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COMMISSION ON GENETIC RESOURCES FOR FOOD AND AGRICULTURE

Eighth Regular Session

Rome, 19-23 April 1999

REPORTS FROM INTERNATIONAL ORGANIZATIONS ON THEIR POLICIES, PROGRAMMES AND ACTIVITIES ON AGRICULTURAL BIOLOGICAL DIVERSITY

PART II: INTERNATIONAL AGRICULTURAL RESEARCH CENTRES OF THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR)

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PART II: INTERNATIONAL AGRICULTURAL RESEARCH ORGANIZATIONS OF THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

INTRODUCTION

1. The Commission on Genetic Resources for Food and Agriculture is the only inter-governmental body where member countries, both donors of funds and technology, and users of genetic resources, discuss matters specifically related to agricultural biological diversity. The Commission, regularly receives reports from relevant international organizations, including FAO, on their policies, programmes and activities for the conservation and sustainable use of plant genetic resources. It has considered that such reports are of value both to the Commission, and to those organizations, which would thereby be able to better acquaint countries that are donors of germplasm and funds with their objectives and programmes, and benefit from their comments.

2. With the expansion of its mandate, the Commission for the first time received reports from organizations covering all fields of agricultural biological diversity at its Seventh Session. On that occasion, thirteen United Nations and other inter-governmental organizations, fourteen International Agricultural Research Centres of the Consultative Group on International Agricultural Research (CGIAR), and seven international non-governmental organizations provided reports.[1] The Commission welcomed these reports, and warmly thanked the organizations that had presented them. The Commission considered that these reports were an important contribution to its task in promoting coordination of activities in the field of agricultural biodiversity. It encouraged organizations to continue to submit such reports to its regular sessions.

3. This document was prepared by the System-wide Genetic Resources Programme (SGRP) of the Consultative Group on International Agricultural Research (CGIAR), consolidating information provided by the individual *International Agricultural Research Centres (IARCs):*

> El Centro Internacional de Agricultura Tropical (CIAT), the Centre for International Forestry Research (CIFOR), the Centro Internacional de Mejoramiento de Maíz y Trigo (CIMMYT), the Centro Internacional de la Papa (CIP), the International Centre for Agricultural Research in Dry Areas (ICARDA), the International Crop Research Institute for the Semi-arid Tropics (ICRISAT), the International Centre for Living Aquatic Resources Management (ICLARM), the International Centre for Research in Agroforestry (ICRAF), the International Food Policy Research Institute (IFPRI), the International Institute of Tropical Agriculture (IITA), the International Plant Genetic Resources Institute (IPGRI), the International Service for National Agricultural Research (ISNAR),

[1] AsDB, Commonwealth Secretariat, CBD, GEF, IICA, IAEA, CABI, IFAD, UNESCO, OIE, UNEP, UNIDO, WB; CIAT, CIFOR, CIMMYT, CIP, ICARDA, ICRAF, ICRISAT, ICLARM, IITA, ILRI, ISNAR, IPGRI, IRRI, WARDA; ASSINSEL, EAAP, ICUC, IUFRO, ICAR, RAFI, RBI.

the International Livestock Research Institute (ILRI), the International Rice Research Institute (IRRI), and the West Africa Rice Development Association (WARDA).

4. The Secretariat has limited itself to compiling the reports, as submitted. Each report is fully the responsibility of the organization submitting it. FAO's own activities are reported in documents CGRFA-8/99/10.1 and CGRFA-8/99/10.2.

5. Reports from United Nations and other Inter-governmental Organizations are contained in document CGRFA-8/99/11.1, and reports from International Non-governmental Organizations are contained in document CGRFA-8/99/11.3.

INTERNATIONAL AGRICULTURAL RESEARCH CENTRES OF THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH (CGIAR)

INTRODUCTION

1. This report to the FAO Commission on Genetic Resources for Food and Agriculture presents an overview of major developments and achievements in the genetic resources programmes of the CGIAR Centres over the last two years. This is a consolidated report, reflecting input from the individual CGIAR Centres, and was prepared in the context of the CGIAR System-wide Genetic Resources Programme (SGRP).

2. The SGRP aims to contribute to global efforts to conserve genetic resources for use in food and agriculture, through combining the strengths of the CGIAR Centres and others. It encompasses crop, forage, forestry, livestock and aquatic genetic resources, and facilitates cooperation among the CGIAR Centres and collaboration with national agricultural research systems (NARS) and other partners, in the areas of public awareness, policy, information, training and capacity development, and the conservation, sharing and restoration of genetic resources.

3. This report is in 4 sections: crop and forage, forest, livestock and aquatic genetic resources.

Crop and forage genetic resources

4. The CGIAR Centres were involved in the series of six regional meetings, held in 1998, to review progress in implementing the Global Plan of Action for the Conservation and Sustainable Utilization of Plant Genetic Resources for Food and Agriculture. The meetings took place in Benin, Botswana, Colombia, Germany, the Philippines and Syria. They were jointly organized by FAO and IPGRI on behalf of the SGRP, with the relevant regional research organizations and host countries. The meetings focussed on the strengthening of national programmes, community management of plant genetic resources, and regional and international collaboration. They provided the Centres with an excellent opportunity to review their contribution to the Global Plan and their support to national and regional efforts for its implementation.

5. Staff of CIAT, ICRISAT, IPGRI and IITA participated in the international workshop, organized by FAO in November 1998, to address the development of institutional agreements and capacity to assist farmers in disaster situations to restore agricultural systems and seed security activities. The CGIAR presented its past experience in restoration efforts and its commitment to continue to contribute to this important activity of the Global Plan. CIAT, CIP, CIMMYT and IPGRI have joined forces to restore adapted varieties of major crops to the countries of Central America devastated by Hurricane Mitch in 1998. IPGRI, through a project funded by the European Union, organized the re-introduction into Somalia of 165 samples of local maize and sorghum varieties. ICRISAT repatriated 500 accessions of sorghum and chickpea to India, in response to a request for the restoration of lost germplasm.

The CGIAR System-wide Information Network for Genetic Resources

6. In 1997, the CGIAR System-wide Information Network for Genetic Resources (SINGER) was made available on the Internet and CD-ROM. It links the genebank information systems of CGIAR Centres around the world, allowing them to be accessed and searched collectively. SINGER contains key data on the source, characteristics and transfers of the individual accessions of crop and forage genetic resources, held in trust by the Centres under the auspices of FAO. A meeting of the Centres and experts from NARS, FAO and other organizations, was held in November 1998, to evaluate progress and propose a plan of action for the improvement and further development of SINGER. In the short term, efforts will be directed to improving the user-responsiveness of the system and to providing access to a wider range of information on the *ex situ* collections, that will meet the requirements of different users (breeders, curators, researchers, policy makers). In the medium term, links will be developed with the databases of key partner (NARS, genebanks) and SINGER will be extended to provide access to the full range of genetic resources information available within the CGIAR.

Germplasm acquisition, conservation and distribution

7. The management of the in trust plant genetic resources collections, including the processing of newly received germplasm, its monitoring in storage, periodic regeneration and distribution on request to users, constitutes the primary work of the CGIAR genebanks. The attached Table 1 provides a summary of the germplasm samples acquired and distributed by the CGIAR genebanks during 1997 and 1998.

8. In some cases, the materials acquired were through collecting missions undertaken or assisted by CGIAR Centres in the period 1997-1998. For example, ICARDA, in collaboration with the respective NARS, undertook eight missions to six countries (Bangladesh, Ethiopia, Morocco, Spain, Syria and Uzbekistan) which resulted in the collection of 1,626 accessions. IPGRI/INIBAP (the International Network for the Improvement of Banana and Plantain) scollaborated with China, India and Indonesia in the collection of 103 accessions of *Musa*. IRRI was involved in an initiative, sponsored by the Swiss Agency for Development and Cooperation, for the collection of cultivated and wild rice. The NARS of 21 countries, primarily in Asia and sub-Saharan Africa, carried out the missions and collected, in total, 7,065 samples of *Oryza sativa* and 1,186 samples of different wild *Oryza* species. ICRISAT collected 93 samples of groundnut, pigeonpea and small millets in Vietnam during 1997-1998.

9. Several Centres have instigated improvements to their conservation facilities over the last two years. For example, WARDA has constructed a new medium-term conservation facility that is expected to become fully operational by mid-1999. Long-term storage of the rice collection held by WARDA will continue to be provided by IITA. CIMMYT and ICRISAT have added new seed drying rooms and CIAT has carried out improvements to its cold storage facilities. CIP has started construction of a new biodiversity facility. The first phase includes a biosafety greenhouse and the second phase (to start later in 1999) includes new facilities for the storage and maintenance, including *in vitro*, of the global collections of potato, sweet potato and Andean roots and tubers held by CIP.

10. Centres are engaged in research to develop improved regeneration procedures as well as addressing the on-going regeneration requirements of the collections they hold. CIP, for example, has placed an increased emphasis on regenerating accessions of wild potato collections held as seed and should complete the process within two years. Over the past two years, IRRI multiplied more than 13,000 accessions of cultivated rice and 480 samples of wild rice, and ICRISAT regenerated over 9,700 accessions of its five mandate crops. The cooperative project among NARS in Latin America and CIMMYT to regenerate maize landraces is resulting in the deposit of about 1,000

accessions a year into long-term storage at CIMMYT. Researchers at CIMMYT and the University of Sao Paulo, Brazil, have developed population genetics and statistical models for determining the best strategy for regenerating and sampling cross-pollinated and mixed self and random mating species. In 1997, IPGRI published on behalf of the SGRP, guidelines on the regeneration of accessions in seed collections.

11. Advances have been made in the development of cryopreservation techniques. IITA has developed protocols for yam and cassava shoot tips, and obtained good results in the use of cryopreservation for the storage of yam pollen. CIAT is now applying cryopreservation for the long-term conservation of a cassava core collection. CIP is studying the application of cryopreservation for both potatoes and sweet potatoes. At present, 145 clones of potato are successfully cryopreserved with more in process. With sweet potatoes the process has been unsuccessful and studies are continuing to develop a usable protocol. Research by IPGRI and partners in Cuba, in collaboration with institutes in France and Spain, has led to the development of efficient cryopreservation techniques for sugarcane, citrus and pineapple.

Germplasm evaluation and use

12. General agro-morphological characterization and evaluation of the collections is a major on-going activity of the genebanks. This is complemented by evaluation of the germplasm for specific traits of importance to current crop improvement programmes. The work is undertaken at the Centres, with NARS and through international trials.

13. Specific evaluation of the collections emphasizes pest and disease resistance and tolerance to climatic extremes. For example, IITA has completed the screening of 12,000 cowpea accessions for resistance to a range of insect pests. ICARDA has found significant resistance to chocolate spot in faba bean germplasm collected in 1996 in Ecuador. CIMMYT has identified novel sources of heat tolerance in Mexican wheat landraces through the measurement of leaf chlorophyll content. It has also developed a model to analyze the economics of searching for useful traits in *ex situ* collections of wheat. CIP has screened the potato collection for late blight, virus and insect resistance. A part of the sweet potato collection has undergone screening for important food quality traits. ICRISAT found high levels of resistance for downy mildew, shoot fly and stem borer in Australian wild sorghums. Also, new sources of resistance were identified for early leaf spot and rosette in groundnut.

14. During the last two years, a number of Centres have advanced the molecular analysis of the species they conserve. CIAT has used molecular markers to clarify the genetic relationship between Lima bean and wild *Phaseolus* species, that shows a secondary genepool in the Andes with one wild species and a tertiary genepool comprising five wild species. IITA is using molecular markers to assess the diversity of collections, identify duplicates and select core collections. In a joint ILRI/ICRAF study, molecular characterization of *Sesbania sesban* accessions indicated fairly distinct population structures with little geneflow between populations.

15. CIMMYT has applied statistical methods to the analysis of molecular marker data together with agro-morphological information, for the assessment of the variation between and within races of maize. It has also used molecular markers to identify quantitative trait loci involved in aluminum tolerance in rye. Through collaboration with the University of Birmingham, UK, IRRI is exploring the association of AFLP markers (amplified fragment length polymorphism) with quantitative traits in diverse rice germplasm. CIP routinely uses molecular-aided screening of diploid potato relatives for late blight resistance. It has also identified and cloned a virus resistance gene from a relative of potato which can be transferred to cultivated potato.

16. Several Centres are using inter-specific hybridization among wild and cultivated species in the improvement of crop varieties. For example, WARDA has successfully combined the best plant

characteristics of *Oryza sativa* and *glaberrima* through hybridization. Crosses are now being made between *O. sativa* and the wild species, *O. longistaminata* to enhance the tolerance of improved rice lines to drought. Tests conducted at ICARDA during the 1996/97 growing season, indicate that the crossing of an accession of the wild species, *Aegilops tauschii*, collected from a low rainfall site in Syria, with a local landrace, has conveyed tolerance to terminal drought and heat stress in the resulting synthetic hexaploid wheat.

17. A Global Programme for *Musa* Improvement (PRO*MUSA*) was launched jointly by INIBAP/IPGRI and the World Bank with the aim of bringing together all the major players in *Musa* improvement worldwide in order to identify and address the main research needs in evaluation and use at the global level.

Research on in situ *conservation*

18. During the past two years, the Centres have furthered research into *in situ* approaches to the conservation of crop genetic resources. This has included studies on the *in situ* conservation of wild crop relatives. For example, CIAT has been involved in a study on preserving crop wild relatives in the national park and protected area system of Costa Rica. ICARDA and the Syrian NARS have cooperated in a simulation on-station of the *in situ* conservation of three wild wheat species on arable land. Results over three years show that the wild wheats compete very well with the autochthonous plants. ILRI applied molecular markers to assess the impact of grazing on the genotypic diversity of two indigenous grasses (*Brachiaria xantholeuca* and *Cenchrus biflorus)* and two indigenous legumes *(Alysicarpus ovalifolius* and *Zornia glochidiata)* from adjacent plots under known grazing pressure in the semi-arid zone of the Sahel. Whilst yield and species composition varied from year to year depending on rainfall and grazing, the samples from grazed and ungrazed areas were not genetically very distinct, which indicates that grazing may not have major effects on genotypic diversity in these species. This indicates a significant opportunity to combine the *in situ* conservation of forages with sustainable use of rangelands by livestock.

19. Together with national partners from the formal sector and community-based organizations, the Centres are working with farmers to gain a better understanding of the dynamics of on-farm conservation and farmer breeding systems. IRRI researchers are collaborating with biologists and social scientists from Indira Gandhi Agricultural University in Raipur, India, the Huê University of Agriculture and Forestry in Vietnam, and from PhilRice in the Philippines. Results across all study sites consistently show that environmental conditions are a determinant factor in the farmers' decision-making process for variety management. In the Cagayan Valley in the Philippines, for example, the anthropological study of variety classification and naming by farmers can be used in connection with socioeconomic and genetic data to elaborate on-farm conservation strategies. The genetic data suggested that an evolutionary process that affects both modern and traditional varieties is continuing.

20. CIMMYT has conducted two case studies of maize seed selection practices in traditional Mexican communities. Working with partners in the Central Valley of Oaxaca, Mexico, local varieties from 15 villages were evaluated in farmers' fields along with genebank accessions from the same region and race. The surveys have yielded information on the varietal traits valued by farm household members. This information will be used to identify source materials to develop experimental varieties and as the basis of participatory breeding activities. ICRISAT collected information on farmers' seed management in four villages in western Rajasthan, India, and studies to estimate genetic changes due to different seed management strategies are underway. Participatory research carried out by IPGRI in Africa on local leafy vegetables which are primarily grown by women pointed to inadequacies in seed supply and processing systems as major constraints in the use and competitiveness of the species studied. CIP's work with Andean Root and Tuber Crops (ARTC) emphasizes *in situ* conservation and the linkages with increased marketability and consumer acceptability. Market and quality studies have shown the value of

ARTC in local markets and more products are showing up in markets. This helps to ensure the continued on-farm conservation of ARTC and links conservation directly to utilization.

21. Socio-economic data and methodologies have also been used by IPGRI in determining the extent and distribution of genetic diversity and in locating plant genetic resources in danger of genetic erosion. A UNEP-funded IPGRI project on monitoring genetic erosion through ethnobotanical surveys was recently completed and technical reports produced for Malawi, Ghana and Uganda. The Institute has also sponsored ethnobotanical research including molecular and isozyme studies of major taro morphotypes in Yunnan, China, confirming that farmers manage and select considerable genetic diversity. IPGRI has constructed, together with partners, a Geographical Information System (GIS) model for predicting the distribution of genetic diversity of cultivated species and indicating areas and cultivars at risk of genetic erosion.

22. A GEF/UNDP project on agro-biodiversity conservation in Jordan, Lebanon, the Palestinian Authority and Syria was approved in 1998 and its implementation will start in 1999. The project, initiated by ICARDA and developed jointly with IPGRI, the Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD) and NARS, will bring more than US$ 8 million to the region of major food crop origin and diversity for *in situ* and on-farm conservation at the regional, national and community level.

Training and capacity development

23. All the CGIAR Centres provide training in aspects of genetic resources conservation. These activities take various forms, including specific courses and on-the-job training in techniques for collecting, characterizing, documenting and managing germplasm collections. For example, ILRI continues to hold regular courses on forage seed production. IRRI provided on-the-job training in genebank management to 23 staff from countries involved in the collecting of rice over the last two years. It also held in-country training courses on the collecting and characterization of rice for 377 staff from countries in Africa and Asia. In 1998, CIAT cooperated with the von Humboldt Institute of Colombia, in training activities. ICARDA and IPGRI jointly organized courses on different topics of genetic resources management in Iran, Morocco, Pakistan, Syria, United Arab Emirates, and Uzbekistan. In 1998, WARDA in collaboration with development agencies in Côte d'Ivoire organized a training course for 30 farmers in community-based seed production and conservation techniques, to promote the on-farm conservation of rice diversity.

24. In addition, the Centres have been active in producing training materials and guidelines. IPGRI's training modules on *ex situ* and *in situ* conservation have been produced in Spanish and distributed to national programme partners in the Americas. A technical bulletin outlining the various molecular techniques which can be used for assessing genetic diversity was recently published and distributed.

25. Centres such as IPGRI, IFPRI and ISNAR also help capacity-building efforts in national programmes by providing assistance with policy issues which are of growing importance to both developed and developing countries. As examples, in collaboration with the African Centre for Technological Studies, IPGRI has compiled a profile of policy, legislative and institutional measures for conserving and using plant genetic resources in Africa and, in July 1998, an expert consultation was held at IPGRI on ways to develop *sui generis* options under the TRIPs Agreement.

Forest genetic resources

26. Three CGIAR Centres, CIFOR, ICRAF and IPGRI, undertake activities with regard to forest genetic resources. CIFOR's work is directed to the sustainable management of forest ecosystems and plantations. ICRAF is concerned with agroforestry systems and the use and domestication of agroforestry species. IPGRI's activities emphasize the assessment and conservation of the genetic diversity of forest species. IPGRI is also host to the coordinating secretariat for the European Forest Genetic Resources Programme (EUFORGEN).

27. In September 1998, IPGRI, ICRAF and FAO held a workshop in Burkina Faso to assist countries in the Sahelian region to assess the status of their forest genetic resources and to prepare a regional plan of action for the conservation, sustainable use and enhancement of their resources. This workshop, which was supported by the SGRP, also led to the recommendation to initiate networks on food tree species, fodder species, timber species and non-timber forest products.

28. IPGRI's activities on forest genetic resources have placed emphasis on developing models and methodologies for *in situ* conservation and decision-making procedures for prioritizing populations, species and ecosystems for conservation. In its project on forest genetic resources in southeast Europe, IPGRI's activities in late 1998 included developing maps of distribution areas, compiling databases of seed stands and *in situ* gene conservation units as well as developing and applying advanced micropropagation techniques. A regional database on forest genetic resources was established for Central Asia.

29. The genetic resources programme of ICRAF has continued to grow extensively since its inception in 1993. During the past two years, 14 priority agroforestry species were collected from 10 countries, with the respective national programmes (Table 2). In 1997, 980 kg. of seed of 73 different species was supplied to agroforestry researchers. In 1998, the amount of seed distributed fell to 600 kg. although the number of taxa supplied remained the same. More than 100 hectares of seed production stands of 8 species were established in the 1997-98 period in Kenya, with parallel activities on-farm in Peru, the Philippines, Malawi and Zambia. In addition, 330 accessions of *Calycophyllum spruceanum* (from Peru), 346 accessions of *Guazuma crinita* (also from Peru) and 843 accessions of *Prosopis africana* (from the Sahel) were sent to the Royal Botanic Gardens Kew, UK, for duplicate long-term storage.

30. ICRAF has produced a Tree Seed Suppliers Directory in collaboration with FAO, the International Union of Forestry Research Organizations and the Danida Forest Seed Centre. It lists suppliers of more than 4,000 taxa and provides information on the material, origin and data available. The Directory is available in book, CD-ROM and Internet versions. ICRAF has also produced a reference and selection guide to agroforestry tree species in CD-ROM format. This contains details on the botanic identity, biophysical limits, history of cultivation, functional uses, pests and diseases of the different species, and the institutions working with them.

31. A joint CIFOR/IPGRI/SGRP project investigated how human activities affect the genetic resources of tropical forest plant species. Sites were selected in India, Malaysia and Thailand to cover as many different types of human activities as possible (including timber harvesting, grazing and collecting of forest products), while also allowing comparisons to be made across countries. Results showed that only the heaviest logging activities had the effect of severely reducing genetic diversity, with the intensity of the impact depending upon the reproductive ecology of the species in question. Severe genetic erosion of forest species was noted in areas of highly intensive harvesting, especially of those non-timber forest products which are seasonal with unreliable yields. Similar work is in progress in Brazil, Cameroon, Costa Rica, Laos, and Myanmar.

Livestock genetic resources

32. CGIAR research emphasizes the characterization of indigenous farm animals as the basis for developing strategies to manage, conserve and sustainably use local domestic animal diversity. ILRI works on cattle and small ruminants in Africa and during last year, expanded its activities to important farm animals in Asia. In 1998, with the support of the SGRP, ICARDA initiated the development of a programme of work on the characterization and sustainable management of small ruminants in the region of West Asia and North Africa (WANA) which will be expanded to Central Asia. The work of ILRI and ICARDA is coordinated with FAO in support of the development of the Global Strategy for the Management of Farm Animal Genetic Resources. Staff of ILRI and ICARDA participated in the first session of the Inter-Governmental Technical Working Group on Animal Genetic Resources, in September 1998.

33. The activities of ILRI include the on-farm characterization of breeds to assess their physical and performance characteristics, and their molecular characterization to quantify the diversity within breeds and the genetic relationships between them. This work leads to the identification of populations that are genetically unique, that require urgent conservation action and that bear unique attributes for use in improvement programmes. Advice and training is given to NARS on strategies for the conservation of unique populations, on measures to combat genetic erosion and on schemes for the sustainable use of existing diversity.

34. During a country-wide survey of livestock breeds in Ghana, a "stratified cluster" technique to estimate breed populations was tested. When refined and sufficiently tested, this method will facilitate the collection of breed statistics and thereby enable the status of endangered breeds to be monitored. DNA microsatellite markers have been developed and optimized for the study of genetic diversity in bovine populations. To date 1,520 bovine samples have been genotyped and the data analyzed to estimate the genetic relationships among 38 cattle breeds. A Y chromosome specific microsatellite marker has been identified and used to show the pattern and magnitude of the male-mediated zebu introgression into taurine cattle populations in Africa. Work has started on the sampling of African sheep breeds and their genetic study using eight microsatellite markers developed at ILRI.

35. ICARDA is currently in the process of developing its research contribution on the characterization and sustainable management of small ruminants in the WANA region. This is being undertaken in conjunction with FAO and the country coordinators for implementation of the Global Strategy for the Management of Farm Animal Genetic Resources. ICARDA was involved in workshops organized by FAO in 1998 that launched activities under the Global Strategy in the WANA region. Together with FAO and the national scientists, ICARDA is organizing a workshop in April, 1999, to develop proposals and plans for the characterization of small ruminants in WANA. In addition, ICARDA is recruiting an animal molecular geneticist to undertake the genomic characterization of small ruminants.

Aquatic genetic resources

36. In 1997 and 1998, ICLARM continued its strategic research, training and information activities on aquatic genetic resources, through extensive partnerships and networks. ICLARM is the Member Coordinator of the International Network on Genetics in Aquaculture (INGA), which has 13 developing-country members and 11 associated institute members. ICLARM and its partners are studying the genetic implications of stock enhancement of marine invertebrates, the population genetics of coral reef species and the dispersal of their larvae, the establishment and management of marine protected areas, and the genetic resources of farmed and fished species with respect to their conservation for sustainable use. ICLARM also hosts two global databases with information on living aquatic resources: FishBase, a biological database covering 20,000 of the world's 25,000 known fish species and ReefBase, covering the world's coral reefs.

37. ICLARM does not maintain genebanks but contributes to international exchanges of aquatic germplasm from its research collections (principally of tilapias and giant clams), through its research partnerships, its coordinating role in the INGA, and through its linkage with the GIFT Foundation International Inc., Philippines (GFII), which holds some of the germplasm that was developed under the UNDP project Genetic Improvement of Farmed Tilapia (GIFT), executed by ICLARM with Philippine and Norwegian partners (1988–97). Table 3 summarizes INGA's fish germplasm transfers for 1997-98. The National Freshwater Fisheries Technology Research Center of the Philippine Bureau of Fisheries and Aquatic Resources (NFFTRC/BFAR) currently holds germplasm of the GIFT project's founder and replacement stocks from eight countries. The GFII currently holds germplasm of a GIFT project founder stock from Egypt, and strains of fish from seven generations of selection.

38. ICLARM and FAO convened a conference 'Towards Policies for Conservation and Sustainable Use of Aquatic Genetic Resources', 15–17 April 1998, at the Conference and Study Center of the Rockefeller Foundation, Bellagio, Como, Italy. The conference identified priorities for action on aquatic genetic resources policy and areas of concern; conference proceedings will be published by ICLARM and FAO in 1999.

39. Representatives of FAO, ICLARM, IPGRI and the World Fisheries Trust (WFT), Victoria B.C., Canada met 16–17 November 1998, at FAO Headquarters, Rome to explore needs and opportunities for a global strategy, information and communication systems for aquatic animal diversity, such as are now established for plants and domestic animals. As a result of this meeting, FAO, ICLARM, the SGRP and WFT are developing the concept of an Aquatic Animal Diversity Information System (AADIS).

Attachments

Table 1. Germplasm Acquisition and Distribution, 1997-1998

	Acquisition of germplasm		Distribution of germplasm	
CGIAR Centre	**no. of samples**	**no. of source countries**	**no. of samples[1]**	**no. of source countries**
CIAT			9,377	
CIP	202[2]		1,190[3]	
ICARDA	5,181[4]	47	80,311[5]	99
ICRISAT	820	3	31,846	30
IITA	687	4	3,184	20
ILRI			4,006	
IPGRI/INIBAP	60[6]		979	
IRRI	14,777[7]	23	11,829	30
WARDA			9,689[8]	

1 Includes distribution to Centre scientists.
2 Comprises 53 potato and 149 ARTC accessions.
3 Comprises 626 potato and 564 ARTC samples.
4 Comprises 2,346 cereals, 1,228 food legumes and 1607 forages.
5 Represents 50,873 accessions.
6 34 accessions established *in vitro*.
7 Comprises 13,594 *Oryza sativa* and 1,183 wild species.
8 Includes breeding lines and interspecific progenies.

Table 2. Agroforestry species collected by ICRAF and national programmes, 1997-1998

Species	Collection area	*Uses*
Adansonia digitata	Kenya	Leaf; Medicine; Fruit
Bactris gasipaes	Peru	Fruit; Wood for flooring; Heart-of-palm; Medicine
Calycophyllum spruceanum	Peru	Timber for furniture, construction and fuel; Medicine and honey
Guazuma crinita	Peru	Timber for construction and fuel
Inga edulis	Peru	Charcoal production; Fruit; Soil fertility
Irvingia gabonensis/ I. wombolu	Cameroon; Nigeria	Fruit
Melia volkensii	Kenya	Insecticide; Fodder; Timber
Prunus africana	Kenya	Medicine (220 million USD per annum); Timber
Sclerocarya birrea	Kenya; Mozambique; Swaziland; Mali	Fruit; Timber for construction and fuel; Medicine
Sesbania sesban	Malawi; Zambia	Soil fertility; Fuelwood
Swietenia macrophylla	Mexico	Timber for furniture and construction
Tamarindus indica	Kenya	Fruit; Fodder; Timber for construction and fuel; Honey
Tephrosia vogelii	Kenya; Zambia	Soil fertility improvement
Tithonia diversifolia	Kenya	Soil fertility

Table 3. Transfers of aquatic germplasm in 1997-98, coordinated by ICLARM through the International Network on Genetics in Aquaculture (INGA)

Species	Strain[1]	Source[2]	Recipient	No. of fish	Date (mo/yr)
Tilapia					
Oreochromis niloticus	GIFT, S, V	Philippines, GIFT	Fiji	600	8/97
Oreochromis niloticus	GIFT, S, V	Philippines, GIFT	Indonesia	2,000	8/97
Oreochromis niloticus	GIFT, S, V	Philippines, GIFT	Thailand	2,000	5/98
Oreochromis niloticus	GIFT, S, V	Philippines, GIFT	India	3,000	8/98
Oreochromis niloticus	On station	Egypt, CLAR	China	2,000	8/98
Oreochromis niloticus	GIFT, S, V	Egypt, CLAR	China	2,000	8/98
Carps					
Cirrhinus mrigala	River Ganges, W	India, CIFA	Vietnam	50	1/97
Labeo rohita	CIFA, S, I	India, CIFA	Thailand	1,000	9/98

[1] CIFA = Center for Inland Fisheries and Aquaculture; GIFT = Genetic Improvement of Farmed Tilapia project; S = Selected; W = wildtype; I, V mean first and fifth generations of selection.

[2] CLAR = Central Laboratory for Aquaculture Research; GFII = Gift International Foundation Inc.