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para la
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y la
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COMMISSION ON PLANT GENETIC RESOURCES

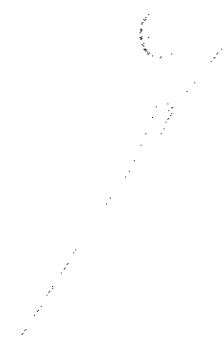
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PROGRESS REPORT ON THE WORLD INFORMATION AND EARLY WARNING SYSTEM ON PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

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PROGRESS REPORT ON THE WORLD INFORMATION AND
EARLY WARNING SYSTEM ON PLANT GENETIC RESOURCES
FOR FOOD AND AGRICULTURE

I. INTRODUCTION

1. The World Information and Early Warning System on Plant Genetic Resources (WIEWS) was established in conformity with Articles 7.1 (e) and (f)¹ of the International Undertaking on Plant Genetic Resources, and with the recommendations of the Commission on Plant Genetic Resources, that FAO develop an information system on plant genetic resources. Article 11 of the Undertaking provides for "Governments and institutions [...] to provide the Director-General of FAO with information on the measures that they have taken or propose to take to achieve the objectives of [the] Undertaking". The compilation, analysis and dissemination of information supplied by governments and institutions is therefore the basis of the WIEWS.
2. The Fourth Session of the Commission recalled the importance of developing, as part of the system, an early warning mechanism, so as to draw rapid attention to hazards threatening the operation of *ex situ* collections, the extinction *in situ* of plant species, and the loss of genetic diversity for food and agriculture throughout the world, as a result of natural disaster or of human activity, so as to make possible action against these threats.
3. Chapter 14 G of Agenda 21 adopted by UNCED called for "Governments at the appropriate level, with the support of the relevant international and regional organizations, [to] review periodically and report on the situation on plant genetic resources for food and agriculture, using existing systems and procedures", and for "strengthening the Global System on the Conservation and Sustainable Use of PGRFA by *inter alia*, accelerating the development of the [World] Information and Early Warning System to facilitate the exchange of information [...]".
4. This document reports on the state of the development of the WIEWS, and on plans for its further development. Synoptic data from the "Survey of National Plant Genetic Resources Activities for Agricultural Species", carried out by FAO in the last two years, are also presented. The guidance of the Commission is sought on further developments.

II. WORLD INFORMATION SYSTEM ON PLANT GENETIC RESOURCES

5. Most data in the WIEWS are provided by countries through replies to questionnaires. The data are then stored in various databases, processed, made available on request, and used for the preparation of periodic reports on the State of the World's Plant Genetic Resources. A number of databases, and associated information retrieval systems, have been developed. The current configuration of databases is as follows.
6. The *Country Profiles Database* contains information on the structure of national plant genetic resources programmes or activities in 190 countries,² and on the amount and type of germplasm held in their genebanks, or other collections.

¹ "The present international arrangements [...] will be further developed [...] in order to develop a global system so as to ensure that: [...] (e) [there develops] a global information system, under the coordination of FAO, relating to plant genetic resources [...]; (f) early warning will be given [...] of any hazards [...], with a view to prompt international action [...]"

² The WIEWS databases now contain data on 190 countries. This includes information on at least one institute and one contact point in the agriculture sector.

7. The *Ex Situ Collections Database*, in its current state of development, contains summary records on over 4.5 million germplasm accessions, held in some 1220 *ex situ* collections around the world.

8. These two databases were developed from sub-sets of existing FAO/IBPGR databases. To validate and update the data they contained, a questionnaire entitled "Survey of National Plant Genetic Resources Activities for Agricultural Species" was jointly developed by FAO and IPGRI. The questionnaire was distributed by a Circular State Letter in May 1994 to both FAO member and non-member countries, with a request that they validate, correct or complete the data. As a follow-up to this distribution, copies of the questionnaire and appendix were distributed to national coordinators in the various countries, to facilitate a response. As a result, 56% of the questionnaires have been returned. The *Appendix* provides synoptic data compiled from the replies to this questionnaire.³

9. A *Database of Databases* of national and international information systems on plant genetic resources for food and agriculture has also been developed, following the recommendations of the Commission. The *Database of Database* does not duplicate information contained in any of the databases it lists. It rather provides profiles of individual databases, and a guide of how to obtain information from them.

10. To acquire data for this database, a questionnaire entitled "Survey of Plant Genetic Resources Information Systems" was circulated, on a trial basis, to a sample set of institutions and individuals. Returns from the trial distribution were employed in the design of the associated database retrieval computer programme. In 1995, the tested questionnaire will be widely distributed to national programmes and international institutes, in order to improve the coverage and quality of the data for the *Database of Databases*, promote the exchange of information on plant genetic resources, and allow users and collaborators to provide feedback.

11. The following two databases were part of the former Seed Information System that was integrated into the WIEWS, following the request of the Conference and the Commission.

12. The *Seed Sources Database* currently contains the addresses of, as well as data on the activities and crop coverage of, about 8000 seed-supplying institutions around the world. The *Seed Sources* was originally designed for mainframe computers, and on the basis of this programme, the *World List of Seed Sources* was published. In 1994, the database was redesigned to run on personal computers, and a new retrieval software developed. This has also made possible its distribution, on request, on diskette, and by electronic mail.

13. The *Crop Variety Database* contains information on commercial crop varieties. It was originally designed as a text retrieval system, and is currently being redesigned as a database management system, with the associated software. When this has been completed, the *Crop Variety Database* will be published in electronic form. The system consists of 55 crop files, with up to 5000 records in each.

14. The possibility of enlarging the coverage of current databases or of developing new databases, such as on crop genetic diversity, crop genetic erosion, and biotechnology research of interest to plant genetic resources for food and agriculture, should be considered. In this context, large quantity of data acquired in the preparation of the first Report on the State of the World's Plant Genetic Resources, in the context of the preparatory process of the Fourth International Technical Conference on Plant Genetic Resources, will be useful.

³ The WIEWS initially took over data on accessions from the earlier FAO and IBPGR databases. Countries were requested to confirm these accessions, as part of the questionnaire. Through replies to the questionnaires, 1,432,408 accessions have been confirmed (32% of the 4,525,800 accessions documented in the WIEWS).

15. A final important element of the WIEWS is the data-dissemination function. Several hundred requests for information, of varying complexity, received from inter-governmental, governmental and non-governmental institutions, as well as from individuals, are satisfied annually, particularly in relation to the latter two databases. Data files were provided by electronic mail, on diskette, and as printouts and reports on paper.

16. The development of a user-friendly graphical user interface retrieval software for the WIEWS has recently been undertaken. This will make it usable by those with only modest computer skills. A newsletter or an electronic bulletin board on the Internet could be used to disseminate information, and create an international awareness of the risk of germplasm losses. Such information technologies could be explored and developed in the near future. The advice of the Commission is sought on the sort of data that should be released and the appropriate data-dissemination technologies.

17. In any case, the major output of the WIEWS will continue to be the Report on the State of the World's Plant Genetic Resources, which provides the basis for updating the rolling Global Plan of Action. These two documents will be the major instruments through which the Commission may exercise its monitoring and coordinating functions, respectively.⁴

III. THE EARLY WARNING MECHANISM

18. The main purpose of the early warning mechanism is to alert the international community to a threatened loss of valuable plant germplasm for food and agriculture. The early warning mechanism aims at receiving information from governments and institutions about germplasm that is at risk, and then disseminate the relevant information to the international community with a view to prompt international action. The success of the mechanism is critically dependent on the quality and timeliness of the information supplied: encouraging such reporting, on a systematic basis, wherever possible, by the inclusion of appropriate questions in the periodical questionnaires, is therefore an important priority of the WIEWS. This has so far been done to a limited extent only.

19. Information that cannot be acquired by questionnaire relates to unpredictable emergency situations, caused by natural and other disasters. In the case of accessions stored in genebanks, for example, such emergencies might arise from equipment malfunction, accidents, or natural disasters. The information on the threat will usually come from the curator, and be reported through the government. The rapid dissemination, by FAO, at the request of the country involved, of such information facilitates remedial action by the international community: a number of such actions have already been successfully undertaken, particularly in eastern Europe.

20. Adequate and timely information on emergency situations threatening wild crop relatives in natural ecosystems, and farmers' cultivars in agro-ecosystems (traditional farming systems), is more difficult to obtain, because the material itself is much more widespread, in geographical terms; because the causes of the threat to the germplasm are more varied; and because there is seldom a clearly identified official (such as the curator of a genebank) able to make the report. The *International Code of Conduct for Plant Germplasm Collecting and Transfer* provides an opportunity to obtain valuable data from expert sources: Article 11 (e) states that collectors should "alert the host country and the FAO Commission on Plant Genetic Resources about any impending threat to plant populations, or evidence of accelerated genetic erosion, and make recommendations for remedial action", but much remains to be done to ensure that such information is actually provided, in a systematic fashion.

⁴ Data acquired in the preparation of the first of these reports, in the context of the preparation of the Fourth International Technical Conference on Plant Genetic Resources, will be incorporated in the various databases of the WIEWS.

21. In addition to information on unpredictable emergency situations, a further function of the early warning mechanism relates to identifying situations of predictable risk to plant genetic resources. One specific area of risk relates to infrastructural, financial and physical factors that may lead to the breakdown of individual genebanks, or their inability to successfully store and regenerate accessions. In this connection, an important quantity of data on the infrastructural health of genebanks has already been acquired, through the "Survey of National Plant Genetic Resources Activities for Agricultural Species" questionnaire, for example, on the conditions under which accessions are maintained in genebanks, and staffing and funding levels (see, for example, the table in para. 5 of the Appendix). Further types of data will be solicited by the systematic introduction of the necessary questions into future questionnaires.⁵

22. The task of monitoring the status of wild crop relatives and farmers' cultivars on an on-going basis is even more complex, for the reasons mentioned in paragraph 22, and others. Considerable technical problems would need to be overcome, before an effective early warning system for such germplasm can be established. One approach could be through the use of external indicators, such as loss or modification of habitats (planned agrarian reform, deforestation, agricultural and economic development, and physical factors, natural - such as desertification - and manmade - such as dam-building). In addition, the use of remote sensing technologies might be explored. In some of these cases of predictable change, countries may wish to inform the WIEWS, with a view to seeking support for their efforts to conserve the resources involved. The loss of traditional crop cultivars could be measured directly, provided countries establish adequate data acquisition mechanisms national level.

IV. CONCLUSIONS AND GUIDANCE REQUESTED FROM THE COMMISSION

23. The World Information System on Plant Genetic Resources has now been established. Data is provided by countries, and the main use is in the preparation of the periodical reports on the State of the World's Plant Genetic Resources. A number of databases are operative, and much data has already been acquired, or is being acquired. The data types being acquired will be systematically updated and expanded with information provided by governments. The WIEWS will need to grow step by step, and with enough flexibility that it may be adjusted with experience, under the guidance of the Commission.

24. Little has yet been done in the development of the early warning mechanism. The potential and limitation of methodologies and strategies being considered, and achievements to date in the development of the early warning mechanism are described. Predictable and unpredictable emergency situations need different treatment. Approaches to material *ex situ* and *in situ* conditions are also different.

25. The Commission is invited to give its guidance upon areas in which the existing databases might be expanded (para. 15); the use of modern information-dissemination technologies (para. 17); and the improvement of data-acquisition, especially in the context of the early warning mechanism.

26. The guidance of the Commission is also sought as to how the WIEWS, with its specific focus on plant genetic resources for food and agriculture, should relate to, and be of assistance to the clearing-house mechanism of the Conference of the Parties to the Convention on Biological Diversity.

⁵ Further data will be acquired in the preparatory process of the Fourth International Technical Conference.

 APPENDIX

 SYNOPTIC DATA FROM THE SURVEY
 OF NATIONAL PLANT GENETIC RESOURCES ACTIVITIES

1. This Appendix presents some synoptic data compiled from the replies to the "Survey of National Plant Genetic Resources Activities for Agricultural Species", received during the last biennium. The data this survey sought included the organization of national programmes, profiles of national collections, germplasm acquisition, genetic resources utilization within the country, and national needs and priorities. An appendix to the questionnaire listed all data in the FAO/IBPGR databases describing national plant genetic resources programmes and germplasm collections.
2. A total of 160 questionnaires were distributed. At the time of preparing this report,¹ 89 completed questionnaires had been returned to FAO, representing 56% of the total.²
3. The regional distribution of replies is as follows:

FAO Region	Percentage of countries responding to the survey
Africa	51 %
Americas	57 %
Asia and the Pacific	48 %
Europe	72 %
Near East	47 %

4. Countries vary greatly in the way in which they organize their national programmes and coordination mechanisms, and their international contacts in this field. With this proviso, the following table³ gives, by region, the number of countries that reported that they have national programmes on plant genetic resources conservation and utilization, a national coordinator, or a national committee on plant genetic resources.

FAO Region	National Programme	National Coordinator	National Committee
Africa	24	22	9
Americas	17	18	7
Asia and the Pacific	18	18	12
Europe	25	28	11
Near East	10	12	3

¹ April 1995.

² The preparatory process for the Fourth International Technical Conference will provide substantial new data, through the preparation of Country Reports.

³ The table also includes additional information maintained in the WIEWS.

5. Countries identified as follows the main constraints that hamper the development of their plant genetic resources activities:

Main constraints identified	Percentage of responding countries
Insufficient funding	97 %
Lack of technical expertise	80 %
Need for training	66 %

6. The following table gives the relative importance, by region, that countries gave to various forms of activities regarding plant genetic resource activities. It is noteworthy that plant breeding remains the main reported use of germplasm. All regions report the use of biotechnology and other advanced techniques to be limited.

Plant genetic resource activity*	Africa	Americas	Asia and the Pacific	Europe	Near East
Plant breeding	37 %	35 %	49 %	50 %	53 %
Plant propagation	30 %	27 %	19 %	6 %	18 %
Germplasm enhancement	22 %	20 %	13 %	15 %	24 %
Conservation technology	6 %	8 %	4 %	2 %	13 %
Biotechnology	2 %	5 %	4 %	6 %	4 %
Other	3 %	5 %	11 %	21 %	3 %

* Percentages in the vertical columns do not sum exactly to 100 %, because of rounding.

7. Countries uniformly reported the need for further collecting, by species or geographic areas, for their national collections. On a global level, 87% of countries list collecting as a priority. The figure varies by region: in Europe, 71% of countries list collecting as a priority; in the Near East, 100%; and in all other regions, over 90%. It is therefore clear that, despite of the many accessions maintained in collections throughout the world, genebanks still feel that much diversity remains to be collected. However, a fuller understanding of the diversity already present in genebanks should inform any generalized collecting effort, which might then be directed to filling gaps, selective collecting species and geographical area.

8. Some 70% of countries responding to the questionnaire reported constraints to their conservation and regeneration activities. Some countries reported a complete lack of storage facilities and others a shortage of financial resources for the timely regeneration of accessions. These two factors represent a real risk of the loss of accessions.

9. The data provided by countries on the origin of acquisitions is insufficient for the preparation of a database on origins of accessions over the last 15 years. It is likely, in most cases, that the necessary information is not available. Other methods of establishing origins might be considered: for example, a global survey might be undertaken of collecting missions around the world, from the time of Vavilov. Some of the data might be acquired from the "Collecting database", established by IPGRI, on all missions it has sponsored. Document CPGR-6/95/8 (CPGR-Ex1/94/5 Annex), *Survey of existing data on ex situ collections of plant genetic resources for food and agriculture*, also represents a first attempt at analyzing the available data.