IBPGR and Groundnut Genetic Resources

V. Ramanatha Rao[1]

Abstract

*Recognition of the need for fostering work on plant genetic resources by the international community led to the formation of the International Board for Plant Genetic Resources (IBPGR). IBPGR has been promoting scientific efforts in relation to various germplasm, including that of groundnut (*Arachis hypogaea*), some which are briefly described here.*

Through IBPGR-sponsored groundnut germplasm collecting missions, a total of 2679 (both cultivated and wild Arachis *species) samples have been collected, which have been distributed widely. IBPGR has supported the establishment of a field gene bank of wild* Arachis *species at the Centro Nacional de Recursos Geneticos (CENARGEN), Brasilia, Brazil.*

For germplasm characterization, evaluation, and documentation, IBPGR has actively supported and/or encouraged some projects on groundnut. It published the groundnut descriptors jointly with ICRISAT in 1981. A revision of this list and a separate one for wild Arachis *species are in preparation. There have been 71 IBPGR alumni from 12 different countries working in 24 gene banks that hold groundnut germplasm. It has sponsored meetings of various committees that have significantly influenced the work on groundnut germplasm. IBPGR hopes that a groundnut genetic resources network will be established that would help in ensuring better conservation and wider use of collections, provide better support to groundnut programs, and involve the developing countries more closely in genetic resources activities, with the cooperation of all concerned.*

Résumé

L'IBPGR et les ressources génétiques arachidières: *Reconnaissant le besoin de promouvoir des recherches sur les ressources génétiques des plantes par la communauté internationale, le Conseil international des ressources phytogénétiques (IBPGR) s'est constitué. L'IBPGR a soutenu des efforts scientifiques pour diverses activités sur les ressources phytogénétiques, y compris celles de l'arachide (*Arachis hypogaea*), dont certaines sont brièvement décrites dans cette communication.*

*Au cours des missions de collecte des ressources phytogénétiques d'arachide organisées par l'IBPGR, on a collecté au total 2679 échantillons d'arachide (espèces cultivées et sauvages d'*Arachis*), qui ont été distribués largement. L'IBPGR a appuyé la création d'une banque de gènes sur le terrain pour des espèces sauvages d'*Arachis *au Centro nacional de recursos geneticos (CENARGEN), à Brasilia, au Brésil.*

*Pour la caractérisation, l'évaluation et la documentation des ressources génétiques l'IBPGR a appuyé activement et/ou encouragé certains projets relatifs à l'arachide. Il a publié les descripteurs d'arachide conjointement avec l'ICRISAT en 1981. Une révision de cette liste et une liste séparée pour les espèces sauvages d'*Arachis *sont en préparation. Il y a eu 71 chercheurs formés à l'IBPGR provenant de 12 pays différents oeuvrant dans 24 banques de gènes qui conservent des ressources génétiques d'arachide. Il a parrainé des réunions de divers comités qui ont influencé de manière marquée le travail sur les ressources génétiques d'arachide. L'IBPGR espère qu'un réseau de ressources génétiques de l'arachide sera établi, car cela permettra d'assurer une meilleure conservation et un usage plus étendu des collections, d'appuyer mieux les programmes arachidiers et de mettre plus étroitement en jeu les pays en développement pour les activités sur les ressources génétiques, avec la coopération de tous les intéressés.*

1. Genetic Diversity Officer, International Board for Plant Genetic Resources IBPGR), Food and Agriculture Organization of the United Nations (FAO), via delle Sette Chiese 142, 00145 Rome, Italy.

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The threat of genetic erosion and the need for conservation of plant genetic resources was recognized by a few perceptive scientists as early as the 1940s. However, the urgency of the action was really felt in the 1960s and resultant international interest led to the formation of the International Board for Plant Genetic Resources (IBPGR) as a component of the Consultative Group on International Agricultural Research (CGIAR). The main objective of IBPGR is to foster "the study, collection, preservation, documentation, and evaluation, and utilization of genetic diversity of useful plants for the benefit of people throughout the world". IBPGR has been charged to act as a "catalyst both within and outside the CGIAR system in stimulating the action needed to sustain a viable international program for the conservation of genetic resources of these plants". IBPGR, which started with a small Secretariat housed and supported by the Food and Agriculture Organization of the United Nations (FAO), has grown into a CGIAR Institute in its own right and will shortly begin operating as an institute administratively independent from FAO under the name of the International Plant Genetic Resources Institute (IPGRI).

Since its formation, IBPGR has been playing a leading role in catalyzing and promoting scientific efforts in genetic resources activities, in collaboration with various national, regional, and international programs, including the other International Agricultural Research Centers (IARCs). In this context, IBPGR undertook several activities in the area of groundnut (*Arachis hypogaea*) and its related wild *Arachis* species germplasm, some of which are briefly described below. It is necessary to make it clear first that

Table 1. Countries, dates, and number of accessions of cultivated groundnut collected through IBPGR-sponsored missions.

Country	Date	Accessions	Country	Dates	Accessions
Algeria	Oct 1984	2	Mauritius	Mar 1985	3
Argentina	Mar–Jun 1977	12	Mexico	Jun–Dec 1983	3
	Apr–May 1983	4		Oct–Nov 1985	1
Bolivia	Apr 1977–Oct 1981	278		May–Oct 1986	2
	Apr–May 1983	51	Mozambique	Apr–May 1981	113
Botswana	Apr 1985	8	Nepal	Oct–Nov 1985	11
Brazil	Jun–Sep 1981	30	Paraguay	Jun 1977	8
	Mar–May 1982	27	Peru	Jan–Mar 1980	148
	Mar–May 1983	16		Mar 1982	2
	Mar–Jun 1985	28	Sierra Leone	Nov–Dec 1977	12
	Apr 1986	81	Somalia	Aug–Sep 1979	5
	Apr–May 1987	7	Sri Lanka	Sep 1986–Jun 1987	4
Burkina Faso	Oct 1981	1	Sudan	Sep–Oct 1980	27
Cameroon	Oct–Dec 1979	27		Oct 1982–Mar 1985	4
Chad	Oct–Dec 1987	2	Syria	Jul–Aug 1985	4
Ecuador	May 1980	53	Tanzania	Jul–Aug 1981	27
Egypt	Oct 1981	14	Thailand	Jan 1978–Dec 1980	28
	Oct 1982	3	Yemen	May–Jun 1980	2
Ethiopia	Feb–Mar 1981	1	Togo	Dec 1983–Mar 1984	27
Ghana	Nov 1982–Feb 1983	40	Uruguay	1984–1985	248
Guinea	Oct–Dec 1989	148	Venezuela	Sep–Nov 1987	1
India	Oct–Nov 1982	8	Zambia	Jun 1980	82
	Sep 1984–Jan 1985	2		Apr–Jun 1981	114
Kenya	Jul 1988	9		Jun–Jul 1982	37
Laos	Nov 1983	23		Jun 1984	10
Malagasy Republic	May–Jun 1984	3	Zaire	Aug–Oct 1987	39
	1990	24	Zimbabwe	Apr–Jul 1982	183
Malawi	Mar–Apr 1979	33		Mar–Aug 1985	78
Mali	Jan–Feb 1982	9	Total		2167

IBPGR is not a 'donor' agency. It is an international scientific organization that seeks collaboration with other scientific institutions to fulfil its mandate. In doing so, IBPGR sometimes gives financial support to work at the collaborating institute.

Germplasm Collecting

Over the years IBPGR has made considerable efforts to rescue germplasm threatened by genetic erosion and to fill gaps in the existing collections so that they become more representative. These efforts involved germplasm collecting and facilitating the distribution of the material collected. IBPGR has supported a number of groundnut germplasm collecting missions (both cultivated and wild *Arachis* species) and 2679 samples have been collected. A significant number of these missions has been targeted at collecting groundnut germplasm, while others were multi-crop missions. The numbers of groundnut accessions collected are given in Table 1 and those of wild species in Table 2. Some joint projects, such as the one for *Arachis* species in Brazil, are continuing.

As part of its efforts to facilitate distribution of germplasm, IBPGR has supported the multiplication of South American *Arachis* germplasm at Texas A&M University, Stephenville, Texas, USA, for the express purpose of despatching the seed to ICRISAT. This was necessary since ICRISAT could not import groundnut seed directly from South America due to quarantine regulations. Seed of all groundnut germplasm samples collected by IBPGR without the direct participation of ICRISAT is also sent to ICRISAT through IBPGR's Seed Handling Units. IBPGR has also supported the establishment of a field gene bank of wild *Arachis* species at the Centro Nacional de Recursos Geneticos (CENARGEN), Brasilia, Brazil.

Table 2. Countries, dates, and number of wild *Arachis* species accessions collected through IBPGR-sponsored missions.

Country	Dates	Accessions
Argentina	Dec 1976	1
	Mar–Apr 1977	2
	Mar–May 1980	2
	Mar–May 1982	10
Bolivia	Apr 1980	8
	May 1983	63
Brazil	Dec 1976	14
	Jun–Sep 1981	25
	Mar–May 1982	41
	Mar–May 1983	44
	Apr 1984	30
	Aug 1984	52
	Mar–Jun 1985	97
	Apr 1986	50
	Apr–May 1987	41
Paraguay	Jun 1977–Apr 1978	20
Uruguay	Oct 1978–Mar 1981	2
	1984–85	10
Total		512

Germplasm Characterization and Evaluation

The characterization and evaluation of conserved germplasm, although essential to the utilization of the material, have never really kept pace with collecting and conservation activities. IBPGR has actively supported and/or encouraged the growing out of material and recording of characterization and evaluation data on the samples. However such activities have mostly been limited to crops that are not within the mandates of other CGIAR centers. A few studies on genetic variability in groundnut germplasm, using morpho-agronomic traits, were supported in the past (Table 3). For example, the material collected in Thailand during 1980 was characterized by the Department of Botany, Kasetsart University in 1981–82. Similarly the groundnut germplasm collected during 1977–1982 from South America was evaluated at the Stephenville campus of Texas A&M University using the minimum descriptors, while being grown out for duplication at ICRISAT. This work at the Texas Agricultural Experiment Station (TAES) resulted in the publication of a catalog (Simpson et al. 1986). The 248 samples collected in Uruguay in 1984 were characterized during 1984–85 at the Universidad de la Republica, Montevideo. However, IBPGR believes that evaluations are highly environment specific and that this work is better undertaken by the crop improvement programs concerned.

Documentation

IBPGR's efforts in groundnut germplasm documentation are presented in Table 4. One of the IBPGR's earliest efforts was to support the establishment of the International *Arachis* Information Service for Germplasm Resources at the University of Florida, USA, during 1976–77. The *International Peanut Program*

Table 3. IBPGR-supported groundnut characterization and evaluation projects.

Institute	Dates	Type of material	Accessions
Department of Botany, Kasetsart University, Thailand	1981–82	Local landraces	28
Texas A&M University, Stephenville, USA	1982	South American landraces collected in 1976–1982	681
Instituto Nacional de Tecnologia Agropecuaria, Manfredi, Argentina	1983–84	Wild & cultivated groundnut	280
Plant Genetic Resources Program, Direction de la Recherche Agronomique, Cacaveli, Togo	1984–85	Local landraces	15
Universidad de la Republica, Montevideo, Uruguay	1984–85	Local landraces	248
Sri Lanka	1983–84	Local landraces	24

Table 4. IBPGR-sponsored groundnut documentation projects.

Organization	Dates	Title of the project
University of Florida, USA	1976–77	International *Arachis* Information Service for Germplasm Resources
		Global Data Base for *Arachis* germplasm
Texas A&M University, Stephenville, USA	1983	Catalog of the *Arachis* material collected in the period 1976–1983
	1985	Catalog of minimum descriptors of groundnut germplasm collections from South America, 1977–1982 (681 accessions)

Newsletter and two volumes of inventories for five collections were issued under this joint program.

Meaningful documentation of genetic resources is essential for studying the variation present and for accessing germplasm for crop improvement. Since its inception, IBPGR has supported the preparation and publication of internationally agreed descriptor lists for crops. IBPGR co-sponsored the IBPGR/ICRISAT ad hoc Working Group on Groundnut Germplasm, and following the recommendations of this committee, the first list for groundnut was published jointly in 1981 (IBPGR/ICRISAT 1981). This list is presently under revision in collaboration with ICRISAT and will be printed early in 1992. At the initiative of ICRISAT and following the recommendation of a Workshop on the Genetic Resources of Wild *Arachis* Species [held at the Centro Internacional de Agricultura Tropical (CIAT), Cali, Colombia, 29 Feb-2 Mar 1989], a preliminary list of descriptors of *Arachis* was produced as part of the report of the Workshop (IBPGR 1990). IBPGR hopes that these descriptors will be used universally to characterize and evaluate *Arachis* germplasm, thus simplifying the process of exchanging and analyzing data from various sources.

Training

IBPGR has not conducted any specific training programs on the genetic resources activities of groundnut. However, several of the staff working in various national gene banks that conserve groundnut germplasm, have benefitted from attending IBPGR-sponsored training programs. In the past 10 years, there have been 71 IBPGR alumni (at various levels of expertise) from 12 different countries working in 24 gene banks that hold groundnut germplasm. If the idea of an international groundnut genetic resources network becomes operational, priorities for training could be identified and action could be taken as required.

Meetings and Workshops

Since its inception IBPGR has worked on various crop species following recommendations made by

Crop Advisory Committees. Such a committee was never established for groundnut. However, it established an ad hoc Working Group in 1979. The meeting of this group was sponsored jointly with ICRISAT in September 1979 at ICRISAT Center, India. A number of decisions made at this meeting, such as the ones on the priority areas for collection of *Arachis* species, and development of groundnut descriptors, influenced the course of *Arachis* genetic resources work. IBPGR also supported the convening of the subcommittee on descriptors in Richmond, Virginia, USA, in 1980 that resulted in the finalization of groundnut descriptors, which was published in 1981 (IBPGR/ICRISAT 1981).

IBPGR also convened a group of scientists for a workshop on the genetic resources of wild *Arachis* species at CIAT, Cali, Colombia in 1989. This workshop was aimed at developing a collaborative program on wild species of groundnut. A number of topics such as the possible development of an *Arachis* network, the use of wild species in groundnut improvement, the taxonomic problems in the genus, further collecting requirements, and descriptors for wild species were discussed. A report of the workshop, containing the recommendations and the preliminary list of descriptors for wild *Arachis*, has been published (IBPGR 1990), as mentioned previously.

Crop Genetic Resources Network

IBPGR feels that crop genetic resources networks would help in ensuring wider use of germplasm collections, provide better support to crop improvement programs, and involve the developing countries more closely in plant genetic resources activities. Such a network for groundnut germplasm is conceived as a partnership in learning and problem solving. Its activities will be based on exchange of information on methods and results, scientific consultation in planning, sharing of material and data, defined commitments for all partners of the network, and on the acceptance of special duties/responsibilities by partners in the best position to provide services to the benefit of all members of the network. The network will be operating in the framework of policies that govern each participating country or organization. IBPGR has been looking for some time to foster such an activity for groundnut genetic resources and it was briefly discussed at a meeting of *Arachis* workers in 1989, convened by IBPGR. Participants of that meeting recommended strongly that a network be established to include all *Arachis* germplasm (IBPGR 1990). We are looking forward to the collaboration of ICRISAT and other interested national programs to develop such a network.

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