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THE FAO INFORMATION SYSTEM ON PLANT GENETIC RESOURCES

Table of Contents

	<u>Paragraphs</u>
I. INTRODUCTION	1-5
II. REVIEW OF EXISTING INTERNATIONAL INFORMATION SYSTEMS RELEVANT TO PLANT GENETIC RESOURCES	6
(i) IBPGR Activities	7-11
(ii) FAO Activities	12-16
III. AVAILABILITY AND COMPLETENESS OF DATA ON PLANT GENETIC RESOURCES	17
(i) Cultivated Varieties in Current Use and newly Developed Varieties	18
(ii) Obsolete Cultivars	19
(iii) Primitive Cultivars or Landraces	20
(iv) wild and Weed Species, Near Relatives of Cultivated Varieties	21-22
(v) Special Genetic Stocks	23
IV. INTERNATIONAL INFORMATION SYSTEM ON PLANT GENETIC RESOURCES COORDINATED BY FAO	24
(i) Complementarity of the Existing FAO and IBPGR Information Systems	25-28
(ii) Integration of Plant Genetic Resources and Seed Information Systems	29-32
(iii) Information Flow Diagram	33-36
V. FINAL REMARK	37
ANNEX Flow Diagram for an International Information System on Plant Genetic Resources Coordinated by FAO	



THE FAO INFORMATION SYSTEM ON PLANT GENETIC RESOURCES

I. INTRODUCTION

1. In adopting Resolution 8/83, International Undertaking on Plant Genetic Resources, the Twenty-Second FAO 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".
2. 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".
3. During its First Session, the Commission on Plant Genetic Resources stressed "the importance of the FAO Seed Information System and recommended the speeding up of its development as an important part of an International Information System on Plant Genetic Resources". The Commission "agreed that FAO should convene, in cooperation with the International Board for Plant Genetic Resources (IBPGR), an expert consultation in order to consider follow-up measures to promote an information system on plant genetic resources". The Commission "recommended that special attention be given to the avoidance of duplication or overlapping of activities and to ensure complementarity between the work of IBPGR and the Commission in the implementation of the Undertaking".
4. The purpose of this document is to review the various aspects of an International Information System on Plant Genetic Resources coordinated by FAO, in view of the recommendations made.
5. For the development of this document, documentation prepared for the First Session of the Commission was consulted, as well as various reports, IBPGR publications and information about the FAO Seed Information System (SIS)(primarily its Cultivar Subsystem).

II. REVIEW OF EXISTING INTERNATIONAL INFORMATION SYSTEMS  
RELEVANT TO PLANT GENETIC RESOURCES

6. The first steps toward the establishment of an information programme on crop ecology and genetic resources were taken between 1950 and 1963 by FAO. This work was discontinued due to a lack of funding. A crop genetic information programme was initiated again in 1974 with the establishment of IBPGR.

(i) IBPGR Activities

7. International genetic resource centres and genebanks have developed individual data systems with descriptor lists, computer software and hardware that differ greatly. Since its establishment, IBPGR has given priority to the development of germplasm documentation and an internationally accepted set of descriptor lists that is considered fundamental for the standardization of germplasm description.

8. The descriptor lists request the following data:

- (a) Passport data for the identification of accessions and the information recorded by the collectors.
- (b) Characterization data for traits that are highly heritable and easily assessed.

- (c) Preliminary evaluation data providing information about very important agricultural traits.
- (d) Further evaluation data describing other important traits for the assessment of the agricultural value of an accession.

9. Characterization and preliminary evaluation are responsibilities of the curators, while data from further evaluation of germplasm are usually obtained from the testing and screening by plant breeders. However, feedback from plant breeders to curator is disappointing for several reasons that were analysed in a study carried out by IBPGR<sup>1/</sup>).

10. A further step taken toward the establishment of an international information system was the provision of technical assistance to interested countries for the construction of global crop-specific data bases. Many of these data bases have been established in international centres or genebanks because of the expertise available there. The content and completeness of these data bases differ widely due primarily to the availability of relevant data. Special efforts are required to fill existing information gaps. The establishment of crop-specific data bases represents one of the main tasks for an International Information System on Plant Genetic Resources; therefore, the Commission agreed that the development of crop-specific data bases for major crops should receive continuous support.

11. In order to provide an initial link between collections and users, IBPGR has published directories of germplasm collections. These directories summarize the information on different collections. They contain information on each genebank, its location, curator, details of samples, types of maintenance of collections, duplication, availability for exchange, evaluation conducted and the type of documentation. The directories cover all major and a few minor crops and serve as a guide to collections. When major or global crop-specific data bases are not available as sources of information for the directories, inquiries are made to genebanks working with the species. Nearly all data in the directories have been computerized to facilitate updating and retrieval.

(ii) FAO Activities

12. For improving the exchange of information on seeds, FAO has installed a Seed Information System (SIS). The system is subdivided into different subsystems, as outlined below.

13. The Seed Review Subsystem provides an overview of the breeding programmes in the 116 member countries, the varieties released and the production and use of seed.

14. The Seed Exchange Subsystem contains approximately 7 000 addresses of seed suppliers, organizations and firms in 161 countries. The directory 'World List of Seed Sources' which contains these data is a helpful guide for obtaining economic seed supplies.

15. The Cultivar Subsystem includes data on cultivars released in developing countries. This subsystem will be developed into a Cultivar Data Bank, with three main objectives:

- (a) To compile by country an inventory of the most useful varieties available within the country.
- (b) To create an international data bank by combining national inventories. This data bank will improve information on available seed of the most widely used varieties and will facilitate trade between countries.

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1/ J. P. Peeters and J. T. Williams. Towards better use of genebanks with special reference to information. Plant Genetic Resources Newsletter, No. 60. 1984.

- (c) To provide worldwide information on varieties to assist plant breeders in locating plant genetic resources.

16. For the Cultivar Subsystem, FAO has developed a variety passport and description forms for a number of crops. These describe the agricultural value of the cultivars and the agroclimatic and soil conditions where they are grown. Morphological characters are also included in the description forms for identification purposes. The passport summarizes the content of the description forms. The completeness of the cultivar data bank depends on co-operation among the member countries and their willingness to correctly complete the forms and return them to FAO. Initially, the data bank will cover some six to ten varieties of the main cereals for each country. Forms have been drafted for maize, rice and wheat and are being prepared for other species. The information will be published in directories on a crop-specific basis.

### III. AVAILABILITY AND COMPLETENESS OF DATA ON PLANT GENETIC RESOURCES

17. It is currently estimated that about 2 million samples are stored in the active collections of genebanks worldwide. In contrast to this considerable number of available samples, the amount of data concerning them is relatively limited. In the IBPGR study cited in paragraph 9, it was documented that 65 percent of the samples did not even have passport data. Characterization data is available for only 20 percent of the accessions and evaluation data for only 5 percent. The availability and completeness of the data depend on the nature of the plant genetic resources. In the following paragraphs, the different categories of plant genetic resources specified in article 2.1 (a) of the Undertaking are examined within this context.

#### (i) Cultivated Varieties in Current Use and Newly Developed Varieties

18. Usually, seed material of cultivated varieties in current use and newly developed varieties is not deposited in genebanks. When it is stored in genebanks, its availability may be restricted. Samples of such material can usually be purchased on the open market or from public or private institutions which produce seeds. The FAO Seed Laboratory assists in the distribution of several thousand samples each year for variety evaluation or breeding. Relatively detailed evaluation data for most of the currently cultivated and newly developed varieties can be obtained from national variety lists, extension services and private institutions.

#### (ii) Obsolete Cultivars

19. The storage of seed material from obsolete cultivars is a traditional task of the genebanks. As for the cultivated varieties, evaluation data for obsolete cultivars are available from variety lists, extension services and private institutions.

#### (iii) Primitive Cultivars or Landraces

20. The storage of seed material from primitive cultivars or landraces is also a traditional task of the genebanks. For primitive cultivars, available evaluation data on morpho-agronomic characters are generally not sufficient. Extensive evaluation work is needed for this type of material.

#### (iv) Wild and Weed Species, Near Relatives of Cultivated Varieties

21. Only a few genebanks are engaged in the collection and evaluation of wild and weed species. Such species can have potential value as a source of new food or for the production of fibres, chemical compounds, medicinal products and timber. Seed material from wild and weed species may be available from some institutions, and directories for

such material, e.g., the Index Herbariorum, exist. The data in these directories are often minimal and do not contain information on the potential value of the material. Collection and evaluation efforts need to be continued for this category at research institutes on a national or international basis.

22. The collections of near relatives of crops are also relatively limited. The availability of data for this group of plant genetic resources seems to be comparable to that for primitive cultivars, and extensive evaluation work is needed.

(v) Special Genetic Stocks

23. The activities of genebanks involve special genetic stocks, including elite and current breeder lines and mutants, only to a limited extent. The availability of such material is also limited, and its distribution is often restricted by the supplier. Most collections held by commercial companies or plant breeders are not included in the directories of IBPGR. The continuous changes in this material caused by breeding procedures make identification with descriptors nearly impossible. More data are probably available for special genetic stocks than for landraces; but due to the continuous changes in the breeding collection, it seems advisable to give only general information concerning the origin of the material and its special breeding objective.

IV. INTERNATIONAL INFORMATION SYSTEM ON PLANT GENETIC RESOURCES  
COORDINATED BY FAO

24. For the development of an International Information System on Plant Genetic Resources, the work completed by both IBPGR (standardized descriptor lists, crop-specific data bases and directories of germplasm collections) and FAO (Seed Information System, including a Cultivar Subsystem that provides a cultivar data bank) must be considered. A bridge between these two systems is needed.

(i) Complementarity of the Existing FAO and IBPGR Information Systems

25. The FAO and IBPGR information systems serve complementary purposes. The FAO Cultivar Subsystem is developing a cultivar data bank with specialized information on the agricultural value of released cultivars. The FAO variety passport and description forms primarily cover traits that describe the cultivar's agricultural value.

26. The IBPGR descriptor lists have the primary objective of describing the samples and providing accession and collection data. The information given by the preliminary and further evaluation data on the potential agricultural value of a sample is generally limited.

27. The descriptors may be different in the FAO and IBPGR systems, and in some instances, it is advisable to reconcile them. For example, plant reaction to pests and diseases is expressed in one system by susceptibility and in the other by resistance.

28. The possibility of establishing communications between the two computerized systems will be determined. This would make the information system more suitable for the needs of the users.

(ii) Integration of Plant Genetic Resources and Seed Information Systems

29. The publication of joint directories is suggested as an initial bridge between the IBPGR information system and the FAO SIS Cultivar Subsystem. Such joint directories would contain information about all types of plant genetic resources.

30. Since the seed material of currently cultivated and newly developed varieties is not usually stored in genebanks, and also to avoid any duplication of FAO and IBPGR activities, it is recommended that the data for such material be included in the Cultivar Subsystem of SIS as a part of the proposed International Information System on Plant Genetic Resources.

31. Since obsolete varieties, landraces and near relatives to cultivated species are stored in genebanks, usually data on these types of resources can be obtained from the IBPGR information system. Data on special genetic stocks, could also be stored in the IBPGR information system. This procedure should be considered for all available data on such material irrespective of where the material is stored.

32. Initially, the proposed International Information System on Plant Genetic Resources should be restricted to crops of economic importance. Provisions have not been made for incorporating wild and weed species in the existing information systems. Further studies and intensive research work need to be conducted for the storage of information on these species.

(iii) Information Flow Diagram

33. An information flow diagram for the proposed International Information System on Plant Genetic Resources is presented in the Annex. First, data for cultivated and newly developed varieties will be assessed periodically with the help of the FAO variety passport and description forms completed by the authorities of the concerned countries. After an examination of the data, they will then be entered into the data bank, and the directory will be prepared by the Seed Service of FAO.

34. The data on the other types of plant genetic resources will be assessed using the IBPGR descriptor lists. The data for global crop-specific data bases will be obtained from the genebanks of individual centres or institutions.

35. The recommended joint directories, combining summarized information from the two systems, will provide comprehensive surveys of the available information on the different types of plant genetic resources for each crop. The directories should contain at least the following information: genebank, centre or institution, details of samples (number and type), origin of the samples or cultivars, evaluation conducted and availability. For more detailed information, the user would contact one of the different crop-specific data bases or the FAO cultivar data bank. On the basis of information received, the user can ask for seed samples from the concerned genebanks or institutions.

36. The FAO Cultivar Subsystem covers only the most widely used cultivated varieties in a country. Varieties that are displaced by newly developed ones will no longer be stored in the FAO cultivar data bank. To avoid this gap, it is recommended that information stored in the data bank be retained until it is verified that the variety is out of cultivation. The data on this obsolete variety should then be transferred to a centre with a crop-specific data base. The centre could then arrange to have a seed sample added to designated base collections.

V. FINAL REMARK

37. The usefulness of an International Information System on Plant Genetic Resources will depend on its utilization by plant breeders and other practical users of plant germplasm. The lack of interest of breeders is an important reason for the relatively limited use of plant genetic resources. There is also a communication gap between plant breeders and experts on plant genetic resources. Additionally, in many countries, especially developing ones, the use of information on plant genetic resources is also restricted by limited capabilities for plant breeding, including a lack of qualified and trained personnel. The strengthening of plant breeding

capabilities is therefore crucial for increasing the use of information on plant genetic resources.



FLOW DIAGRAM FOR AN INTERNATIONAL INFORMATION SYSTEM ON PLANT GENETIC RESOURCES  
COORDINATED BY FAO

