic variability, inherited from nature and from human endeavour, of plants actually or potentially useful for mankind. A clear idea of the magnitude of this task cannot be given, nor is it possible to assess, for any given species, the number of samples that would represent the existing genetic variability. So far only estimates could be made; the estimate for rice is approximately 120 000 samples. Only further scientific work in genetics and plant exploration will provide a clearer picture of the size and form of the gene pools for each crop species which should be maintained as basic genetic resources.

23. In the case of a large number of seed propagated crops, controlled storage conditions have been developed to maintain full viability of seeds without genetic change for long periods of time, thus enabling the preservation of the genetic resources of those species. For some other species, long-term seed preservation is not possible, and vegetatively propagated crops can be preserved only as growing plants or, in more recent times, as tissue culture under controlled conditions. However, as will be seen in paragraph 46 below, both these methods of preservation present difficulties. For plant species requiring vegetative propagation or having seeds which cannot be stored, in situ preservation of genetic diversity in their natural habitats is therefore an important parallel task in plant genetic resource management.

Concluding remarks

24. The above general considerations provide the context of the statement, in the Report of the Seventh Session of the Committee on Agriculture (document CL 83/9, para. 221), that plant genetic resources are a heritage of mankind and that they should be freely exchanged between countries and their respective institutions for scientific purposes and use in crop-breeding programmes.

25. Successful plant breeding will increasingly depend on access to the full range of variability in plant genetic resources existing and developing in all countries of the world; from the resources of plants in their natural habitat to those that have undergone or are undergoing changes and selections by man. The full availability and exchange of plant genetic resources should therefore be ensured and increasing emphasis should be given to exploring and evaluating them, to safeguarding them against indiscriminate losses and to placing all nations, particularly developing countries, in a position to make full use of them through plant breeding for their agricultural development.

Principles underlying Resolution 6/81

26. In Resolution 6/81, the Conference requested the Director-General to "prepare the elements of a draft international convention, including legal provisions designed to ensure that global plant genetic resources of agricultural interest will be conserved and used for the benefit of all human beings, of this and future generations, without restrictive practices that limit their availability or exchange...". The Conference also requested the Director-General "to prepare a study on the establishment of an international bank of plant genetic resources of agricultural interest under the auspices of FAO, taking into account... ongoing national, regional and international efforts in this field in particular those of the IBPGR".

27. The general principle underlying the Conference's request, particularly as seen in the light of the discussions of COAG (see para. 3 above), is that plant genetic resources are a common heritage of mankind and should be freely available, and that such availability should be the object of a firm commitment by the international community and individual governments.

28. In the context of the principle of free exchange of plant genetic resources, the study in document COAG/83/10 noted (see paras. 22 to 32) certain cases of restrictions of a legal nature. Such restrictions did not appear significantly to affect the availability of resources, particularly those of food crops. In response to a request by FAO to governments for details of specific cases in which a government or institution has been unable to obtain material on account of restrictive practices relating to exchange, information was received from one government. The latter referred to difficulties in obtaining, for research purposes, samples of modern varieties covered by plant breeders' legislation in other countries, particularly those of horticultural species, but also field crop cultivars.

29. In the discussions during the follow-up to Resolution 6/81, a number of governments stated that they would not be able to commit themselves to providing material in violation of their national legislation on plant breeders' rights. This legislation confers on a breeder exclusive rights limited in time and related to the commercialization of cultivars originating from his breeding programmes and meeting specific conditions. The legislation does not restrict the exchange and use of samples of a cultivar for which legal protection has been granted, if they are to be used as a genetic source in other breeding programmes, even in the countries of protection (the rights conferred do not in any event extend to other countries). Such samples can, in addition, be purchased on the market.

30. The problem of availability may be greater with respect to material that is not in itself eligible for legal protection, but from which one or more plant varieties that are eligible could be developed with comparative ease: for example, advanced breeders' lines produced in active breeding programmes or the inbred parent lines used in hybrid breeding. Material of this kind may considerably facilitate the breeding work in developing countries with agro-ecological conditions similar to those of the country where the material was developed, particularly as the former countries do not generally have sufficient technology and facilities to breed the material from its original parent lines. However, enterprises run for commercial purposes may be reluctant to release the material, which they may have developed and tested at considerable cost, for fear that it would reach the hands of competitors.

31. It should be noted, however, that advanced breeding lines are often exchanged among breeders, and are made available in cooperative breeding programmes, particularly those of the international agricultural research centres (IARCs) and the countries wishing to join the programme concerned. The exchange covers both the material developed by the IARCs and that developed by the participating countries. However, outside the context of programmes of this kind, it may be difficult to obtain general acceptance of the principle of free availability of advanced breeding material.

32. Whether or not restrictions on the availability of plant genetic resources are more widespread than has so far become apparent, the fact remains that there has been no general commitment on the part of governments or relevant institutions to apply the principle of free exchange and to ensure that this principle is adequately reflected in basic legal texts.

33. Similarly, the Conference in Resolution 6/81 noted both the ongoing activities with respect to plant genetic resources, and the absence of any international commitment in this context. It requested studies on the elements of a convention and on the establishment of a bank for such resources, considering "that there is no international agreement for ensuring the conservation, maintenance and free exchange of the genetic resources of agricultural interest contained in existing germplasm banks".

34. With respect to the international bank for plant genetic resources, the Committee on Agriculture (para. 231 of document CL 83/9) suggested that the bank "should be considered as an international concept and not a single physical entity; it could be formed of a network of storage facilities." COAG also considered (para. 227) that account should be taken of ongoing activities. In addition, emphasis was placed (para. 233) on the predominant need to strengthen the national capabilities of developing countries in plant genetic resources, plant breeding and seed multiplication.

35. In the light of the discussions of the Committee on Agriculture, the remaining paragraphs of this Section outline an international system which would reflect the principles and meet the requirements underlying the Conference's Resolution. They essentially indicate the specific activities that should be carried out, the way in which those activities could be coordinated and the commitments that would be necessary to guarantee the effective operation of the system.

Activities relating to Plant Genetic Resources

Priority for exploration and collection

36. In the face of the magnitude of the task of exploring and making available all valuable or potentially valuable plant genetic resources, the approach can only be progressive, and depends on worldwide scientific collaboration in many disciplines. An international system relating to those resources has therefore to be based on priorities by plant species and geographical areas taking into account the achievements made so far. The IBPGR, in collaboration with FAO, has developed such priorities for international action, which will need to be updated in the course of future developments. The need for major food crops, the threat to genetic resources in particular geographical areas and the size of the genetic base of present plant breeding are among the important criteria used.

37. The world expertise of scientific knowledge has to be mobilized, on a crop-by-crop basis supported by cytogenetics, phytogeography and taxonomy, to orient and update priorities for plant genetic exploration and collection. Further eco-geographical surveys will be needed in some major centres of crop diversity so that more activities can be planned. Scientifically established priorities should be subject to periodical intergovernmental review to ensure government acceptance and commitment.

The conservation of plant genetic resources

38. There are basically two ways of conserving plant genetic resources: one is by leaving them in their natural habitat (in situ conservation). This allows a natural evolution of the plants without any intervention from man. The other way is by the (ex situ) conservation of plants or parts of plants (for example, seeds, seedlings, trees, tissues or organs) outside their natural habitat.

39. For in situ conservation, the establishment of nature reserves is of utmost importance. Within an international system the development of such reserves in relation to plant genetic resources should be pursued in close collaboration with UNEP and the International Union for the Conservation of Nature (IUCN).

40. Ex situ conservation takes the form of living collections of plants, or gene banks holding tissue cultures of vegetatively reproduced plants or seed of many categories of sexually reproduced plants. A gene bank, depending on its purpose, comprises "base collections" or "active collections", or preferably both.

41. Base collections hold samples of plant genetic resources for long-term storage. In the case of seed, the samples must be kept at a temperature of approximately 20°C below zero in air-tight containers that are normally only opened when tests of the continued viability of the seed are necessary (at an average of about ten-yearly intervals, depending upon the type of plant). A reliable continuous supply of electricity is an essential requirement for guaranteeing the quality of the samples.

42. Many food crops can only be vegetatively propagated. They include root and tuber crops, such as cassava, potato, sweet potato, taro, yam and cocoyam, and also the herbaceous and woody perennials such as banana, cocoa, date palm and breadfruit. They are often important sources of food and are widely grown in developing countries. The techniques for conserving such material, for example through tissue cultures and low temperature storage, are relatively new and are demanding in resources (especially skilled labour).

43. International action should concentrate primarily on base collections: In those collections, the treasure of genetic variability of many crop plants should be maintained for the future in cases where in situ conservation is not possible. The deterioration or destruction of base collections would mean the extinction of invaluable genetic resources, which could never be recovered in many cases. Moreover, for both seed and vegetatively propagated plants, international recognition of base collections should be restricted to those containing the most comprehensive collections of one or several crops, and are thus capable of replacing any material that is lost or is no longer maintained in active collections.

The maintenance of plant genetic resources

44. The maintenance of plant genetic resources requires careful handling to avoid losses in viability, genetic shifts or changes, reduction of a given sample below a minimum size and contamination or even loss through pests and diseases. In the case of seed conservation, the minimization of seed moisture is a prerequisite to maintaining viability. Another requirement is constant storage conditions.

45. A particularly demanding task for base collections is the rejuvenation of the samples. This is determined by their physiological characteristics, by the need for periodic checking, or by the reduction of the samples to the minimum amount needed, as a result of requests for the material where it cannot readily be obtained elsewhere.

46. The maintenance of vegetatively propagated material is even more demanding. Material which has to be grown in the field is subject to the vagaries of weather conditions and, even more important, to infection or infestation. There are many ways of minimizing these risks, but there is always a danger of failure. Tissue culture propagation and maintenance, where possible, reduces the risks as there is the possibility of cleaning infected plants or even putting their storage under completely controlled conditions. However, the maintenance of base collections in the form of tissue culture requires well-designed special laboratories and well-developed logistics. For medium-term storage, shoots might need to be transferred to fresh culture media only once a year. For long-term storage, cryopreservation is necessary. This method has so far been developed only for a few plant species. Cryopreservation can be applied for the long-term storage of cell cultures, which will become of increasing importance to genetic resources with the progress made in genetic engineering.

The documentation and evaluation of plant genetic resources

47. An essential component of conservation activities (without which efforts would be almost purposeless) is the preparation and dissemination of information enabling the retrieval of material kept in a collection. For all plant genetic resources, information starts with the observations made at the point of collection and the taxonomic identification of the material. But only the further evaluation of the material for cytogenetic, agronomic and breeding characteristics, for resistance to particular diseases and for quality characteristics will provide the information which is of essential interest to plant breeders. Ideally a genetic "passport" is established, containing information on particular genes and gene combinations.

48. The preparation and assembly of such information is the most extensive task in all genetic resource activities and has begun only in a limited way. It can be done only through the well-organized collaboration between gene banks and a number of specialized institutions and groups of scientists, often going well beyond national boundaries.

49. The systematic collection of such information requires internationally agreed systems of "descriptors" in order to facilitate information exchange and retrieval.

50. Each base collection should be the focal point for the systematic collection of information on the plant genetic resources for which it is responsible, and for the constant updating and accumulation of information, received from various sources, that results from the evaluation of material, where this takes place.

Security precautions

51. The introduction of plant genetic resources into gene banks presents a risk of plant pests and diseases. This is especially true where, in the various exploration missions, material is collected from the field and taken for storage, and also where material is transferred from one ecological zone to another. Stringent quarantine rules (including the periodic checking of material in storage) must therefore be followed to prevent contamination and the creation of a breeding ground for diseases and pests. A sufficiently equipped seed pathology laboratory for the inspection and treatment of plant material is a minimum requirement for a gene bank, in addition to its active cooperation with the plant quarantine authorities of the country of its location.

52. Account must also be taken of the possible loss of material through natural or man-made disasters. The material in base collections should therefore be duplicated or, if possible, triplicated in base collections located elsewhere.

The use of plant genetic resources

53. The maintenance of gene banks responding to the requirements set out above will ensure that plant genetic resources are preserved and are available for use. However, unless a country has well-qualified plant breeders, the great potential of the material conserved will be wasted. It is therefore vital that national capabilities in plant breeding be developed hand in hand with other activities relating to plant genetic resources, so as to ensure that a country may derive the maximum benefit from the resources available on its territory and elsewhere.

International Network of Base Collections

The conservation of material

54. A central component of a global system for the collection, preservation and exchange of plant genetic resources would be an internationally coordinated network of base collections. Each collection should be responsible for the maintenance of particular crops, account being taken of the need for some duplication (see para. 52 above). The activities of the network should be carried out in accordance with internationally agreed scientific and technical standards. The network should evolve in line with priorities accepted at the international level. The priorities relating to major food crops should be considered first.

55. Each base collection should be linked with an active collection, which would arrange for the exchange of material and organize the rejuvenation (see para. 45 above) of the material for which the base collection is responsible.

The coordination and distribution of information

56. As the exchange and utilization of plant genetic resources depends to a large extent on the availability of information concerning their characteristics (see para. 47 above), this information should be collected and distributed by each base collection in the network. The base collections should also be the focal point for the accumulation and dissemination of information generated in the evaluation of the resources. The information

available to the base collections should be linked to a global information system operated at the international level.

57. Other sources of information and information systems on plant genetic resources established at the national or international level, outside the ambit of the base collections, should be interlinked with the global system, where feasible.

Legal and institutional requirements

58. The various activities of the network - the designation of its components, the operations of the latter and agreement on international standards and priorities - would need to be carried out within a firm legal and institutional framework.

59. In the first place, a State or institution which agrees to participate in the international network should enter into binding commitments. Such a legal guarantee is necessary since the base collection operated by the State or institution would be a component of a structure on which the international community would rely for the fulfillment of the present and future needs with respect to plant genetic resources.

60. The State or institution should agree to maintain the base collection, in accordance with internationally agreed standards. It should also agree that, while the base collection would continue to serve the purposes for which it was established, its activities would also be oriented to the fulfillment of the needs of the international community, including the supply of samples for the purpose of plant breeding or scientific research. Finally, the State or institution should guarantee that it will maintain the base collection on a permanent basis, providing the necessary funds and facilities or, if at any time it finds it is unable to do so, that it will give the international community sufficient notice to enable the material in the base collection to be transferred elsewhere.

61. The preservation of plant genetic resources, for the present and the future, would depend upon a constant source of funding. There should be a mechanism for a guarantee in this respect if the international community is to have any security concerning the permanence of the network and the material kept in it.

62. The international network would also require procedures for coordinating the activities of the various components, for establishing the standards and priorities and for reaching agreement on the specific crops that would be covered by each base collection. Procedures would be needed to enable the operations of the network to be monitored and for recommendations to be made to its components. There should also be an international forum in which the coordination of the system and its progress, including problems encountered, could be discussed.

63. A fundamental principle of the network would be that the material in the base collections, if it is not readily obtainable elsewhere, should be made freely available for use in plant breeding or scientific or technical research. Ideally, such material should be held, by the State or institution concerned, at the disposal of the international community. This would give full application to the principle that plant genetic resources are the common heritage of mankind.

International Cooperation

64. An international system covering the various activities outlined above, based on the principle of the full availability of plant genetic resources, and having as a central component a network of base collections, would require the interacting cooperation of the scientific community and the community of nations. In addition, the emphasis of international cooperation should be on ensuring that all nations are in a position to exploit the benefits of plant genetic resources.

Scientific cooperation

65. As indicated above a comprehensive system for plant genetic resource activities would need to evolve on many fronts: exploration and collection, conservation and maintenance, evaluation and documentation, security precautions and, finally, the full utilization of

the resources in plant breeding programmes. As many of the activities are of a scientific nature, their success depends upon the work and guidance of scientists and scientific institutions.

66. Reliance must therefore be placed on the scientific community, at the national and international levels, to recommend priorities and organize exploration and collection missions, to develop scientific and technical standards, including those for documentation, and to provide the necessary advice concerning the designation of the components of the network of base collections, and on the activities and development of the network. There should be strong links between the base collections and the scientific networks engaged in the evaluation of plant genetic resources, so that in time the required information to characterize the resources in base collections will be available for utilization by plant breeders.

Intergovernmental cooperation

67. As has been seen above, an international system for the collection, conservation, maintenance and free availability of plant genetic resources would cover a whole range of activities, demanding substantial inputs. If any government is to adopt a policy under which it will use the financial and other resources available to take part in such a system, in the interest of the international community as a whole, it would be realistic for it to require a guarantee that other governments and prepared to assume the same responsibilities. A similar guarantee might be required in return for the free availability of the plant genetic resources under a government's jurisdiction or control.

68. A country with scarce financial resources assuming responsibilities with respect to plant genetic resources, for the benefit of the international community, would also expect some guarantee of support from that community in funds, technology and equipment.

69. The basis of international cooperation should therefore be a commitment, reflected in a legal instrument or instruments, by each State or relevant international institution to participate in, or support, the international network, and the various other activities carried out at the international level, within the limits of its capabilities.

70. At the same time, this commitment should be matched by the involvement of governments in the general operation of the network and the coordination of the other activities. It should be noted that international cooperation would, to a large extent, particularly in the case of developing countries, depend upon activities carried out by governments and on the financial and other resources that they are prepared to make available for that purpose. Governments should be placed in the position of full participants in an international system for the exploration, preservation and exchange of plant genetic resources.

71. There should therefore be an intergovernmental forum through which governments could collectively exercise their responsibilities with respect to plant genetic resources, including the review of scientific and technical progress, the final approval of the standards and priorities developed on scientific and technical considerations, and the mobilization of financial and other support for plant genetic resource activities.

Strengthening of national capabilities concerning plant genetic resources

72. As has been seen, most of the land races and wild relatives of cultivated crop species are found in the less developed countries where agricultural progress has been slow. These countries should, if they receive the necessary assistance, play an important role in the international network outlined above. They are, moreover, generally countries that are in serious need of expertise and equipment in order to enable them to exploit the broad range of genetic variations that exist on their territory and those that are available elsewhere.

73. Intergovernmental cooperation and support from intergovernmental organizations and financing agencies should ensure increased assistance to developing countries, to strengthen or establish their plant breeding and seed production capabilities, their expertise in exploration and evaluation work, with the related training, and the establishment of gene banks for their plant breeding programmes, in the first instance, and for their participation in the network of base collections.

III. DRAFT INTERNATIONAL AGREEMENT

Purpose of the Agreement

74. The agreement would essentially be the legal basis of the international system, outlined in paragraphs 54 to 73 of the preceding Section. It would develop the general principle that plant genetic resources are the heritage of mankind and that they should be preserved and made available without restriction, into a set of more specific principles covering the commitments and role of governments and relevant institutions with respect to plant genetic resources.

75. It should be noted that there are already multilateral and bilateral agreements that are relevant to plant genetic resources. Many of them have been concluded under the auspices of the United Nations, or organizations in the UN system, in particular UNEP and Unesco. In this connection, mention might be made of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973, the African Convention on the Conservation of Nature and Natural Resources, 1968, the Convention on the Conservation of Nature in the South Pacific, 1976, the Treaty for Amazonian Co-operation, 1978, and - with respect to plant genetic resources in marine areas - the recent Protocol concerning Mediterranean Specially Protected Areas, 1982, to the Convention for the Protection of the Mediterranean Sea against Pollution.

76. However, the scope of these agreements is essentially restricted to the aspect of preservation as far as plant genetic resources are concerned. The draft agreement proposed in this Report would cover all aspects, and its emphasis would be on the essential objective of plant genetic resources, namely plant breeding.

Form of the Agreement

77. At its Seventh Session, the Committee on Agriculture agreed (para. 227 of its Report - document CL 83/9) that "in the spirit of Conference Resolution 6/81 further discussions on the question of a proposed convention must relate to the drafting of elements which would meet and respect the concerns of the majority of governments both members and non-members of FAO, so that the convention would be truly universal". The consensus of the discussions was that further study should be given to a convention or other form of international agreement.

78. In considering the form of the instrument that would embody the principles in the agreement, account has been taken of the need for the wide acceptability and rapid entry into effect of the principles and, at the same time, for an instrument that would establish specific commitments. The basic alternatives in this respect are outlined below.

79. In the first place, the principles could be incorporated in an international convention or agreement in the strict sense. The essential advantage of this solution is that, after its entry into force, the instrument would be legally binding on the States that had accepted it. One of the main disadvantages is the time that would be needed to bring the instrument into force for a significant number of States. The first step would be the adoption of the instrument: this could take the form of approval of the text by the FAO Conference, if the instrument was to be adopted within the framework of FAO in accordance with Article XIV of the Constitution; or the instrument could be adopted by a plenipotentiary conference consisting of interested governments. After adoption, the instrument would be transmitted to States for their consideration with a view to acceptance. This acceptance normally takes the form of ratification (by governments that have signed the instrument) or accession. The process of acceptance may take a long time especially as, in many countries, the approval of the national Parliaments would be required. The convention or agreement would not enter into force until the number of States specified in its provisions had deposited instruments of ratification or accession, and it would not be binding on any State which did not deposit such an instrument.

80. Another factor to be considered is that the convention or agreement would lay down binding obligations for the parties. This could be a disadvantage if the instrument is to achieve the widest possible acceptability. States may have difficulties in joining in a consensus on the text of a legally binding instrument and in committing themselves to implementing each one of its provisions.

81. Another alternative would be an instrument on the lines of the International Undertaking on World Food Security, adopted by the FAO governing bodies in 1974. Such an instrument would have a strong moral force, rather than a legally binding character. It could be adopted in a resolution of the FAO Conference, which could invite governments to notify FAO of their agreement with its provisions. Apart from the fact that the procedures involved would be considerably quicker, this solution has, to a lesser degree, the advantages and disadvantages of a convention or agreement. States, especially those which had notified their agreement to the Undertaking, would be making commitments similar to those of a convention, the main difference being that they would not be bound by those commitments as a matter of law.

82. Finally, the principles could be incorporated in a more general instrument, such as a Code of Conduct, which again could form part of a Conference resolution. The Code of Conduct would reflect an international consensus on the principles. Moreover, governments could be invited in the Code to report to FAO on the measures that they have taken or intend to take to give effect to its provisions.

83. The alternative of a draft International Undertaking on Plant Genetic Resources would appear to be the most appropriate solution. Unlike a convention, it could be adhered to by relevant international institutions, in addition to governments. It would represent a strong formal commitment (rather than a set of agreed principles in a Code of Conduct), without having the legally binding character of a convention, which could be an obstacle to acceptance and would certainly entail a delay in its entry into effect for a significant number of governments.

Content of the Agreement

84. The text of a draft resolution containing an International Undertaking, which would be open to adherence by governments, as well as by autonomous international institutions engaged in plant genetic resource activities, is set out in Appendix A hereto. The draft Undertaking begins with a general part (Part I), defining the coverage of the Undertaking and setting out the responsibilities of governments and institutions, essentially at the national level, with respect to the various plant genetic resource activities outlined in paragraphs 36 to 53 above.

85. Part II relates to international cooperation, and provides an outline of the arrangements for an international network of base collections, including an international information system, referred to in paragraphs 56 and 57 above. It would be built on the existing arrangements, in the manner that is proposed below in Section V. Within the network, there would be an international gene bank, under the auspices of FAO, consisting of the base collections that participating governments or institutions had agreed to place at FAO's disposal.

86. Part III stresses the importance of phytosanitary measures in the context of plant genetic resources. It also contains provision for adhering governments and institutions to provide FAO with reports on progress in the implementation of the principles of the Undertaking.

87. It is believed that the general principles in the Undertaking would be largely acceptable to all governments and international institutions. There may, however, be details (such as the principle of availability of all categories of plant genetic resources - see para. 31 above) on which it may not be possible to achieve universal acceptance. For this reason, the second operative paragraph of the Resolution makes it clear that governments and institutions would be able to adhere to the Undertaking subject to any limitations that they may specify.

IV. REVIEW OF EXISTING ARRANGEMENTS

Historical Development

88. The major developments leading to the present arrangements for global plant genetic resource activities are summarized in paragraphs 3 to 7 of the document presented to the Committee on Agriculture (COAG/83/10).

Existing Collections of Plant Genetic Resources

89. Appendix 7 of document COAG/83/10 gives a list of the major collections of plant genetic resources, and indicates the crops covered by each of them. A vast number of collected plant genetic resources (referred to as "accessions") are distributed among 90 countries. Many of the collections are active collections, maintained by plant breeding institutions for use in current breeding programmes. The crops most frequently included in global programmes are cereals and food legumes (see document COAG/83/10, Appendices 4 and 7). This indicates the importance that has been given to these staple food crops, to the preservation of their variability and to the amount of breeding work for their improvement.

90. A total of more than 293 000 accessions of cereal crops are held in three countries: the Soviet Union (106 000 accessions covering wheat, barley, sorghum and millet); the United States of America (124 000 accessions covering wheat, maize, barley and rice); and the Philippines (with 63 000 accessions of rice). Various other institutions (in particular, in Australia, Canada, China, Iran, Israel and Italy) hold appreciable amounts of wheat and barley collections (more than 19 000 accessions each). Most of the major collections of food legumes (totalling about 125 000 accessions) are found in China, Colombia, India, the Soviet Union, Syria, and the United States of America.

91. These figures should, however, be treated as indicative only, for the following reasons: In the first place, there has been no full assessment of the genetic variation represented by the accessions. In addition, a small collection of well-evaluated samples may be more significant than a larger collection of an institution that has not yet fully documented and evaluated the material it holds (see para. 17 above). Furthermore, the information available shows, for example, that of some 30 000 lines of wheat held at the Germplasm Institute in Bari, Italy, and the 37 000 at Beltsville, USA, 21 000 are common to both institutions. If one takes account of the extensive exchange of material between all the major institutions, one must conclude that duplication at the global level is far greater than that necessary for security (see para. 52 above).

92. Although global documentation is at present insufficient to give an accurate picture of the contents of the collections, it would seem, from an analysis carried out by the IBPGR, that land races make up the greater part of accessions in the global collections. The remaining part comprises breeders' material or plant varieties, and a few samples of wild species. There are also indications that the genetic variation in the collections is inadequate.

93. The conditions under which seed is stored in the various institutions are relatively good. There would, however, seem to be room for improvement with respect to the rejuvenation of material.

International Activities

94. International activities relating to all the various aspects of plant genetic resources are mainly carried out by the IBPGR (in collaboration with FAO), with respect to the resources of crops, and by FAO with respect to forest resources.

Activities of the IBPGR

95. The basic function of the International Board for Plant Genetic Resources (IBPGR) is to promote and support the collection, conservation, documentation, evaluation, utilization and exchange of plant genetic resources, at the global level, in order to ensure the sustained supply of useful material for national and international breeding programmes. The overall achievements of the IBPGR to date are summarized below.

96. Priorities for action. The first few years of operation of the Board were mainly devoted to the rescue of threatened germ plasm, on the basis of well-defined criteria in relation to crops and geographical areas, that were drawn up having regard to the urgent needs as highlighted by FAO. For this purpose, expert advice was obtained from the Board's advisory committees and working groups and individual specialists, and a large IBPGR field programme was developed. Emphasis was placed on major staple food crops. Since 1980, action has been taken to cover other crops, including major vegetatively propagated plants. There are now 50 priority crops, with respect to collection and conservation, in the 14 regions into which countries are grouped for the purposes of the IBPGR system. The crops include staple food crops and other species of worldwide or regional economic importance.

97. Collecting missions. The Board carries out, organizes or supports about 65 collecting missions each year. In general, the missions are headed by a scientist from the host country; samples of the material collected are always deposited with the host country, and local expertise is used. The missions are carried out in accordance with proposals to which the governments or government institutions concerned have previously agreed. More than 100 000 seed samples of priority species have been collected in the 250 missions carried out over the last few years. The cost of collecting one sample varies considerably: it may be as low as US$10 or as high as US$300. The IBPGR, which does not itself maintain collections, makes arrangements before the mission for the conservation of the collected material, under the most suitable scientific and technical conditions.

98. Conservation. The most important achievement of the IBPGR has been the promotion of a global network of base collections. This aspect is dealt with in more detail in paragraphs 101 to 104 below.

99. Documentation. The IBPGR has, in particular, prepared "descriptor lists", setting out the botanical characteristics of material, for 37 crops. Forty-five more lists are under preparation. It has a two-pronged approach to documentation: the preparation of directories providing information on existing collections and the establishment of data bases, and the mobilization of funds for documentation work. The directories for 1980 to 1983 cover rice, wheat, barley, sorghum, millet, maize, food legumes, root crops, some cash crops and vegetables. Information on fruit is at an advanced stage of preparation. The data will be kept under review and computerized. Detailed inventories on a crop-by-crop worldwide basis are being developed by specialized institutes and coordinated through the IBPGR. The emphasis of the data bases being developed by the IBPGR is on information enabling the comprehensiveness of existing collections to be assessed.

100. Training. Training under the auspices of the IBPGR is available on all major aspects of genetic resource activities. About 160 trainees have attended a one-year post-graduate course, initiated in 1969 at the suggestion of FAO, on the conservation and use of plant genetic resources, at the University of Birmingham in the United Kingdom. The courses have received financial support from the IBPGR and the United Nations Environment Programme, during the past eight years. Five hundred trainees from developing countries have attended short technical courses, at a number of agricultural research institutes, on various subjects, including exploration techniques and seed technology for gene banks. Study tours have been arranged for about 100 scientists from different parts of the world. In addition, the Board has organized or co-sponsored regional workshops and technical conferences.

The IBPGR conservation network

101. With the cooperation of the institutions maintaining collections of plant genetic resources, the IBPGR has promoted a network of base collections. It has at present designated 38 institutions in 29 countries to hold collections covering 33 crops (see document COAG/83/10, Appendix 4). The institutions bear the cost of operating the base collections, and release material to centres holding active collections, for the purpose of exchange. Repositories for the resources of vegetatively propagated crops have, since 1981, been designated by the IBPGR for certain crops.

102. As has previously been explained, base collections are intended essentially for the long-term storage of resources, and thus for their preservation rather than their exchange, for plant breeding and similar purposes. It is planned to expand the IBPGR network to cover 100 centres, two thirds of which would hold active collections.

103. An examination of information concerning important crop resources held in collections, including those of the major staple cereals, legumes, vegetables, annual oil seeds, root crops, banana and plaintain, has shown that, in addition to the gene banks in the IBPGR conservation network, significant collections exist in 100 countries.

104. The centres holding these collections are distributed over seven regions: 26 in Europe, 23 in Africa, 19 in Latin America, 14 in Asia and the Far East, 12 in North Africa and the Near East, 3 in the Pacific, and 2 in North America. Seventy-seven are in developing countries, several of which (for example, Brazil, China, India and Peru) have a relatively large number of accessions covering various kinds of crops. However, 15 of the 100 countries do not yet have an adequate gene bank.

Activities relating to Forest Resources

105. For more than 15 years, FAO has been coordinating the activities of national institutes, supporting ongoing work relating to forest resources, and highlighting global, regional and national priorities. The seed and other propagating material collected by countries under this global seed programme is temporarily stored, if possible, in the country of collection. The centre holding the material then distributes it, in accordance with requests by FAO, for the purpose of evaluation, conservation and seed production or selection stands of species of value to the region, country or area concerned.

106. For conservation, the seed is rarely put into long-term storage; the emphasis has been on living collections in situ or ex situ. Genetic improvement work is always performed with respect to populations of plants that are specially created for that purpose, leaving the wild species with maximum variation. Collection, exploration and evaluation work is left to the countries themselves; this maximizes local interest and knowledge in the resources.

107. The programme benefits from advice provided by an FAO Panel of Experts on Forest Gene Resources (consisting of specialists acting in a personal capacity), established in 1968.

Problems of a Scientific and Technical Nature

108. A major constraint on the establishment of collections of seed and other plant genetic resources in developing countries is their inadequate infrastructure for the maintenance and use of those resources. In many national gene banks, inadequate seed storage facilities and the lack of land and skilled labour place severe limitations on the number of samples in a collection and on the frequency of rejuvenation of the material conserved. Equipment for the maintenance of an acceptable level of hygiene is also lacking. Facilities for the collection of resources in remote areas (such as vehicles, camping equipment and field instruments) are not always available. Essential activities, such as the collection and multiplication of genetic resources, are often in jeopardy due to insufficient funds. Of these constraints, the inadequacy or lack of storage facilities would seem to be the most serious. The provision of such equipment involves large inputs in terms of installation and maintenance costs. The amount of material to be stored, its safety, and the frequency of rejuvenation and the flow of samples for evaluation and exchange are dependent on the quality and size of the storage facilities available. Equipment to maintain a miniature plant quarantine system is also needed, especially as, in many developing countries, the national quarantine programmes are not sufficiently developed.

109. The lack of funds and qualified plant breeders also place serious constraints on the creation of essential links between gene banks and breeding programmes. Breeders frequently do not make use of primitive material. The general tendency is to take advantage of modern cultivars, often with less potential for plant breeding, since primitive lines, which usually represent a major part of the collections of gene banks, have no immediate value as varieties and are difficult to use in breeding work.

110. Cooperative links of the kind referred to depend upon the adequate evaluation of the material in gene banks. Progress in the characterization and evaluation of material has been slow in many national gene banks. This is due to the much greater priority that is often given to collection and conservation activities, and to the lack of funds and qualified personnel. The present cost of growing out one sample for characterization varies from about US$10 to 50, in the case of most food crops.

111. The non-availability of data, at least in a usable form, is a general problem. Whereas data are generated at all stages of genetic resource activities from collecting in the field to evaluation, their assembly and storage, and the retrieval procedures, are often insufficient to enable their use in the most efficient way. Moreover, especially in the case of the older existing gene banks the data may not have been properly gathered at the time of collection; material unaccompanied by data may have been obtained through exchange; and the greater part of the samples in the gene bank may not have been characterized and evaluated.

112. There also appear to be problems concerning the duplication of material in collections: there are indications not only of an excessive duplication, referred to in para. 91 above, but also of insufficient duplication of certain significant genetic resources.

113. Finally, a constraint on the achievement on maximum genetic variation is the tendency of many gene banks to restrict the material conserved to that which is of direct use to current breeding programmes.

Legal and Institutional Aspects of the IBPGR System

114. The following paragraphs of this Section examine how the present network, and the related activities, are coordinated, how far governments are involved in such activities at the international level; the extent to which those activities are the subject of a commitment; and how the activities are financed.

The components of the network

115. The IBPGR network consists, on the one hand, of national and regional institutions and, on the other, of the international agricultural research centres (IARCs) in the system of the Consultative Group on International Agricultural Research (CGIAR).

National and regional institutions

116. These institutions, or the governments responsible for them, have retained full autonomy with respect to plant genetic resource activities. Decisions as to the mandate of the institutions, including the crops that they will cover and their policy concerning the release of material, and to the standards to be observed in the performance of their mandate, thus rest with the governments or institutions concerned.

The CGIAR system

117. The CGIAR has been described (in the Report of the Second Review of the CGIAR, 1981, para. 3.10) as "an informal association of countries, international organizations and private institutions with a common understanding that they will consult and agree on ways in which they will support international agricultural research". It was initiated in 1971 under the co-sponsorship of FAO, the World Bank and the United Nations Development Programme (UNDP). Apart from the sponsors, the members are in two categories: the donors, and representatives of developing Member Nations of FAO elected biennially by the countries in the five FAO regions concerned. The CGIAR has no constitution, no legal personality and no rules of procedure. Decisions are taken by consensus. The basic objective of the CGIAR is to support international agricultural research for the improvement of food production in developing countries. In addition to the Secretariat, provided by the World Bank, the CGIAR has a Technical Advisory Committee (TAC), which *inter alia* advises the CGIAR on the main gaps and priorities in agricultural research related to the problems of developing countries. TAC consists of a chairman and 12 members, appointed by the co-sponsors and serving in their personal capacity, half of whom are from developing countries. The Secretariat of TAC is provided by FAO.

118. The donor members of the CGIAR provide financial support to 13 international institutions, many of which have been established to carry out multidisciplinary agricultural research. For convenience, they are all (apart from the IBPGR - see below) referred to here as the International Agricultural Research Centres. Plant genetic resources is one of the aspects of the work of nine of the IARCs; six of them hold base collections of such resources and three are establishing them. The IARCs have legal personality, either as internationally-oriented institutions incorporated under a national law or (in one case) as an intergovernmental organization. The IARCs are autonomous, working (except in the case of the intergovernmental organization) under the overall direction and supervision of a Board of Trustees, whose members act in a personal capacity. In the case of many of the institutions, some of the members of the Boards are designated by the CGIAR.

119. The IBPGR is also an institution in the CGIAR system. It was established in 1974, on the recommendation of the CGIAR, as an autonomous international, philanthropic, non-profit organization. The IBPGR does not have legal personality. The only legal instrument relevant to its establishment is a letter of agreement concluded between FAO and donor members of the CGIAR to set up a trust fund to finance the IBPGR's activities. The text of this agreement is reproduced in Appendix B hereto. The IBPGR is managed by its 15 members, serving in their personal capacity, of whom not less than half are to be nationals of developing countries. Thirteen members are elected by the CGIAR, on the recommendation of the IBPGR. FAO and the United Nations Environment Programme (UNEP) each appoint one ex-officio non-voting member. The Executive Secretary of IBPGR also acts as an ex-officio member. The Chairman of the IBPGR is elected by the Board in consultation with the Director-General of FAO. The IBPGR has an Executive Committee, with power to act on behalf of the Board, comprising the Chairman, Vice-Chairman and three other elected members. The member designated by FAO and the Executive Secretary (an FAO official) also participate. Two of the members are to be from developing countries. FAO provides the Executive Secretariat. The IBPGR has set up a number of advisory committees and working groups, whose members serve in a personal capacity.

120. The Board has, with the approval of the CGIAR, adopted terms of reference. The most recent version is reproduced in Appendix C hereto. However, the IBPGR's main function, described above, concerning the promotion of coordination of the international conservation network, is not immediately apparent from that version.

The decision-making process with respect to IBPGR activities

121. In establishing its global priorities for action, including the choice of priority crops and geographical areas (see para. 36 above), the IBPGR seeks the opinions of experts of international repute. These priorities are regarded as flexible guidelines for action and are revised from time to time. For the establishment of priorities at the regional nd national levels, the IBPGR organizes international consultations, at which it invites the participants to report on progress with respect to plant genetic resource activities and to inform it of the needs of the countries concerned.

122. The proposed programmes of the IBPGR are presented annually to the TAC for analysis. They are then considered by the CGIAR, whose members may make comments or suggest changes and approve the budget for the IBPGR. Reports on the IBPGR's activities are received by FAO as a member of the CGIAR, and reports on regional activities are submitted to the governments concerned through FAO. Moreover, FAO's Sub-Programme 2.1.2.1.(Genetic Resources), which covers activities performed in the context of the IBPGR, is reviewed, with respect to its implementation and future planning, by the relevant FAO governing bodies - COAG, the Programme Committee, the Council and the Conference.

123. With respect to the funding of activities by the IBPGR, decisions are taken by the Board itself and, within the limit of US$75 thousand, by its Executive Committee. The Executive Secretary may also take decisions on funding within the Programme approved by the Board up to an amount of US$10 thousand.

The involvement of governments in international activities

124. As has been seen, the IBPGR is managed by experts acting in their personal capacity. Its programme is presented through TAC, whose members also act in their personal capacity, to the CGIAR, which is in essence an informal association, although representatives of

States and intergovernmental organizations take part in its discussions. There is a further intergovernmental element in that FAO is represented in the IBPGR and provides the Secretariat of the IBPGR and the TAC. The day-to-day work of the IBPGR is therefore carried out by FAO officials. Because of the links between the activities of FAO and the IBPGR, the activities of the latter in effect come to some extent within the scope of the review by the FAO governing bodies.

125. At the regional and sub-regional levels, there has been an increasing governmental involvement in the coordination of plant genetic resource activities, which had previously been largely dependent on the initiatives of scientific institutions. In 1976, a Working Group, consisting of representatives of governments in the Southeast Asia Region and sponsored by the IBPGR, adopted a proposed organizational framework for a Regional Cooperative Programme for the exploration, conservation, evaluation and documentation of plant genetic resources of significance to the region. The Programme was to be administered, under the auspices of IBPGR, by a Regional Committee representative of the participating countries. The Regional Committee held its first meeting in 1978, and has been an important forum for presenting to the IBPGR the views and priorities of governments in the Southeast Asia Region.

126. In Europe, on the suggestion of FAO and some countries in the Region, and with financial assistance from UNDP, a European Cooperative Programme was established in order to support and strengthen the inter-institutional cooperation, relating to plant genetic resource activities, that had been promoted by some governments and private organizations, in particular the European Association for Research on Plant Breeding (EUCARPIA), and individual scientists. The Programme is coordinated by a Governing Board, consisting of government representatives, which receives advice from a Scientific Advisory Committee, composed of experts in their personal capacity. Each participating government appoints a national coordinator to facilitate the day-to-day implementation of the Programme at the national level. The first two objectives of the Programme are to further the activities of national and sub-regional institutions for plant genetic resources in Europe, by supplementing and strengthening cooperation through the establishment of intergovernmental links, and to constitute the European part of the global network in the IBPGR system. The other objectives cover a wide range of plant genetic resource activities, including the furtherance of the exchange of material, both within Europe and between Europe and other regions.

127. Of the sub-regional initiatives of a governmental nature in Europe, mention might be made of the Nordic Gene Bank, established in 1979, and the network of genetic resources established by the countries of the Council for Mutual Economic Assistance (CMEA).

128. An organizational framework of the kind established for Southeast Asia and Europe was proposed last year at a meeting of Liaison Officers for the IBPGR Mediterranean Programme, and also at an IBPGR sponsored regional meeting, of government representatives, on plant genetic resources in the Andean Region. It should be noted, with respect to the international consultations referred to in paragraph 121 above, that the IBPGR in most cases invites governments to designate two participants, one of whom is to be the spokesman of the government. The IBPGR has also invited governments to appoint liaison officers to provide a link with the Board, as well as national coordinators with respect to IBPGR activities.

129. A form of global forum for the general discussion of plant genetic resource activities is also provided to some extent by international conferences, sponsored by FAO and the International Biological Programme of the International Council of Scientific Unions, and, for the last such conference in 1981, by FAO, UNEP and the IBPGR. These conferences are held at about six-yearly intervals.

Commitments relating to plant genetic resource activities

130. In Section III above, reference was made to conventions establishing national and collective commitments that are relevant to the subject matter of Resolution 6/81. The participation of States in the Southeast Asia and European Cooperative Programmes represents collective commitments corresponding to those envisaged in Resolution 6/81, but essentially do not entail individual commitments for the participating governments.

131. With respect to the IBPGR conservation network, the question arises as to how far the governments and institutions participating in it have entered into a binding commitment of the kind recommended in Section II (paras. 59 and 60 above). The practice has been for the Executive Secretary of the IBPGR to write a letter to a potential cooperating institution inviting it to accept designation for maintaining a specified base collection or collections. The relevant extract from a typical letter is reproduced in Appendix D hereto. The general substance of the letter corresponds to a great extent to the requirements stated in para. 60 above.

132. The wording of the letter could be improved, since it merely states that "The Board's policy...is to require the following commitments:...", and adds that "On this basis, the IBPGR invites the (institution) to accept designation". Nevertheless, the acceptance of a designation would probably be construed also as an implied acceptance of the commitments. To have a firm legal basis, however, a commitment should be established in an agreement between two (or more) legal persons. The IBPGR and, perhaps in some cases, the cooperating institution do not have legal personality.

133. A formal commitment to carry out certain activities in the interest of the international community is clearly important in the case of national cooperating institutions. This may also be true, to a certain extent, with respect to international institutions: in the report of the TAC quinquennial review of the IBPGR, 1980, it is stated (page 26): "The IARCs are independent bodies, each having generally a strong interest in assembling the germ plasm it needs for its own work but with no necessary commitment to (genetic resource conservation) activity beyond those limits." However, in a recent statement to FAO (of 1 July 1983), the Directors of the IARCs participating in the network "pledge their total support to the conservation and effective utilization of crop genetic resources".

Funding of plant genetic resource activities

134. As stated above, the IBPGR conservation network comprises national and regional institutions, and IARCs holding base collections. The financing of the former institutions is largely a matter for the governments concerned. The IARCs and the IBPGR mainly depend for their financial support on the CGIAR system. The CGIAR itself does not provide contributions; it approves its programme and the budget levels of the activities it supports. Each donor member annually pledges a specific amount (one member contributes on a pro rata basis of 25 percent of total contributions) for activities selected by it within the system. No more permanent commitment is made by donors. However, there would appear (from the Report of the Second Review of the CGIAR, November 1981, para. 3.7) to be an understanding that, on becoming a member of the Group, donors accept a long-term - but unquantified - responsibility in this respect.

135. In 1983, the CGIAR agreed to set up a stabilization mechanism in funding, for which, as a final step, the World Bank will make available the equivalent of 2.5 percent of total contributions by the CGIAR system. This would be in addition to the 10 percent of total contributions which the Bank is already providing and which can serve to fill any gaps in the support to the various IARCs.

136. As far as the planning of funding is concerned, the IARCs submit to the CGIAR through TAC an outline of their proposed budget for the two following years, as well as budget projections for an additional three years.

Conclusion

137. The essential characteristic of the present system for the coordination of international activities relating to plant genetic resources is its lack of institutionalization. It derives from the CGIAR, an association without legal personality or legal structure, though with intergovernmental participation. The coordination is promoted by the IBPGR, an entity without legal personality. The activities are performed by institutions which have retained the authority to decide on their programmes, although - in the case of the IARCs - an overall review is carried out by TAC and the CGIAR. Certain essential guarantees with respect to plant genetic resource activities in the IBPGR system are contained in a letter of commitment for which, however, there is no firm legal basis. Furthermore,

the IARCs depend, for their financial support, to a large extent on voluntary contributions from CGIAR donors, which do not make longer-term commitments in this respect.

138. The orientation of the activities is largely influenced by the advice of experts, who - while they are nationals of a broad range of countries - do not in most cases represent their governments. Although the IBPGR has encouraged links with governments, in the appointment of liaison officers, for example, as well as intergovernmental links, in the form of the regional organizational frameworks, those links cannot be considered part of a general institutional structure, particularly as there is no institutional apex.

139. Furthermore, there is no established mechanism for the global coordination of plant genetic resource activities. While the IBPGR's work in the promotion of coordination is of considerable value, the IBPGR has limited resources (about US$4 million annually) and many other responsibilities.

140. However, the informal and scientific approach of the IBPGR ensures that the orientation of activities, which mainly depends upon scientific considerations, is carried out with scientific professionalism. Moreover, the voluntary donations of the members of the CGIAR, and the decentralization of the various activities, have resulted in the mobilization of substantial financial support (the contribution in 1983 for plant genetic resource conservation amounted to about US$14.5 million) and in an expanding network of gene banks.

141. At the same time, the responsibility for ensuring that the needs relating to plant genetic resources are satisfied ultimately rests on governments, individually and collectively. This does not necessarily mean that all activities must be carried out under their direction and control. For the fulfillment of their responsibility, they can rely on initiatives outside their direct control provided that they are satisfied that the activities fully respond to present and future needs. However, reliance cannot reasonably be placed on a system, however effective, if it offers no firm guarantee of permanence. At present, there is no such guarantee, either on the part of the CGIAR system as a whole or on the part of its individual components.

142. In addition, the IBPGR system has been criticized by some countries as working unfairly with respect to developing countries: reference has been made to a significant concentration of plant genetic resources in the gene banks of industrialized countries; to an orientation of activities to resources of cultivars valuable to the agriculture and industry of industrialized countries, to the detriment of resources of great importance to developing countries, such as breeders' lines; and to a lack of guarantee concerning the free availability of resources.

143. While other countries hold an opposing view, the fact that such criticism has been made at least highlights an important lacuna in the present situation: namely, the absence - apart from some indirect influence that can be exerted through FAO - of an established mechanism, at least at the global level, through which States can collectively monitor plant genetic resource activities, and express their views and concerns.

V. MEASURES THAT COULD BE ADOPTED IN THE LIGHT OF THE BASIC PRINCIPLES, OBJECTIVES AND REQUIREMENTS

International Bank for Plant Genetic Resources

144. In line with Resolution 6/81, the starting point in the examination of possible measures to improve the present arrangements relating to plant genetic resources was a study of the feasibility of establishing an international bank for plant genetic resources of agricultural interest under the auspices of FAO. This study is contained in paragraphs 61 to 119 of the Proposal presented to the Committee on Agriculture (document COAG/83/10).

145. It was noted, however, that, for the establishment of such a bank, considered as a single physical entity, a number of difficult problems would have to be faced and that the cost involved in the construction and in the operation and (permanent) maintenance of the bank would be large, even if the capacity of the bank were reduced to a minimum. Indeed,

there was a consensus in the Committee on Agriculture that the indicative figures, given in the study with respect to the costs, were in all probability underestimated (see document CL 83/9, para. 229).

146. In the light of the above, a government has suggested that consideration could be given to the establishment of a pioneer gene bank under the auspices of FAO, which would make use of facilities and material that some governments would be prepared to offer. While it is not possible to estimate the cost involved for FAO in the absence of detailed information on the support and facilities that might be available from governments, solutions of this kind should be borne in mind, especially if it does not prove possible to realize the concept of the international gene bank, as suggested by the Committee on Agriculture.

147. As stated in paragraph 34 above, the suggestion of the Committee on Agriculture was that the international gene bank should be considered as an international concept, rather than as a single physical entity, and that account should be taken of relevant ongoing activities.

148. Paragraphs 54 to 63 of Section II have described an international network of base collections that could be established in line with Resolution 6/81. Section IV has examined the existing conservation network. It has been suggested by some governments that, in view of the discussions of COAG, an international network of base collections, founded on the present network, could be considered as constituting in practice an international gene bank. Further scientific and technical aspects of such a gene bank are discussed immediately below. The additional element in the Conference's Resolution - namely, an international gene bank that would operate under the auspices of FAO - is the subject of the subsequent paragraphs relating to legal and institutional aspects.

149. In view of the present state of development with respect to the exploration and conservation of plant genetic resources, the concept of the network should be an evolving one, starting from a realistic base and envisaging a minimum comprehensive coverage by a certain date.

150. The network would, subject to the agreement of the governments and institutions concerned, comprise the base collections that have already been designated by the IBPGR for 32 crops, or groups of crops, in 38 institutions situated in 29 countries. Additional collections are planned, account being taken of priorities developed by the IBPGR. These priorities would be reviewed and further developed, with the participation of governments, with the aim of establishing a comprehensive system for major crops, which would, in time, satisfy the main needs relating to plant breeding, conservation and geographical coverage.

151. Within the legal framework outlined below, the IBPGR would advise and be consulted on the further expansion of the network, through the designation of existing national or international institutions as base collections. As the coverage of the network evolved, it might be necessary to establish completely new facilities for base collections of particular crops. The national, regional or international authority that would be responsible for the administration of such collections would be decided by the participating governments.

152. The material in the base collections of the network, and the availability of that material, would in principle cover all categories of plant genetic resources. However, subject to the agreement of FAO in particular cases (see para. 167 below), qualifications of that principle would be possible.

153. As base collections must function as long-term depositories of world genetic resources, they should, as explained in paragraph 55 above, be linked with active collections. Most of the exchange of genetic resources would take place between the numerous active collections and plant breeding and other scientific institutions. Requests for material from the

base collections would be made only where active collections were not able to supply samples of it.

154. The financial implications of an international gene bank, established as a network of base collections can be estimated from various sources. The calculations of expenditure in Appendix 8 of document COAG 83/10 can be used as one source of reference. The views of administrators of gene banks, and estimates of expenditures provided by IARCs, indicate that actual costs are probably about 50 percent higher than the estimates in document COAG 83/10. Appendix E to this Report summarizes, as a second source of reference, the budget estimates provided by IARCs.

155. The most complete information on expenditures for a genetic resources centre has been given with respect to the International Rice Research Institute (IRRI), in which base collections are linked to active collections and have been systematically evaluated over the last ten years. IRRI's collection was initiated 20 years ago. It includes wild material as well as advanced breeding lines, with a total of 63 000 samples, and it is adjacent to experimental fields and laboratory facilities. The investment cost of the building has been US$4 million and the cost of other facilities, including a seed health unit, has been over US$1 million. The operational costs, including overheads, training and collecting, are in the order of US$1 million per annum. Further details are provided in Appendix F hereto.

156. IRRI's operational costs seem to be basically in agreement with those of other IARCs, as can be seen in Appendix E, which indicates that nine centres together spend an annual amount of US$10 million on plant genetic resource activities. Expenditures for the annual maintenance of small collections are much below the average in the Centro Internacional de Mejoramiento de Maís y Trigo (CIMMYT) (US$350 000), while for the Centro Internacional de la Papa (CIP) the annual operational costs of maintaining germ plasm of a vegetatively propagated crop (potato) are much higher (US$2.5 million). The maintenance of living plant collections generally results in higher expenditures per sample unit and are demanding on land and labour. It should be recalled that 3 000 coconut samples occupy 300 hectares in Java, an overpopulated island where the average holding is less than one hectare per family, entailing therefore a very high annual rent. In addition, the cost of maintaining a plantation healthy and clean, without any commercial return, has to be met.

157. Expenditures for the evaluation of plant genetic resources have to be considered in addition to the cost estimates provided for a genetic resources centre, which include expenditures only for the most basic evaluation of a descriptive nature. Considerable additional costs are involved, depending upon the crop to be evaluated, in the systematic screening of genetic resources for resistance to particular diseases, quality characteristics such as amino-acid composition of proteins and crossing ability, for example.

158. The establishment of an international gene bank as a network of base collections can be achieved only on the assumption that the present financing of the participating base collections, by the national or international agencies supporting them, would continue. Moreover, this financing should be based on commitments, even increased beyond the present level, so as to avoid any weakening of the base collections and their related genetic resources activities, and, if possible, to strengthen them.

Strengthening of National Capabilities

159. An important component of an international system covering plant genetic resource activities, would be action to assist countries with limited facilities in strengthening their capabilities with respect to such activities, both within and outside the context of the international network of base collections proposed above.

160. The difficulties outlined in paragraph 108 above, relating to the establishment and maintenance of gene banks, are only a few examples of the constraints facing many developing countries. However, international action should first concentrate on the strengthening of national plant breeding capabilities. Without such capabilities, the establishment of a national gene bank, and the international network of base collections, would be ineffective.

161. In this connexion technical cooperation - in addition to assistance by countries with advanced breeding techniques - is an important element. National capabilities can be

strengthened through cooperative links between developing countries, and between the latter and countries or institutions with advanced breeding programmes. In the first place, such links would be useful in order to distribute the work involved in the storage and rejuvenation of plant genetic resources, thus sharing the costs which might otherwise unduly burden the financial resources available for other activities at the national level. Encouragement should also be given to joint activities carried out by institutions conserving the same kinds of crops or experiencing similar problems. Such activities would reduce the costs for both institutions. Collaborative research work would be helpful in strengthening breeding programmes in countries with limited manpower and facilities, and would, at the same time, serve as a mechanism for the transfer of technology.

Legal and Institutional Aspects

162. The preceding paragraphs of this Section have suggested that an international bank for plant genetic resources could consist of an international network of base collections, built to the extent possible on the existing IBPGR conservation network, and that an international system, comprising the International Gene Bank, should provide other services, in particular those related to the strengthening of the capabilities of developing countries. The following paragraphs suggest possible measures, of a legal and institutional nature, that could be taken to improve the present system for the conservation network and related activities.

163. The main lacunae in the present system were identified, in Section IV, as the lack of a longer-term commitment concerning the operation and performance of the system, and the absence of any mechanism for significant governmental participation. One way of filling these lacunae would be the introduction into the CGIAR system of a greater degree of institutionalization and governmental participation. A solution of this kind was considered in the Second Review of the CGIAR, 1981, and the conclusion was, in effect, that it would run counter to the basic philosophy of the CGIAR. The following paragraphs explore an alternative solution, which would seem to be capable of satisfying the main concerns expressed by some countries, without essentially affecting the CGIAR/IBPGR system. Moreover, if significant changes in that system were later considered necessary, the solution outlined below would provide a procedure for giving the matter in-depth consideration.

An FAO legal framework

164. It is suggested that the present activities of the IBPGR would not be prejudiced, and would indeed be strengthened, if they were carried out within a legal framework under which FAO would take charge of the legal aspects of the conservation network and which would also enable States to exercise their collective responsibilities with respect to plant genetic resources.

The legal aspects of the IBPGR's activities

165. One such legal aspect covers agreements relating to assistance provided by the IBPGR to governments. In the Report of the TAC Quinquennial Review of the IBPGR, 1980, it was noted (para. 4.5.4) that the IBPGR's de facto association with FAO "has immeasurably aided the international activities of the Board". The agreements referred to could be placed on a firm legal basis, and the association with FAO would become clearer, if the agreements were concluded between the governments concerned and FAO. The substance of the agreements would not be affected. The latter would still relate to assistance that would be provided by FAO officials in the context of IBPGR.

166. As far as the conservation network is concerned, the most important activities having legal aspects are the designation by IBPGR of the components of the network, and the related commitments made by the latter. This designation could be made by FAO (after consultation with the IBPGR), and the commitments could be made to FAO. In connexion with the commitments, the main defect is that they are at present made to an institution that has no legal personality (see para. 132 above). The commitments would be placed on a firm legal basis if they were made in an agreement concluded between the institution concerned, or preferably (where applicable) the government or governments responsible for that institution, and FAO.

167. The first step would, therefore, be for FAO to invite governments and institutions that are at present participating in the IBPGR conservation network to continue their activities, within the legal framework referred to above, under an agreement with FAO, which would basically specify the crops that would be conserved by the government or institution, and set out the latter's commitments. If a government or institution were unable to accept all the commitments proposed by FAO, its reservations should be stated clearly, so that FAO could decide whether or not they were of such a nature as to preclude designation.

168. Under these arrangements, the material in the base collections would be held in the context of the international network, but would continue to be under the ownership and control of the governments or institutions concerned.

169. A further important step would be for FAO to invite governments or institutions that had accepted the commitments proposed, particularly those relating to the full availability of samples, to place the material in their collections at the disposal of FAO. They would continue to administer the collections, but would provide material that had been requested by FAO (requests would be limited to material that could not easily be obtained elsewhere), and would allow FAO access to the collections in order to ensure that they were being administered in accordance with internationally agreed standards. In these circumstances, such base collections could be considered as forming part of an International Gene Bank under the auspices of FAO, in line with Resolution 6/81. An offer to hold a base collection available in this way was made by Spain (see Appendix G) to the Committee on Agriculture at its Seventh Session. It is likely that other governments or institutions would also be willing to participate in such an International Gene Bank.

170. The same kind of arrangements would be made by FAO with respect to new centres agreeing to participate in the network.

171. Finally, this FAO legal framework would be the context for the necessary intergovernmental participation in the global coordination of the network as well as of plant genetic resource activities in general. This aspect is elaborated below.

Governmental participation

172. As has been noted in Section IV (see paras. 125 to 128 above), there has in the relatively recent past been an increase in governmental participation in international plant genetic resource activities, particularly in the case of the organizational frameworks that have so far been established in Southeast Asia and Europe, side by side with the IBPGR system. At the national level, the regional committees are complemented by national committees established by the participating governments, or national coordinators appointed by them. FAO and the IBPGR should continue to encourage and facilitate these developments.

173. The main lacuna at present is the absence of any similar organizational framework at the global level. This lacuna could be filled through the establishment, within the framework of FAO, of an intergovernmental committee or other body open to all interested States. The main functions of such a body could be:

(a) a review of the operation of the conservation network, including the international information system proposed below (paragraphs 181 to 189) as well as of plant genetic resource activities in general, including the examination of the reports of the IBPGR which are received by FAO as a member of the CGIAR and reports which the regional committees might be invited to provide to FAO;

(b) the discussion of questions of particular concern to governments, and the formulation of related recommendations to be made, through FAO, to the CGIAR and the IBPGR;

(c) the adoption by governments of the priorities and standards developed under the auspices of the IBPGR; and

(d) the coordination of the support that States may, individually or collectively, be able to provide to overcome problems encountered, especially those related to the conservation network and to conservation and plant breeding activities in developing countries.

174. The above functions could be carried out by the Committee on Agriculture, in the context of its review of the biennial programmes of work of the Organization and their implementation (under Rule XXXII.6(c) of the General Rules of the Organization (GRO), regard also being had to para. 6(d) of the same Rule). The Committee on Agriculture may in exceptional cases establish subsidiary bodies under the conditions set out in GRO XXXII.12. With respect to the biennial review relating to plant genetic resource activities, it would be desirable that COAG should set up such a subsidiary body for two reasons:

(a) to avoid an increase in the already heavy workload of COAG itself, and

(b) to enable all potentially interested States to participate as full members of the body: under GRO, Rule XXXII.13, the Committee may include Member Nations that are not members of COAG in the membership of subsidiary bodies (subpara. (a)); and the Council may admit to membership of such bodies non-members of FAO which are members of other organizations in the UN system (subpara. (b)). In this context, it should be noted that two countries that are not Member Nations of FAO (the Soviet Union and the German Democratic Republic) hold significant collections of plant genetic resources.

175. With respect to secretariat services for the subsidiary body, reliance could be placed on the FAO unit which is at present also engaged in activities relating to the IBPGR. Since the subsidiary body would meet only biennially, the workload on that unit should not be unduly increased. The main financial implications for the Organization would be the increased cost of interpretation and other facilities for the meetings.

Financial security

176. The present lack of financial security, especially on a long-term basis (see para. 134 above), is a problem that will require detailed consideration, and could be one of the essential questions to be discussed in the context of the subsidiary body referred to above.

177. A suggestion has been made by the Government of the Netherlands in a letter to the FAO Secretariat dated 10 June 1983: "In the case of more funds becoming available, the establishment may be considered of a 'World Gene Fund', to be administered by an international agency, such as FAO. The IBPGR could act as an advisory body, or alternatively as a sub-contractor taking responsibility for the conservation of the major food crops worked upon by the CGIAR institutes." A fund of this kind could be administered by FAO as a trust fund or a reserve fund, or it could be established under the sponsorship of FAO but outside its framework.

178. Even small annual contributions made by governments and financing agencies to a fund which would only be used to meet emergency cases arising in the operation of the conservation network (or to complement other sources of assistance in such cases), would be a desirable first step. It would also be of assistance if donors, particularly those of the CGIAR system, could give the international community an advance indication of the amounts that they would be making available for plant genetic resource activities, in order to facilitate forward planning.

179. Furthermore, while governments and funding agencies may be faced with competing priorities, many of which may be considered as important as plant genetic resource conservation, it can in general be said that there is one essential difference in the case of conservation work. Whereas a budgetary reduction could lead to a delay in the implementation of other activities, a reduction in the funds necessary for conservation work could result in the irretrievable loss to humanity of valuable material. This point should be borne in mind when funding priorities are assigned.

180. Irrespective of the amount of funds that can be made available for plant genetic resource conservation in the future, financial security could be improved if conservation was treated separately from other activities: it would be desirable that institutions with responsibilities covering plant genetic resources should prepare separate programmes relating to conservation work, with their own budget and budgetary projections for the longer term, that governments should allocate funds to the institutions specifically

for such work, and that donors should assign their contributions to a special fund to be used exclusively to finance conservation activities.

International Information System for Plant Genetic Resources

181. As explained above (see paras. 56 and 57), the international network of base collections must be complemented by information systems at the national, regional and international levels. While valuable work is being promoted by the IBPGR in this connexion the lack of information, in a readily retrievable form, is perhaps the most serious weakness of the present system from a scientific and technical point of view.

182. The data available for individual gene banks, as well as the ways in which they are kept, show a great diversity, ranging from the simple filling in of cards with the most elementary information, such as the place and date of collection of a sample, to computerized data, including the location of individual genes along each of the chromosomes of certain species. Considerable efforts have already been made by the IBPGR to assist individual genetic resources collections to improve their information systems, including computerization.

183. Experience has demonstrated that progress in plant genetic resources information has to be pursued on a crop-by-crop basis, and the IBPGR has issued, in collaboration with its advisory committees, the IARCs and regional programmes, lists of crop descriptors in order to standardize information collection and exchange. The wide acceptance and application of those standardized descriptors should be further pursued, and institutions holding base collections should take the lead in these efforts, as already under way through IRRI for rice, IBPGR for wheat, ICRISAT for sorghum and millet and CIP for potatoes, to give only a few examples.

184. It is necessary to ensure that the data from the evaluation of plant genetic resources flows back to the base collections.

185. With increasing information becoming available and the evolution of the international network of base collections, a central focus for plant genetic resources information would be essential. Earlier attempts to concentrate all available information in one centralized data bank, initiated by FAO in 1973 and pursued by the IBPGR during 1974/75, demonstrated that this is an impractical and difficult solution.

186. It is therefore suggested that an International Information System on Plant Genetic Resources should be established, and should take advantage of the previous experience and of collaboration with the IBPGR. It should be developed so as to interlink the main existing crop-based information systems in base collections and to incorporate new ones, in order to enable the retrieval, from a central point, of the information existing in each institution participating in the international network of base collections. The system should be designed in such a way as to ensure the compatibility of the information systems developed in individual centres with respect to computer hardware and software.

187. The system should also include information from relevant institutions outside the proposed international network of base collections.

188. In order to place the international information system within the legal framework described above, and in view of FAO's experience in successful information systems, such as AGRIS and CARIS, FAO would seem to be the most appropriate organization to administer the system, in collaboration with the IBPGR, concluding the necessary agreements with cooperating institutions.

189. The establishment of an International Information System on Plant Genetic Resources, administered by FAO, would require the provision of additional funds to FAO. Without a more concrete assessment of the form of the system and its requirements, it is not possible to give a precise estimate of the amount involved.

VI. CONCLUSIONS

190. This Report demonstrates the tasks that must be carried out in order fully to ensure the exploration, collection, conservation, documentation, evaluation, availability and utilization of plant genetic resources, including the dependence of the extent to which plant genetic resources can be utilized, for the benefit of the agricultural development of each country, upon the strength of the capabilities in that country for plant breeding.

191. The Report recognizes the achievements of international cooperation to date, while demonstrating that many scientific and technical aspects of plant genetic resources are in need of further development, which will require increasing support from all interested countries and strengthened international collaboration.

192. This Report, in Section IV, identifies certain major constraints in the context of the present international arrangements, which can be summarized as follows:

(a) the lack of the necessary personnel and facilities in many developing countries, and their pressing needs for assistance in training and equipment, for satisfactory participation in plant genetic resource activities, and for deriving the full benefits of those activities;

(b) shortcomings of a scientific and technical nature - in particular insufficient evaluation and the lack of readily retrievable information, especially at the global level, which is an essential component of a system for the preservation and use of plant genetic resources;

(c) the absence in general of a firm commitment, on the part of governments and of relevant institutions, with respect to plant genetic resource activities, particularly the conservation of nature reserves in areas of important genetic diversity, the maintenance of base collections and the free availability of plant genetic resources for exchange;

(d) the insufficient means through which governments can collectively exercise their responsibilities with respect to the preservation and use of plant genetic resources;

(e) the absence of any long-term guarantee concerning the financing of essential activities related to plant genetic resources.

193. The measures proposed in this Report to improve the situation are essentially as follows:

(a) the adoption of an International Undertaking on Plant Genetic Resources, open to adherence by all interested governments and relevant institutions (Section III of this Report);

(b) the establishment of a network of base collections of plant genetic resources, which could be considered as an international gene bank and would -

(i) make full use of the present expanding network (paragraphs 147 to 158 of this Report);

(ii) operate within an FAO legal framework (paragraphs 164 to 168);

(iii) provide cooperating governments and institutions with an opportunity to hold the material in their base collections at the full disposal of FAO (paragraph 169);

(c) the encouragement of governmental participation in plant genetic resource activities, at the regional, sub-regional and national levels, and the global intergovernmental review - by a subsidiary body of the Committee on Agriculture - of such activities, including the operation of the network of base collections, mechanisms for increasing financial security, the action taken by countries with limited facilities to increase their plant breeding capabilities, and the assistance provided to the latter to meet their training and other needs (paragraphs 172 to 175);

(d) the consideration of ways of strengthening financial security, and the improvement of existing funding arrangements through the allocation of funds specifically for conservation activities (paragraphs 176 to 180);

(e) the establishment of a global information system, to be administered by FAO in collaboration with the IBPGR (paragraphs 181 to 189).

194. Thus, in the context of the proposed network, full advantage would be taken of the offer made by the Government of Spain (see Appendix G) and of similar offers from governments or institutions, to hold base collections at the disposal of FAO. Offers of this kind could, in addition, be the starting point in the exploration of alternative measures if the coverage provided by the proposed network should prove to be insufficient in terms of species or geographical distribution (see paragraph 146).

195. In the light of the above, the Director-General proposes:

(a) that the Conference consider, with a view to adoption at its forthcoming Twenty-second Session, the draft Resolution containing an International Undertaking on Plant Genetic Resources, set out in Appendix A to this Report;

(b) that the Director-General should, in consultation with the IBPGR, invite relevant governments and institutions to participate in an international network of base collections within an FAO legal framework, placing - if they so desire - their base collections fully at the disposal of FAO;

(c) that, as soon as a significant number of governments and relevant institutions have notified him of their intention to give effect to the Undertaking as adopted -

(i) the Committee on Agriculture should establish the above-mentioned subsidiary body on plant genetic resources, which would meet at the time of the Committee's regular sessions and would include interested governments both members and non-members of the Committee (GRO, Rule XXXII.13(a)), and

(ii) the Council should admit to membership of that body, interested non-Member Nations of FAO that are members of the United Nations, a specialized agency or IAEA (GRO, Rule XXXII.13(b));

(d) that the Director-General should seek the views of donor governments and financing agencies with respect to strengthening the present funding mechanisms or to establishing new mechanisms;

(e) that the Director-General should prepare a study on the feasibility of establishing the aforesaid global information system, including the latter's financial implications; and

(f) that the Director-General should present a report to the Council at its Eighty-sixth Session, on progress achieved in the implementation of the Conference's recommendations and decisions relevant to this Report.

Appendix A

DRAFT RESOLUTION AND INTERNATIONAL UNDERTAKING
ON PLANT GENETIC RESOURCES

(see Section III of this Report)

OUTLINE

THE RESOLUTION

The Resolution essentially summarizes the rationale of the Undertaking. The various aspects are developed in the text of the Undertaking.

THE INTERNATIONAL UNDERTAKING

I. GENERAL

Article 1 is a concise statement of the objective that the other provisions of the Undertaking are intended to achieve.

Article 2 gives definitions of terms used in the Undertaking, including the categories of plant genetic resources covered by it. The coverage is comprehensive, but should be seen in the context of the second operative paragraph of the Resolution, which invites Governments and institutions to inform FAO of the extent to which they can give effect to the principles in the Undertaking.

Articles 3 to 5 state the principles that should apply, essentially at the national level, with respect to the exploration, preservation and exchange of plant genetic resources.

II. INTERNATIONAL COOPERATION

Article 6 indicates the general lines of international cooperation: (a) strengthening plant genetic resource capabilities in developing countries; (b) intensifying existing international activities; (c) collaboration in the network referred to in Art. 7; (d) studying the feasibility of additional arrangements, including gene banks under FAO administration, if the network referred to in Art. 7 proves to be insufficiently comprehensive; (e) considering institutional measures to finance activities relating to plant genetic resources.

Article 7 sets out the legal framework for a network of base collections founded, to the extent possible, on existing international arrangements. The network would comprise the collections of governments or institutions that agree to carry out, within an FAO legal framework, the activities whose coordination is promoted by the IBPGR (Art. 7.1), and governments or institutions that, in addition, arrange for their base collections to be recognized as part of an International Gene Bank (Art. 7.2). The network would also include a global information system (Art. 7.1(d)).

Article 8 suggests principles designed to ensure financial and other support for activities, in particular to meet difficulties encountered in the operation of the network.

Article 9 relates to the role of FAO, which would have the responsibility of monitoring international cooperation relating to plant genetic resources, and taking all necessary measures with respect to the network of base collections, including the conclusion of agreements with participating governments and institutions. FAO would carry out its responsibility in consultation with Governments supporting the network (Article 9.4);

III. OTHER PROVISIONS

Article 10 stresses the importance of phytosanitary measures with respect to plant genetic resource activities.

Under Article 11, adhering Governments and institutions would be invited to provide FAO with progress reports concerning the achievement of the objective of the Undertaking.

Resolution /83

INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

THE CONFERENCE

Recalling its Resolution 6/81 on plant genetic resources;

Recognizing that:

(a) plant genetic resources are indispensable for the genetic improvement of cultivated plants, but have been insufficiently explored and are in danger of erosion and loss;

(b) plant genetic resources are a heritage of mankind to be preserved, and to be freely available for use, for the benefit of present and future generations;

(c) full advantage can be derived from plant genetic resources only through an effective programme of plant breeding, and that, while most such resources in the form of wild plants and old land races are to be found in developing countries, training and facilities for plant breeding are insufficient or even not available in many of those countries;

Considering that:

(a) the international community should adopt a concrete set of principles designed to promote the exploration, preservation, availability and full exploitation of relevant plant genetic resources for plant breeding essential to agricultural development;

(b) it is the responsibility of governments to undertake such activities as are needed to ensure the exploration, collection, conservation, maintenance, evaluation and exchange of plant genetic resources in the interest of all mankind; to provide financial and technological support to institutions engaged in such activities; and to ensure the equitable and unrestricted distribution of the benefits of plant breeding;

(c) progress in plant breeding is essential to the present and future development of agriculture; and the establishment or strengthening of plant breeding and seed production capabilities, at the national, sub-regional and regional levels, is a prerequisite to making efficient use of international cooperation in the exploration, collection, conservation, maintenance, evaluation and exchange of plant genetic resources;

1. Adopts the International Undertaking on Plant Genetic Resources attached hereto;

2. Requests the Director-General to transmit this Resolution and the attached International Undertaking to Member Nations of FAO, to non-Member Nations which are members of the United Nations, any of its Specialized Agencies or the International Atomic Energy Agency, and to autonomous international institutions having responsibilities with respect to plant genetic resources, and to invite them to inform him by (date) of the extent to which they are in a position to give effect to the principles contained in the Undertaking, especially Articles 3 to 5 thereof;

3. Urges Governments and the aforesaid institutions to give effect to the principles of the Undertaking and to support the international arrangements outlined therein, and - where appropriate and feasible - to participate in such arrangements.

Annex

INTERNATIONAL UNDERTAKING ON PLANT GENETIC RESOURCES

I. GENERAL

Article 1 - Objective

1. The objective of this Undertaking is to ensure that plant genetic resources of agricultural interest will be explored, preserved, evaluated and made available for plant breeding, for the benefit of all human beings of the present and future generations.

Article 2 - Definitions and Scope

2.1 In this Undertaking, unless the context otherwise requires:

(a) "plant genetic resources" means the reproductive or vegetative propagating material of the following categories of plants:

(i) cultivated varieties (cultivars) in current use and newly developed varieties;

(ii) obsolete cultivars;

(iii) primitive cultivars (land races);

(iv) wild and weed species, near relatives of cultivated varieties;

(v) special genetic stocks (including elite and current breeders' lines and mutants);

(b) "base collection of plant genetic resources" means a collection of seed stock or vegetative propagating material (ranging from tissue cultures to whole plants) held for long term security in order to preserve the genetic variation for scientific purposes and as a basis for plant breeding;

(c) "institution" means an entity established at the international or national level, with or without legal personality, for purposes related to the exploration, collection, conservation, maintenance, evaluation or exchange of plant genetic resources;

(d) "centre" means an instituion holding a base collection of plant genetic resources, as described in Article 7.

2.2 This Undertaking relates to the plant genetic resources of all species of interest to agriculture at present or in the future, and has particular reference to food crops.

Article 3 - Exploration of Plant Genetic Resources

3.1 Governments adhering to this Undertaking will organize or arrange for missions of exploration, conducted in accordance with recognized scientific standards, to identify potentially valuable plant genetic resources that are in danger of becoming extinct in the country concerned, as well as other plant genetic resources in the country which may be useful for agricultural development but whose existence or essential characteristics are at present unknown, in particular:

(a) known land races or cultivars in danger of becoming extinct due to their abandonment in favour of the cultivation of new cultivars;

(b) the wild relatives of cultivated plants in areas identified as centres of genetic diversity or natural distribution;

(c) species which are not actually cultivated but may be used for the benefit of mankind as a source of food or raw materials (such as fibres, chemical compounds, medicine or timber).

3.2 Special efforts will be made, in the context of Article 3.1, where the danger of extinction of plant species is certain, or is likely, having regard to circumstances such as the clearance of vegetation from tropical rain forests and semi-arid lands with a view to the expansion of cultivated areas.

Article 4 - Preservation of Plant Genetic Resources

4.1 Appropriate legislative and other measures will be maintained and, where necessary, developed and adopted to protect and preserve the plant genetic resources of plants growing in areas of their natural habitat in the major centres of genetic diversity.

4.2 Measures will be taken, if necessary through international cooperation, to ensure the scientific collection and safeguarding of material in areas where important plant genetic resources are in danger of becoming extinct on account of agricultural or other development.

4.3 Appropriate measures will also be taken with respect to plant genetic resources held, outside their natural habitats, in gene banks or living collections of plants. Governments and institutions adhering to this Undertaking will, in particular, ensure that the said resources are conserved and maintained in such a way as to preserve their valuable characteristics for use in scientific research and plant breeding.

Article 5 - Availability of Plant Genetic Resources

5. It will be the policy of adhering Governments and institutions having plant genetic resources under their control to allow access to samples of such resources, and to permit their export, where the resources have been requested for the purposes of scientific research, plant breeding or genetic resource conservation. The samples will be made available free of charge, on the basis of mutual exchange, or on the most favourable terms having regard to the costs related to the provision of the material and having regard to the person or entity requesting it.

II. INTERNATIONAL COOPERATION

Article 6 - General

6. International cooperation will, in particular, be directed to:

(a) establishing or strengthening the capabilities of developing countries, where appropriate on a sub-regional basis, with respect to plant genetic resource activities, including plant breeding and seed multiplication and distribution, with the aim of enabling all countries to make full use of plant genetic resources for the benefit of their agricultural development;

(b) intensifying international activities in plant exploration, plant breeding and germ plasm maintenance, including those carried out by FAO in collaboration with the institutions supported by the CGIAR, as well as the FAO Panel of Experts on Forest Genetic Resources, with the aim of progressively covering all plant species that are important for agriculture and other sectors of the economy, in the present and for the future;

(c) supporting the arrangements outlined in Article 7, including the participation in such arrangements of governments and institutions, where appropriate and feasible;

(d) studying the feasibility of arrangements, additional to those outlined in Article 7, including the establishment and administration by FAO of base collections to form part of the International Gene Bank, referred to in Article 7.2, if it appears that the facilities provided by Governments and institutions would be insufficient fully to achieve the objective of this Undertaking;

(e) considering institutional measures, such as the strengthening or establishment of funding mechanisms, to finance activities relating to plant genetic resources.

Article 7 - International Arrangements

7. The present international arrangements, being carried out under the auspices of FAO and other organizations in the United Nations system, by national and regional institutions and institutions supported by the CGIAR, in particular the IBPGR, for the exploration, collection, conservation, maintenance, evaluation, exchange and use of plant genetic resources will be further developed and, where necessary, complemented so as to ensure that:

(a) there exists an internationally coordinated network of national, regional and international centres that have assumed the responsibility to hold, for the benefit of the international community and on the principle of free exchange, base collections of the plant genetic resources of particular plant species;

(b) the number of such centres will be progressively increased so as to achieve as complete a coverage as necessary, in terms of species and geographical distribution, account also being taken of the need for duplication, of the resources to be safeguarded and preserved;

(c) the activities of the centres that are related to the exploration, collection, conservation, maintenance, rejuvenation, evaluation and exchange of plant genetic resources will be carried out with due account being taken of scientific standards adopted from time to time under the auspices of FAO;

(d) sufficient support in funds and facilities will be provided, at the national and international levels, to enable the centres to carry out their tasks;

(e) a global information system, under the auspices of FAO, relating to plant genetic resources maintained in the aforementioned base collections and - to the extent feasible - elsewhere, and linked to systems established at the national, sub-regional and regional levels, will be developed on the basis of relevant arrangements that already exist;

(f) early warning will be given to FAO, or to any institution designated by FAO, of any hazards that threaten the efficient maintenance and operation of a centre, with a view to prompt international action to safeguard the material maintained by the centre.

7.2 Any Governments or institutions that agree to participate in the network referred to in Article 7.1 may, furthermore, notify the Director-General of FAO that they wish the base collection or collections for which they are responsible to be recognized as part of an International Gene Bank under the auspices of FAO. The centre concerned will, whenever so requested by FAO, make material in the base collection available to FAO and will permit FAO to have access to the premises and facilities of the collection.

Article 8 - Financial Security

8.1 Adhering Governments, and financing agencies, will, individually and collectively, consider adopting measures that would place activities relevant to the objective of this Undertaking on a firmer financial basis.

8.2 Adhering Governments, and financing agencies, will, in particular, explore the possibility of establishing mechanisms which would guarantee the availability of funds that could be immediately mobilized to meet situations of the kind referred to in Article 7.1(f).

8.3 Adhering Governments and institutions, and financing agencies, will give special consideration to requests from FAO for funds, equipment or services needed to meet situations of the kind referred to in Article 7.1(f).

Article 9 - Monitoring of Activities and Related Action by FAO

9.1 FAO will keep under continuous review the further development of international cooperation in the exploration, collection, conservation, documentation, exchange and use of plant genetic resources.

9.2 FAO will, in particular, monitor the operation of the arrangements referred to in Article 7. It will take, or recommend to Governments or institutions participating in the arrangements, measures that are necessary or desirable in order to ensure the comprehensiveness and efficiency of operations in line with the objective of this Undertaking.

9.3 The measures adopted by FAO will include:

(a) invitations to Governments and international institutions to support the arrangements;

(b) the designation, with the consent of the Government or institution concerned and after consultation with the IBPGR or other scientific advisory body, of suitable national or international institutions to act as the centres referred to in Article 7.1;

(c) invitations to Governments or institutions to agree to hold their base collections as part of the International Gene Bank referred to in Article 7.2;

(d) the conclusion of agreements, with the Governments or institutions concerned to confirm their commitment to the principles of this Undertaking and to the responsibilities indicated in Article 7.1 and, where applicable, Article 7.2;

(e) measures to overcome any difficulties or shortcomings identified;

(f) participation, where applicable, in any arrangements adopted by Governments in addition to those referred to in Article 7;

(g) the solicitation of funds, services or facilities referred to in Article 8.

9.4 In the performance of its responsibilities outlined in Part II of this Undertaking, FAO will act in consultation with those Governments that have indicated to FAO their intention to support the arrangements referred to in Article 7.

III. OTHER PROVISIONS

Article 10 - Phytosanitary Measures

10. This Undertaking is without prejudice to any measures taken by Governments - in line with the provisions of the International Plant Protection Convention, adopted in Rome on 6 December 1951 - to regulate the entry of plant genetic resources with the aim of preventing the introduction or spread of plant pests.

Article 11 - Information on the Implementation of this Undertaking

11. Adhering Governments and institutions will, at yearly intervals, provide the Director-General of FAO with information on the measures that they have taken or propose to take to achieve the objective of this Undertaking.

Appendix B

LETTER OF AGREEMENT BETWEEN CGIAR MEMBERS AND FAO
(June 1974)

(see para. 119 of this Report)

LETTER OF AGREEMENT

between

The undersigned, members of the Consultative Group on International Agricultural Research (hereinafter referred to as the Donors)

and

The Food and Agriculture Organization of the United Nations (hereinafter referred to as FAO)

Whereas various members of the Consultative Group on International Agricultural Research (hereinafter referred to as "the Donors") wish to make funds available to the Food and Agriculture Organization of the United Nations (hereinafter referred to as "FAO"), as provided in this Agreement for the purpose of creating a Central Fund to finance the activities of the International Board for Plant Genetic Resources (hereinafter referred to as "the International Board") described in Annex I attached hereto:

Whereas the Director-General of FAO may under FAO Financial Regulation 6.7, receive voluntary contributions for this purpose;

Now therefore the Donors and FAO agree as follows:

ARTICLE I

1. The Donors undertake, as provided in this Agreement, to contribute to FAO funds for the purpose of creating a Central Fund to finance activities as described in Annex I.

2. The above funds will be deposited with FAO as Funds in Trust to be administered and accounted for in accordance with the Financial Regulations of FAO. For 1974 the charge to cover FAO's technical and administrative costs has been waived. The decision as to whether any charge will be made for subsequent periods, and if so, the appropriate rate of the charge, will be made at an appropriate later date. It is understood that FAO will not incur any financial liabilities in excess of the amounts actually received.

3. The Funds in Trust will be used exclusively to finance the activities of the International Board to which FAO will submit a statement of account at the end of every calendar year.

4. In accordance with the Financial Regulations of FAO, all costs incurred by the Organization for these activities of the International Board described in Annex I are to be borne by the Trust Fund. The costs chargeable to the Trust Fund may include unforeseen expenditure incurred in accordance with the Regulations of FAO.

ARTICLE II

1. FAO's obligations under this Agreement are subject to the constitutional rules and Financial Regulations of FAO.

2. This Agreement, including Annex I, may be modified by mutual consent between FAO and the International Board, each of which shall give full and sympathetic consideration to any proposal for such amendment.

ARTICLE III

The Agreement shall remain in effect for a period of one year unless terminated soon by FAO or the International Board by notice in writing given to the other, of not less than thirty days (30) in advance of the effective date of termination; any balance of funds remaining unspent in such case will be handed over to the Chairman of the International Board who will receive them on behalf of all Donors. Upon the mutual agreement of both FAO and the International Board, the effective period of the Agreement may be extended. This Agreement shall enter into force upon signature by FAO and another three of the Donors.

Appendix C

TERMS OF REFERENCE OF THE IBPGR

(see para. 120 of this Report)

Status

The Board is an autonomous scientific, international, philanthropic, non-profitmaking organization under the aegis of the CGIAR.

Terms of Reference

The Board will have responsibility, under the authority of the CGIAR, for recommending policies and developing programmes in close collaboration with and with the help and advice of FAO to meet the following objectives:

(i) To plan, initiate and coordinate wherever possible a worldwide programme through the promotion of genetic resources concepts at government and scientific level;

(ii) To identify general and specific needs for exploration, collection, conservation and evaluation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them, and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;

(iii) To see the collection of genetic resources is carried out according to the established priority needs;

(iv) To arrange for the replicated maintenance of both seed and vegetative collections and the duplication of materials between collections;

(v) To implement appropriate data storage and retrieval systems;

(vi) To arrange for the characterization of collections, and to incorporate relevant data in data storage and retrieval systems; to promote fuller evaluation by breeders; and to see that relevant data are exchanged along with materials;

(vii) To promote training at all levels;

(viii) To promote technical meetings to further the foregoing objectives and to issue technical publications relating to standards, methods and procedures and other matters;

(ix) To support research activities into problems the solving of which are essential to the operation of the Board's activities.

Membership of the Board

The Board consists of 15 members, of whom not less than four are to be nationals of developing countries, and not less than six are to be scientists. Thirteen members of the Board are elected by the CGIAR, on the recommendation of the IBPGR. FAO and UNEP each appoint one ex officio, non-voting member of the Board. The Executive Secretary also acts as ex officio member. Elected members serve in their personal capacities irrespective of their professional or official affiliation. The Board shall have the power to co-opt additional members if the need should arise.

Executive and other Committees

The Executive Committee comprises the Chairman and Vice Chairman of the Board and at least three other elected Board members. The member of the Board designated by FAO shall participate in all the deliberations of the Executive Committee. At least two of the members of the Executive Committee will be from developing countries.

Executive Secretariat of the Board

FAO provides the Executive Secretariat for the Board.

Other Relationships with FAO

The priorities recommended by the Board will be observed to the maximum praticable extent in formulating the programmes of the Crop Genetic Resources Centre of FAO.

Financial Support

The central fund, established by a Letter of Agreement between certain donor members of the CGIAR and FAO, will be administered by FAO as a Trust Fund.

Appendix D

LETTER OF INVITATION TO PARTICIPATE IN IBPGR CONSERVATION NETWORK

(see para. 131 of this Report)

The following extract, taken from a typical letter addressed by the Executive Secretary of the IBPGR to a potential cooperating institution, relates to the commitments required by the IBPGR, and contains an invitation to the institution to accept designation for maintaining a specified base collection or collections:

"...

The Board's policy for base collection is to require the following commitments:

(a) that the collection will continue to receive adequate operating funds and personnel and that if, at some future time, this is not possible, FAO/IBPGR will be alerted promptly;

(b) that if the material stored is not available from an active collection, it will be made freely available from the base collection to any professionally qualified institution or individual seriously interested in using it;

(c) that material will be accepted for storage on a global basis;

(d) that appropriate arrangements will be made (if necessary with suitable institutes) for regeneration of the material; and

(e) that arrangements will be made to duplicate the material for safety (preferably in another IBPGR designated gene bank).

On this basis the IBPGR invites the (Institution) to accept designation for maintaining base collections of (specification of the crops concerned).

..."

Appendix E

ACTIVITIES OF THE IARCs ON PLANT GENETIC RESOURCES
AND THEIR PRESENT COST
(see para. 154 of this Report)

SUMMARY TABLE

Centre	Present Annual Expenditure	Projected for 5 years hence 1983
	US$	
CIAT	1 358 000	1 809 000
CIP	2 530 000	3 000 000
CIMMYT	350 000	1 000 000
Germ plasm enhancement not itemized	1 000 000	1 000 000
ICARDA	1 043 000	1 356 000
ICRISAT	1 028 500	1 145 800
IITA	850 000	2 500 000
ILCA	148 000	336 000
IRRI	1 001 550	1 000 000
Germ plasm enhancement not itemized	1 000 000	1 000 000
WARDA	100 000	500 000
	10 409 050	14 646 800
IBPGR	4 117 000	5 131 000
	14 526 050	19 777 800

Appendix F

ESTIMATED BUDGET FOR GENETIC RESOURCES WORK (1983-1985)
OF THE INTERNATIONAL RICE RESEARCH INSTITUTE (IRRI)
(see para. 155 of this Report)

(at 1983 Prices)
(in US$)

Operational Budget	1983	1984	1985
		US$	
A. Direct Costs for International Rice Germ plasm Centre (includes Seed Health Unit) a/			
Salaries and Benefits Senior Staff (1) Junior Researchers (12) Labourers and others (35) Post Doctoral Fellows (2)	249 773	254 373	254 373
Supplies	41 600	41 600	41 600
Equipment	56 000 b/	20 000	20 000
Maintenance of Motor Vehicles	3 000	3 000	3 000
International Travel	5 900	5 900	5 900
Travel within the Philippines	3 000	3 000	3 000
Sub-total	359 273	327 873	327 873
B. Adjusting Factor c/			
Light and Power	36 000	36 000	36 000
Postage	10 000	10 000	10 000
Maintenance of Building	24 000	24 000	24 000
Depreciation of Facilities	81 560	81 560	81 560
	151 560	151 560	151 560
C. Contingencies	10 217	9 587	9 587
D. Administrative Costs	109 600	100 000	100 000
Sub-total	630 650	589 020	589 020
Direct Costs for Field Collections	20 000	20 000	20 000
Training (5 scholars/5 man-years)	50 900	50 900	50 900
TOTAL	701 550	659 920	659 920

a/ Includes multiplication and regeneration.

b/ Includes initial equipment for the Seed Health Unit.

c/ This is in addition to the normal distribution of administrative costs and represents extraordinary charges that would apply to the Germ Plasm Centre.

Capital Expenditures - IRRI	US$
Cost of Facilities (Buildings and Equipment)	4 000 000
Farm Development	500 000
Green Houses	200 000
Transfer of Collection	250 000
Training of Staff 1/	
Complete back-up of electrical utilities	300 000

1/ No basis for estimating budget which has to depend on the number of trainees, duration and kind of training.

Genetic Resources Laboratory at IRRI (Germ plasm Bank Complex)	US$
1976	323 000
1977	1 516 000
Total Cost of Laboratory	2 039 000

Appendix G

GENE BANK OF SPAIN

Substance of the Offer by the Government of Spain

(see para. 169 of this Report)

Offer to FAO to place the Gene Bank of Spain at the service of the international community as a safe deposit for base collections of plant genetic resources.

This offer would mean that:

1. FAO could designate species for long-term storage by the bank at global level. It is suggested that these should be seed legumes and fodder plants from rangelands, propagated by genuine seeds.

2. The cost of conserving these seeds would remain the responsibility of the Government of Spain, and working samples could be provided on request through FAO.

3. A service of active collection could not be provided without international financing, since this service would involve a constant increase in the number of samples, plus packing and dispatch of many specimens.

Technical information

The Gene Bank of Spain has available:

(a) A storehouse at a temperature of $15^{o}C$ below zero, of 7 x 3 x 3 m = 63 m^3.

(b) A seed storehouse at temperatures of 0 to $2^{o}C$ below zero, of 3 x 10 x 3 m = 90 m^3.

(c) There are in the country 80 people working for the Gene Bank, who are responsible for reproducing the samples in the most suitable place, making use of INIA experimental stations.

(d) The size of the samples and the method of collecting them, to ensure that they represent the proper variability, follow IBPGR standards.

(e) Germination trials are made when the samples are deposited. Viability trials are made only when they are going to be rejuvenated.

(f) Material at present stored has been classified by computer, and the first volume of the catalogue has already been published. It is hoped that the second volume will appear toward the end of 1983.

22nd Session of the FAO Conference - 8 November 1983

Statement of the Independent
Chairman of the Council
Dr. M.S. Swaminathan

Mr. Chairman, Mr. Director-General, Distinguished Ministers of Member Nations of FAO, Excellencies, Ladies and Gentlemen,

May I first of all convey to all of you the greetings of the Members of the FAO Council. To you, Mr. Chairman, I feel privileged to offer my felicitations on your unanimous election as Chairman of this Conference. Your country has shown not only how food scarcity can be made a problem of the past but also how food surpluses can be used as a powerful tool of development. The Conference is fortunate to have as its Chairman a person of your practical accomplishments and who has a reputation for doing more and talking less.

May I also say how happy we are that we have as Vice-Chairmen three very distinguished men.

Farmers of China are known as farmers of "fifty centuries" and China has shown how over 1 billion people can be fed adequately through the effective mobilization of public policy and appropriate technology to enable the rich humen resource to convert land, water, sunlight and other natural endowments into wealth meaningful to the people. Cyprus is well known for the excellence of its horticulture and the Lake Titicaca region on the Peru-Bolivian border is the home of what is referred to as

the Irish potato. Thus, our Vice-Chairmen all come from countries which occupy important positions in the evolutionary history of agriculture, and they themselves have made significant personal contributions in the fight against hunger.

Your country, Mr. Chairman, has shown the power of scientific agriculture. In your remarks on the opening day of the Conference you emphasized that to derive benefit from the untapped production potential existing in many developing countries, economic and political barriers must be eliminated. You also reminded us of the conclusion of the Hot Springs conference which led to the birth of FAO, that the primary cause of hunger is poverty. Poverty persists under conditions where production potential remains untapped, and the human resource is underutilised. A famine of jobs leading to a famine of purchasing power, more than scarcity of food in the market, is a major cause of undernutrition in many developing countries. Import of food by countries where agriculture is the dominant occupation of the rural people will further add to the problems of rural unemployment and underemployment. Unfortunately, lack of infrastructure including trained personnel hampers progress at the desired pace. Also, when land use shifts from just meeting the needs of the farming family to one catering to both home and external markets, assured and remunerative marketing holds the key to sustaining farmers' interest in producing more. The problems of developing countries in this respect have been repeatedly highlighted in Council meetings. Mr. Chairman, you yourself stated recently that if the level of protectionism in agricultural trade was cut by half, developing nations could

increase their exchange earnings by $8 500 million a year. We therefore need a systems approach in dealing with problems of agriculture, paying concurrent attention to all links in the production-marketing-consumption chain.

Since the Twenty-first Session of the Conference the Council has had three regular sessions involving in all 23 days of intensive discussions. My sincere gratitude goes to the Members of the Council and Observers on the one hand and the Director-General and his staff on the other for making the Council meetings purposeful and pleasant. The Council has also been fortunate in having received for consideration though-provoking reports from the different committees. On behalf of the Members of the Council, I wish to record our sincere appreciation to Professor M. Trkulja and Members of the Programme Committee, Mr. D.H.J. Abeyagoonasekera and Members of the Finance Committee, Mr. T. Glaser and Members of the Committee on Constitutional and Legal Matters, Mr. H. Carandang and Members of the Committee on Commodity Problems, Admiral Abdu Rachman and Members of the Committee on Fisheries, Mr. R.M. Peterson and Members of the Committee on Forestry, Mr. Norman W. Tape and Members of the Committee on Agriculture and Mr. E.W. Muir and Members of the Committee on World Food Security.

I would also like to express our deep appreciation of the services of the Secretary General, Mr. Sylla. His calm composure, quiet efficiency and unfailing courtesy are qualities which have endeared him to everyone who came into contact with him. His services to the Council have been outstanding and I wish to convey to him our thanks as well as our best wishes.

Under its charter, the Council is required to keep under review the state of food and agriculture in the world and serve as the executive organ of the Conference between sessions of the latter. Therefore the quantitative and qualitative dimensions of the world food problem so lucidly and authoritatively described by the Director-General yesterday have been under continuous review in the different sessions of the Council. The Council has given enthusiastic support to the enlarged concept of Food Security proposed by the Director-General which stipulates that the ultimate objective of food security is to ensure that all people at all times have both physical and economic access to the basic food they need. At its 84th Session, which was held between 1 and 3 November 1983, the Council as a whole expressed its full support to the FAO Programme of Work and

Budget for 1984-85. The format, contents and the strategy of effective redeployment of resources have all been highly commended by the Council. I share the hope expressed by the Director-General yesterday that the Conference will give it its unanimous approval.

I should now like to share with the distinguished audience my personal views on five of the issues discussed in the Council during the last two years.

1. Immediate alleviation of hunger: Role of WFP

The World Food Programme is probably the largest source of multilateral assistance within the UN system apart from the World Bank group and is completing 20 years of valuable service this year.

Food aid, as used by WFP, has demonstrated the capacity to reach the poorest and the needy. This feature of WFP can be further enhanced by concentrating it even more strongly on the poorest regions in each country and by enhancing the participation of the people of the concerned area in designing and implementing suitable projects. The World Food Programme, together with the "Food for Development", "Food for Work" and similar programmes sponsored by the United States, European Economic Community and many developed and developing nations provide immediately feasible methods of enabling everyone to earn their daily bread with human dignity. I have seen the power of "Food for Work" programmes to benefit the poor, particular women and thereby of children, in my country as well as in Bangladesh.

While listening to the recitation of a poem by Rabindranath Tagore, Mahatma Gandhi once said, and I quote:

"The hungry millions ask for one poem - invigorating food. They cannot be given it. They must earn it. And they can earn it only by the sweat of their brow. Imagine therefore what a calamity it must be to have several million becoming degraded every day for want of employment, devoid of self-respect. Indeed at the root of this doctrine of social equity must be the trusteeship of the wealthy for the superfluous wealth possessed by them."

Gandhi considered that the only meaningful pathway of development is one where the good of all is served by promoting the good of the poorest, the lowliest and the lost." This aspect has found considerable stress in the WFP/Netherlands Government Seminar held in the Hague from 3 to 5 October 1985. It is only programmes like the World Food Programme which are immediately relevant to the poor and needy. However, if WFP and similar national programmes are to achieve their stated objective of making food an instrument of achieving self-reliance in agriculture, we will need a vast army of professionals who, imbued with humility and humanism, will help in both project formulation and effective delivery based on a clear

understanding of the felt needs and aspirations of the local population.

2. Establishment of a Division of Research and Technology Development

1983 marks the thirtieth anniversary of the discovery of the double helix structure of the chemical substance of heredity Deoxyribose Nucleic Acid (DNA) by Watson and Crick. This discovery resulted in rapid progress in the standardization of techniques to isolate genetic material, identify portions of the genetic molecule responsible for specific characteristics and then splice this portion onto a genetic molecule from another strain. Consequently research in cell biology, molecular genetics, recombinant DNA, tissue culture, and related fields are laying the groundwork for important technological developments. Developing countries should take interest in the potential applications of biotechnology and genetic engineering in agriculture, health and energy. The euphoria surrounding the bio-technology revolution should, however, not blind us to the fact that much of the increased production needed during the next ten years will come mainly from the adaptation and transfer of already available technologies.

I wish to quote what President Nyerere of Tanzania said recently, "I am tired of hearing about the production potential of my country as well as others in Africa. What we would like to see is the speedy conversion of the potential into actual production".

Science and technology are important components of the wall dividing poverty and prosperity. It is in this context that the decision to establish a Division of Research and Technology Development in FAO is a timely initiative. Agriculture is a location specific vocation and a dynamic national research system is a must for initiating and sustaining a dynamic production programme. FAO, ISNAR (International Service for National Agricultural Research) and IFARD (International Federation of Agricultural Research Systems for Development) can make important contributions in this field.

In the past, technological progress led to a process of industrialisation characterised by high capital requirements, centralization, automation, urbanization and pollution. However, we now have unique opportunities for harnessing recent advances in agricultural and rural technologies including biotechnology, microelectronics and microprocessors, computers, satellite communication and imagery and solar and renewable energy technology to upgrade traditional skills and occupations. In this way, villages can be converted into small agro-industrial centres engaged in the production of value-added products from primary raw material. Decentralized production supported by relevant centralized services particularly in the areas of production planning, raw material supply, designs based on consumer preferences and producer oriented marketing will help to combine the advantages of the technologies involved in "production by masses" and "mass production". This is the only way by which we can fight the famine of jobs, which is threatening to be the most important famine in coming years.

To do all this a vast army of trained personnel will be needed. Such persons should be capable of imparting training to rural artesans,

farmers and fishermen in new techniques of production and post-harvest processing through the method of "learning by doing", a process which I termed as "techniracy" about twelve years ago.

To farmers "seeing is believing" and visual demonstrations have hence high credibility. A few hundred demonstrations laid out in small farmers' fields in India with dwarf varieties of wheat during 1965-66 had such a striking impact that the area under semi-dwarf high yielding varieties of wheat rose from four hectares in 1964 to four million hectares in 1970. Wheat production in India went up from 12 million tonnes in 1965 to 42.5 million tonnes in 1983. A small Government programme thus became a mass movement.

Nothing succeeds like success and we need experience of agricultural success in every country to build up the self-confidence of Agricultural Departments and extension workers. Historians of U.S. agriculture say that the release of hybrid maize in the U.S. in the thirties led not only to a rapid increase in maize production but triggered a process of improved farm management in all crops. This is because farmers who learnt the value of good management in hybrid maize transferred this experience to other crops. Based on an understanding of comparative advantages, countries lagging in agricultural progress will have to find candidate crops and technologies for serving as catalysts of change. Rice and wheat have been two major sources of success stories in many countries of Asia and I believe maize and rice are two candidate crops for initiating an era of more rapid agricultural progress in several parts of Africa.

For the successful spread of new technologies under small farm conditions, policy-makers have to take into account two important factors. The new technologies involving high yielding varieties of crops are size neutral with regard to their relevance to farms of differing sizes but they are not resource neutral. Also from the technology transfer point of view new farming practices can be classified into two major groups - those which can be adopted with profit by individual small farmers and secondly, those which need group or community participation for profitable adoption. Integrated pest management, scientific water harvesting and conservation in drought prone areas, better on-farm management of water in the command areas of irrigation projects, and improved post-harvest technology can be effective if there is team work among farmers in a village or watershed. Improving the efficiency of small farm management deserves greater attention.

3. Women in Development

I should like to make a particular reference to the training of rural women in new skills. The WCARRD programme of action lays considerable stress on the role of women in rural development. We normally tend to assume that the household is a homogeneous unit in which resources and income are shared equally by all members of the family. Available evidence

suggests, however, that intra-household distribution of resources and income vary by age and sex, and that often men and women enjoy different economic status within a household. Their expenditure preferences also often differ. It is therefore important that women have greater and independent access to income. Additional income for them will help to increase total family income and thereby improve the quality of life of the family in general and nutrition of children in particular.

In this context, I would like to quote from a statement by Annette Wagniere, Chair-person of the Congress organised last year at Helsinki by the International Alliance of Women:

> "The introduction of new technologies which affects more particularly the jobs held mainly by women, requires a difficult process of adjustment, involving both job creation and job destruction. Attempts to protect jobs which are becoming obsolete only hinder the flexible adjustment that is required. We must adopt not a defensive but an

offensive position in that we encourage business and governments to develop the means of controlling this change so that jobs are not wiped out more quickly than new ones are created and that instead of reducing job content, these new technologies give the job-holder more varied tasks to perform in the time saved by the machine".

To achieve this aim, new development projects should be subjected to an impact analysis with regard to their potential impact on current and new employment opportunities for women. When we examine recent developments in the modernization of agriculture we find several examples of an unconscious shift in the relative job opportunities for men and women. For example, in the older systems of grain cultivation, seed selection and production were done by women. Modern seed industry in developing countries generally tends to bypass women.Organic manuring and recycling were largely women's occupations. Mineral fertilisers, however, are handled largely by men. Transplanting of rice was done by women but mechanical transplanters are often operated only by men. Weed control by hand was done by women, while chemical weedicides are applied generally by men.

Similarly there are numerous examples in animal husbandry, fisheries and forestry of similar shifts. The fresh water sardine industry in Lake Kariba located between Zambia and Zimbabwe is an example.

There are several fields of activity in scientific agriculture where the innate finger skills of rural women can be used with great profit. Thus in India seeds of hybrid cotton are produced by hand emasculation and pollination by tribal and rural women to cover nearly 2 million hectares. One hectare of hybrid seed plot provides employment for about 100 women for 80 days.

Induced breeding techniques in aquaculture programmes provide another example where women, if trained, will be able to make significant contributions.

The goal of increasing agricultural output necessitates specific programmes and policies for women to enable them to play their roles more effectively. Their specific roles vary widely depending upon ecological, economic, sociological and religious factors and it will be for each country to formulate appropriate programmes and policies based on local circumstances.

The need for the development and spread of technologies which can generate more on-farm and off-farm employment and lead to a reduction of drudgery for family farm women who are overworked due to their dual productive and reproductive roles deserves to be more widely recognised.

4. Conservation of basic agricultural resources

At its 21st Session held two years ago the FAO Conference adopted a World Soil Charter designed to promote soil conservation and scientific land use as well as a resolution on plant genetic resources sponsored by the delegation of Mexico. In pursuance of the resolution on plant genetic resources, the Director General has submitted a report which the Council has forwarded for the consideration of this Conference. The proposals contained in the report will be discussed in Commission II and I hope the Conference will arrive at agreed conclusions which can help to strengthen further the existing arrangements for the collection, conservation and utilisation of plant genetic resources. Biological diversity is basic to the security of food production and hence we need similar consideration at a future meeting on methods of strengthening the conservation of microbial, farm animal and inland and marine fisheries resources.

Extinction of genetic variability caused by the destruction of forests and other natural habitats is a threat which can be successfully met only by generating widespread awareness of this problem and public cooperation. Many members of the Council have expressed deep concern about the impact of deforestation in the tropics where some estimates suggest that tree formations are being lost at the rate of 11 million hectares every year. For nearly every 10 hectares of forests lost, hardly one hectare is being reforested in tropical America, Africa and Asia. Not only has this serious implications with regard to the *in situ* preservation of genetic variability in several economic

plants but also to the quality of life of millions of forest dwellers. The conservation and scientific utilisation of forest tree resources have hence received considerable stress in Council meetings. Even now, the value of annual trade in forest products is around US$ 50 billion and scope exists for developing countries to increase their earnings through the preparation of value-added products.

On this occasion, I would like to recall what Chief Seattle of the Washington State in USA said in 1854, and I quote:

"The earth does not belong to man; man belongs to the earth. We know that all things are connected like the blood which unites one family. The perfumed flowers are our sisters; the deer, the horse, the great eagle, these are our brothers. Whatever befalls the earth befalls the sons of the earth. Man did not weave the web of life. He is merely a strand in it. Whatever he does to the web, he does to himself."

Some experts have estimated that only 1 in 6 of tropical plants and animals has so far been given a scientific name. Some others believe that before humankind follows the advice of Chief Seattle, probably 25 to 50 percent of the 5 to 10 million species that now

share with us the earth as their home would have become extinct. It is hence appropriate that this Conference discusses questions relating to biological diversity in economic plants, genetic vulnerability arising from monoculture and a narrowing of gene base in widely grown cultivars, gene erosion resulting from the loss of germplasm of both economic and wild species and, above all,methods of ensuring the unrestricted availability of germplasm to all nations. Thanks to the work of the International Board of Plant Genetic Resources (IBPGR), FAO, Unesco, UNEP and above all national agencies, we now have facilities around the world for germplasm collection and conservation. The work of IBPGR in strengthening national conservation centres and collection efforts in developing countries is particularly praiseworthy.

I would like to give you a brief picture of the dimensions of the work involved as well as its importance from the experience of the International Rice Research Institute. Since 1971, the IRRI Germplasm Bank has served as the central repository for the base collection of the world's rices. Our Collection now has 67 000 Asian cultivars, 2 600 African rices, 1 100 wild rices and 690 genetic testers, totalling over 71 000 strains. It is believed that there may be about 120 000 distinct types of rices in the world. Recently, in collaboration with IBPGR and nagional government agencies, we have drawn up a five year plan (1983-87) to collect the remaining genetic material with the help of appropriate national organizations, so that we can preserve for posterity the

fruits of thousands of years of natural evolution and human selection.

When the ecology of crop fields is changed in a direction that favours higher yield, conditions also become more favourable for pests and pathogens. Also, an increasing amount of land is being affected by soil constraints like salinity, alkalinity, acid sulphate conditions and waterlogging as a result of unscientific irrigation. Fortunately, in nature there is considerable variability for many of these characters. Let me cite two examples from recent work in rice which underline the importance of genetic resources conservation. Resistance to the Grassy Stunt virus came from a wild species, Oryza nivara, collected from Uttar Pradesh in India. The famous hybrid rices of China, which now cover about 7 million hectares in that country could be developed because of the discovery by Chinese scientists of cytoplasmic male sterility in a wild rice plant found on Hainan Island.

Mr. Chairman,

The first human form, referred to as Hominid, is believed to have evolved in East Africa some 25 million or more years ago. Human

beings may have existed as a species for about 2 million years. Yet, it was only about 10 000 years ago that human beings started growing food, rather than merely gathering them from the wild state and hunting wildlife. Thus, if the existence of human beings as an independent species is equated to a 24 hour day, we have been farmers for only about 7 minutes. Even during these 7 minutes, we have practised market-oriented agriculture only for a few seconds. Within these few seconds, we have been confronted with numerous problems including changing consumer preferences. We do not know what all new pests and soil and atmospheric (including temperature changes from higher CO_2 content) constraints we will have to face in the future. We do not know what all physiological and morphological traits will be needed for plants to perform well in a post-nuclear war era, if unfortunately such a calamity befalls our planet. Future generations of scientists and farmers will not have the tools with which they can solve such problems if we do not make genetic resources conservation, evaluation and utilisation a common cause and accord it the highest priority.

5. New Dimensions in technical assistance

Historically, agriculture had its origin in the Third World. Most of the important crop plants and farm animals were first domesticated in what are now referred to as "developing countries", several of whom have become net food importers. Yet these very countries are blessed with considerable 'green power' since abundance of sunshine enables year-round harvest of solar energy through green plants. To cite an example,

a crop of rice is planted every Monday and a crop is harvested every Friday in the Institute where I work. There are thus as many harvests as there are weeks and over 20 tonnes of rice are obtained per hectare each year through such a system of intensive agriculture. Where there is water, such systems can be promoted so as to harvest the maximum amount of sunlight. However such techniques require for their success pest-resistant varieties, avoidance of indiscriminate use of pesticides so that the natural enemies of pests are not killed and careful monitoring of soil and plant health.

I recently saw in Zanzibar in the Republic of Tanzania such an intensive system of rice cultivation introduced by a FAO field expert, taking advantage of underground water. Zanzibar has a rich aquifer and if there is energy to pump water, rice production can be doubled within a short time. Electricity or diesel are, however, not yet available in the quantity needed for taking advantage of the ground water. Biogas plants and biogas operated pumps may be of help in getting the green power converted into grains but this technology will have to be introduced and tested. The FAO/UNDP project has shown the way but how can such small demonstrations be scaled up so as to have an impact on production ? Examples of this kind can be multiplied and numerous such opportunities in African and other countries are crying for attention.

Mr. Chairman, this bring me to my last point. FAO estimates that about 6,000 to 7,000 new entrants are needed annually to strengthen national agricultural research systems in developing countries (C 83/26). How long will the present pattern of technical assistance take to respond to needs of this dimension ?

The gross financial requirement for providing one expatriate expert is currently estimated by many multilateral and bilateral technical assistance agencies at about US$ 100,000 per year. In many developing countries this amount may suffice to pay the salaries of 40 to 50 national experts. The gap in the "pay, perks and privileges" package is growing between international experts and national scientists of many developing countries and this is hurting poor nations in two major ways. First, such high cost of expert services makes the quantitative dimensions of knowledge and skill transfer very small in relation to crying needs. Secondly, it promotes in national experts the urge to become also an expatriate expert. Compounding the problem of grossly unequal salaries is the fact that most of the available funds in many national research systems as well as technical assistance programmes go to meet salaries and little is left for operations, thus making it difficult for the scientists to give their best.

It is my conviction that this pattern of technical assistance is not sustainable. It will not lead to the conversion of production potential into production in Africa and elsewhere with the needed speed.

An alternative system must hence be found which not only accepts and propagates the ideal of "sustainable development" in its stated goals and objectives and relationships to others but demonstrates a sustainable model of development in its internal structure and method of working, responsive to change and relevant to the times. It must be capable of not contradicting in internal practice what it outwardly preaches.

We urgently need a global cadre of agricultural development workers consisting of young men and women professionals, husband-wife teams, and elderly couples who are physically and mentally active, and development aid volunteers and teachers of the kind described yesterday by Dr. Bruno Kreisky, if we are to fulfil our desire to assist the poor nations and arrest the decline in the per capita food output of several developing countries in Africa. Patterns of technology

transfer similar to those of the Peace Corps of the U.S. and Canada, the UN Volunteers programme, and numerous such initiatives of government and non-governmental agencies around the world will be relevant in this context. Among young and old professionals around the world there will certainly be many to whom the intellectual challenge of problem-solving or a sense of purpose in life arising from social commitment are more important than "high wages, perks and privileges".

It is in this context that the Council has attached great importance to the "New Dimensions" concept of FAO in project formulation and implementation.

If such a system of technical assistance is to be successful, it will need structured linkages with three major groups. These are first, international, regional and national development banks, secondly, international regional and national research institutes, and thirdly, governmental, non-governmental and cooperative organizations having the necessary social motivation. A marriage between those who move society and those who move science and technology needs to be accomplished. Fortunately, in agricultural research, we have a mechanism for this purpose.

The Consultative Group on International Agricultural Research jointly sponsored by FAO, UNDP and the World Bank and financially supported by nearly forty countries and donor organizations now supports thirteen international institutions and a vast network of cooperative research activities. The

donor nations include not only countries such as the United States which provides 25 percent of the budget of the system, but also several Third World countries such as Brazil, China, India, Mexico, Nigeria, the Philippines and Saudi Arabia.

Even those who for personal or family reasons cannot directly join a global corps of professionals who have accepted voluntary poverty in ~~exchange~~ exchange for the thrill and joy of uplifting agricultural production can help such a movement by becoming members of an invisible college of co-workers who make available their knowledge and experience through correspondence.

This concept is not new and we have numerous examples around the world of such work being done by non-governmental and some governmental organizations. These, however, remain as unique examples - occasional blossoms in the midst of a sea of despair. How can we convert unique examples into a universal movement ? Herein lies the challenge to those in charge of promoting foreign technical aid and TCDC and ECDC programmes.

Mr. Chairman, forty years ago the Conference held in Hot Springs, Virginia, to which you referred to in your opening remarks, resolved: "This Conference, meeting in the midst of the greatest war ever waged, and in full confidence of victory, has considered the world problem of food and agriculture and

declared its belief that the goal of freedom from want of food suitable and adequate for the health and strength of all peoples, can be achieved". Forty years later, we are discussing at this Conference the ravages of drought, the plight of 500 million members of our species to whom "God, give us this day our daily bread" is the only meaningful prayer, the onslaught of Rinder Pest and other animal diseases, the devastation caused to crops by the unholy triple alliance of pests, pathogens and weeds, the lack of capital for agricultural development, trade barriers, pricing and marketing problems, environmental degradation and the need for coming to the rescue of countries in sub-Saharan Africa.

In several densely populated countries in Asia, there is hardly any difference between cultivated land and cultivable land. Many countries in Africa and Latin America are more fortunately placed in terms of per capita land availability. They will have to become the future bread baskets, if the anticipated population of 8 billion by A.D. 2015 is to be fed adequately.

In the face of such realities, are we going to be content with mutual backslapping heartiness at such meetings and eternally talk poor and live rich ? It is for the leaders of world agriculture who have gathered here to decide. ~~I thank you for giving me the privilege of working with the Members of the FAO Council and with the dynamic Director-General and his dedicated staff during the last two years.~~