

# Management, conservation and utilization of plant genetic diversity in CEEC, CIS and other Countries in Transition

Sergey M. ALEXANIAN.  
Deputy Director for Foreign Relations  
N.I. Vavilov Research Institute of Plant Industry

## ACRONYMS USED

ARS	Agricultural Research Service of the United States
USDA	Department of Agriculture
ASES	Aral Sea Experiment Station (Kazakhstan)
CACNET	Central Asian and Caucasus Network for PGR
CBD	Convention on Biological Diversity
CGIAR	Consultative Group for International Agricultural Research
CGN	Centre for Genetic Resources (the Netherlands)
CIMMYT	International Maize and Wheat Improvement Center (Mexico)
CIS	Commonwealth of Independent States
COMECON	Council of Mutual Economic Assistance
ECP/GR	European Cooperative Programme for Crop Genetic Resources
ESCORENA	European System of Cooperative Research Networks in Agriculture [FAO]
FAO	Food and Agriculture Organization of the United Nations
GEF	Global Environment Facility
GPA	Global Plan of Action for Conservation and Sustainable Utilization of PGRFA
IARC	International Agricultural Research Centre
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRISAT	International Crops Research Institute for Semi-Arid Tropics
IIPGR	Institute for Introduction of PGR (Bulgaria)
IPGRI	International Plant Genetic Resources Institute
IU	International Undertaking on PGR
NGB	Nordic Gene Bank
NGO	non-governmental organization
PGR	plant genetic resources
PGRFA	plant genetic resources for food and agriculture
STC	Scientific and Technical Council on PGR for COMECON countries

TCP	Technical Cooperation Programme of FAO
UPOV	International Union for the Protection of New Varieties of Plants
USAID	United States Agency for International Development
USSR	Union of Soviet Socialist Republics
VIR	N.I. Vavilov Research Institute of Plant Industry (Russia)
VURV (=RISP)	Research Institute of Crop Production (Prague; later Ruzyně, Czech Republic)
WANA	West Asia and North Africa Network for PGR
ZADI	Centre for Agricultural Documentation and Information (Germany)

## 1. INTRODUCTION

The problem of collection, conservation and sustainable utilization of the diversity of plant genetic resources (PGR) is exceptionally important at the present stage of global community development because of the direct linkage with national and global food security. Plant genetic resources for food and agriculture (PGRFA) are vital components of the agricultural production systems that ensure food security. The future success of world agriculture will depend on its ability to change, and crops will have to be adapted to sustainable forms of agriculture while maintaining increased productivity to feed a growing world population. To ensure that agriculture can meet future needs, an important approach is through the conservation and sustainable utilization of PGRFA.

In the last two decades, the conservation and utilization of PGRFA have captured international attention. Major international events have included:

- The agreement in the form of the International Undertaking on Plant Genetic Resources (IU), as adopted by FAO in 1983, and in 1989 supplemented with a Resolution on the recognition of “farmers’ rights,” as well as an interpretation of the “rights of the country of origin.” The Resolution also provided for the sharing of benefits derived from genetic resources.
- The establishment of the Global System for the Conservation and Utilization of PGR, and formulating its underlying political and legal principles. Thus, by 1992, the global community had achieved certain success in conserving agrobiodiversity and the basis for setting up the Global System for PGR had been laid.
- The adoption of the Convention on Biological Diversity (CBD) in 1992. In adopting the CBD, countries also adopted Resolution 3 of the Nairobi Final Act, which recognized that access to *ex situ* collections, not acquired in accordance with the CBD and Farmers’ Rights, were outstanding matters that the CBD had not addressed.

- The negotiation on the revision of IU to achieve harmony with the CBD started in 1994, and is expected to be completed in 2001.
- The adoption of the Global Plan of Action on PGRFA (GPA) at the 4<sup>th</sup> FAO Technical Conference on PGRFA, in 1996.

The three objectives pursued by GPA are as follows:

(i) Guarantee PGR conservation for food and agriculture to ensure food security.

(ii) Facilitate better utilization of PGR, with the aim of accelerating economic and social development and eradicating hunger and poverty in developing countries.

(iii) Facilitate equitable sharing between countries, communities and farmers of benefits arising from PGRFA utilization.

The importance of GPA adoption and its implementation is conditioned by the fact that no single country can be self-sufficient in PGR. All stakeholders should work together. Activities in the sphere of agrobiodiversity involve state organizations, private sector, NGOs, farmers and communities, researchers and breeders, politicians and lawyers. Integration of PGR-related measures implemented within the frame of a comprehensive national programme makes it possible to link all the parties involved at the national, regional and global levels. In fact, the structure and organization of international and regional programmes directly depend on the infrastructure of national programmes and country capabilities.

The PGR programmes in the former USSR and East European countries are important components in GPA implementation. Due to the recent political changes, they now total 27 countries. This paper reviews the situation regarding management, conservation and utilization of plant genetic diversity in these countries.

Within the USSR, the N.I. Vavilov Research Institute of Plant Industry (VIR) was the only organization working on the whole complex of problems related to genetic resources of cultivated plants and their wild relatives. VIR was actively involved in exploration and germplasm collecting throughout the world, maintaining the collected germplasm in its genebank and providing it to various users, carrying out characterization and preliminary evaluation of the accumulated genetic stocks, developing documentation, and training specialists. VIR possessed a vast network of 19 experiment stations, which maintained working collections, carried out research and regeneration of accessions. After the break up of the USSR, six experimental stations, namely those in Ukraine, Kazakhstan, Turkmenistan, Georgia and Uzbekistan appeared to be the major holders of national germplasm collections in these countries.

National programmes in East European countries, including Bulgaria, Hungary, former East Germany, Poland, Romania, Czechoslovakia and Yugoslavia evolved from collaboration between member countries of the Council of Mutual Economic Assistance (COMECON) in the period 1964 to 1990. This regional cooperation, guided by the Scientific and Technical Council for PGR (STC), provided the basis for establishing national collections in these countries (Table 1).

**Table 1.** Dynamics of growth of *ex situ* collections in COMECON countries participating in the regional programme on PGR (1964-1990)

Country	Number of accessions		
	1964	1985	1990
Bulgaria	12 000	23 000	40 000
Hungary	25 200	39 780	44 500
East Germany	27 320	59 853	62 161
Mongolia	-	10 560	13 600
Romania	-	31 279	- *
Poland	8 500	45 403	59 500
USSR	164 000	340 000	350 000
Czechoslovakia	27 211	41 075	43 806
<b>Total</b>	264 231	590 950	623 567

NOTE: \* = left COMECON.

In view of the social, political and economic changes in the USSR and countries of the Eastern Block, at the last STC meeting in 1990, an “Appeal to the UN FAO Commission” was adopted. A series of joint missions was undertaken by FAO and IPGRI in 1992 in six countries of eastern Europe and Russia. The missions identified factors threatening security of *ex situ* collections in these countries, and recommended steps to be taken at the national level. A number of collections were in immediate danger of loss and required emergency financial and technical assistance. At the CGIAR International Centres Week (1992), donor country representatives agreed on the need to coordinate efforts of potential donors. A trust fund was set up at the CGIAR to receive donor contributions targeted for the CIS and eastern Europe. Since then, donations channelled through this fund have been used to alleviate urgent problems in many countries, through emergency assistance. Later on, thanks to joint projects and participation in programmes of FAO and IPGRI, countries of eastern Europe and former republics of the USSR have become more involved in activities of the global community on conservation and sustainable utilization of PGRFA. All countries of eastern Europe, CIS and countries in transition participated in the Leipzig Conference in 1996.

To facilitate the analysis of the current status of PGRFA activities in these countries (some 27 countries), it is convenient to divide them into five groups. The member countries and summary information on various PGR aspects in each group are presented in Table 2 and the proposed priority areas for each group are presented in Table 3.

**Table 2.** Summary information on various PGRFA respects in each country in five regional groups

Group	Country	AO	U	BD	Regional cooperation	Total ex situ accession	National Geneva Bank	National Prog.	Documentation	Legislation
	Czech Republic				ES CORENA, ECP/GR	51 517	1 989		+	UPOV
	Hungary				ES CORENA, ECP/GR	75.170	1 985		+	UPOV
	Poland				ES CORENA, ECP/GR	91 802	1 987		+	UPOV
	Slovakia				ES CORENA, ECP/GR	14 547	1 996		+	UPOV
	Slovenia				EC P/GR	2 676	-		+	-
<b>I</b>	Albania				ES CORENA, ECP/GR	20 000	-		-	-
	Bosnia and Herzegovina				inte nds to join ECP/GR	38	-		-	-
	Bulgaria				ES CORENA, ECP/GR	55 420	1 987		+	UPOV
	Croatia				ES CORENA, ECP/GR	15 336	-		-	-
	Yugoslavia				ES CORENA, ECP/GR	38 000	-		-	-
	Macedonia (FYR)				ES CORENA, ECP/GR	-	-		-	-
	Moldova				ES CORENA, observer in ECP/GR	6 000	-		-	+
	Romania				ES CORENA, ECP/GR	93 000	1 990		-	-
<b>II</b>	Russian Federation				ES CORENA, observer in ECP/GR,	320 000	1 975		+	UPOV

				CACNET					
	Ukraine			ES CORENA, observer in ECP/GR	136 400	-	-	-	UPOV
	Belarus			ES CORENA, observer in ECP/GR	4 000	-	-	-	-
V	Latvia			ES CORENA, ECP/GR, NGB	9 730	GB	N	-	-
	Lithuania			ES CORENA, ECP/GR, NGB	12 821	GB	N	-	-
	Estonia			ES CORENA, ECP/GR, NGB	3 000	GB	N	-	-
	Azerbaijan			EC P/GR, CACNET, WANA	33 000	-	-	-	-
	Armenia			EC P/GR, CACNET, WANA	2 000	-	-	-	-
	Georgia			EC P/GR, CACNET, WANA	10 000	-	-	-	-
	Kazakhstan			CA CNET, WANA	31 000	-	-	-	-
	Kyrgyzstan			CA CNET, WANA	29 000	-	-	-	-
	Tajikistan			CA CNET, WANA	-	-	-	-	-
	Turkmenistan			CA CNET, WANA	4 832	-	-	-	-
	Uzbekistan			CA CNET, WANA	54 000	-	-	+	-

NOTES: Group I = Central Eastern Europe; Group II = Southeastern Europe; Group III = Belarus, Russia and Ukraine; Group IV = Baltic states; Group V = Caucasus and Central Asia

**Table 3.** Priority areas in PGRFA in each regional group

Group	Priority Areas
<p><b>I</b> Central Eastern Europe</p>	<ul style="list-style-type: none"> <li>- collection of the local diversity</li> <li>- documentation of <i>ex situ</i> collections (characterization and evaluation)</li> <li>- enhancement of <i>in situ</i> and on-farm conservation</li> <li>- study of <i>ex situ</i> collection for utilization</li> <li>- development of national legislation on PGR</li> </ul>
<p><b>II</b> Southeastern Europe</p>	<ul style="list-style-type: none"> <li>- collection of the local diversity</li> <li>- development of passport databases for <i>ex situ</i> collections</li> <li>- development of national programmes</li> <li>- enhancement of <i>in situ</i> and on-farm conservation</li> <li>- establishment of long-term <i>ex situ</i> storage facilities</li> <li>- development of national legislation on PGR</li> <li>- inventorying of plant diversity</li> <li>- training of PGR specialists</li> <li>- study of <i>ex situ</i> collection (Bulgaria, Yugoslavia, Romania)</li> </ul>
<p><b>III</b> Belarus, Russia, Ukraine</p>	<ul style="list-style-type: none"> <li>- collection of the local diversity</li> <li>- expansion of regional and international cooperation</li> <li>- development of passport databases for <i>ex situ</i> collections (Ukraine, Belarus)</li> <li>- development of characterization and evaluation databases (Russia)</li> <li>- development of national programmes (Russia) and their enhancement (Ukraine, Belarus)</li> <li>- establishment of <i>in situ</i> and on-farm conservation</li> <li>- establishment of <i>ex situ</i> conservation (Belarus)</li> <li>- establishment of long-term storage conditions (Ukraine)</li> <li>- study of <i>ex situ</i> collections (Ukraine, Russia)</li> <li>- development of national legislation on PGR</li> <li>- training of PGR specialists (Ukraine, Belarus)</li> <li>- expansion of global cooperation (Russia)</li> </ul>
<p><b>IV</b> Baltic States</p>	<ul style="list-style-type: none"> <li>- collection of the local diversity</li> <li>- monitoring of germplasm repatriation from foreign <i>ex situ</i> collections</li> <li>- enhancement of <i>in situ</i> and on-farm conservation</li> <li>- enhancement of passport and characterization databases for <i>ex situ</i> collections</li> <li>- inventory of local plant diversity</li> <li>- education and training of PGR specialists</li> <li>- development of national legislation on PGR</li> </ul>
<p><b>V</b> Caucasus &amp; Central Asia</p>	<ul style="list-style-type: none"> <li>- collection of the local diversity</li> <li>- development of medium-term and long-term storage conditions for <i>ex situ</i> collections</li> <li>- enhancement and intensification of regional cooperation</li> <li>- monitoring of <i>in situ</i> conservation</li> <li>- development of <i>ex situ</i> conservation strategies</li> <li>- development of <i>in situ</i> and on-farm conservation strategies</li> <li>- monitoring of germplasm repatriation from foreign <i>ex situ</i> collections</li> <li>- development of passport databases</li> </ul>

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|  | <ul style="list-style-type: none"><li>- development and enhancement of national programmes</li><li>- development of national legislation on PGR</li><li>- training of PGR specialists</li></ul> |
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## 2 STATUS OF NATIONAL PGR PROGRAMMES IN THE REGION

### 2.1 Central Eastern Europe

Before 1990, the countries in this group, with the exception for Slovenia, were the core of COMECON cooperation. Major attention was paid to collecting, conserving and studying crop species and wild relatives of cultivated plants that possessed potential value for agriculture and breeding. In each country, an appropriate institute was appointed as a coordinating body, and at present these institutes are heading national programmes. The level of training offered to experts working on PGR issues is traditionally high, but financial constraints and economic reforms in all these countries have resulted in decreased training, even though training has been given high priority at the national level. At the same time, there is a trend toward privatizing collections. All countries of this group are members of ECP/GR and of the FAO Commission on Genetic Resources for Food and Agriculture (CGRFA).

In **Hungary**, PGRFA activities are carried out under the supervision of the Ministry of Agriculture and under the leadership of the Technical Advisory Committee. The Institute of Agrobotany, the core institution, was set up in 1959, and currently maintains the national base collection of various crops in its genebank. The main tasks of the institute are: collection of (mostly indigenous) plant species, their evaluation, propagation for supplying to users, development of databases on the *ex situ* collections available in the country, medium- and long-term storage of the base collection, and coordination of PGR activities at the national level. The total accessions conserved by 24 institutes and experiment stations, including those preserved *in situ*, amount to about 80 000, with the genebank accounting for 50 000. As a result of international cooperation, passport databases have been compiled for all accessions. Within the ECP/GR European Crop Databases, the Institute is responsible for the *Bromus* and *Trifolium* databases. Other large holders of PGR collections within the national programme are the Institute of Horticulture and Ornamental Crops (Budapest), with 5 430 accessions; Institute of Viticulture (Kecskemet), with 2 100 accessions; and the Institute of Cereal Crops (Szeged), with 3 000 accessions. Further, Hungary is one of the selected countries within the IPGRI global project on “*In situ* conservation of crop plants and their wild relatives.” A new approach is being implemented for the conservation of local varieties at their site of origin. The focus is on landraces of crop species with a long history of cultivation in Hungary (*Secale* spp., *Zea mays*, *Vicia faba*, *Lathyrus sativus*, *Vicia sativa*, *V. villosa*, *Cucurbita pepo*, *C. maxima*, *Capsicum annuum*). Landraces of different species (*Phaseolus* spp., *Zea mays*, *Sorghum* spp.) are cultivated in farmers’ home gardens. *In situ* and on-farm

conservation will contribute to better understanding and appreciation, and will add value to the locally developed genetic resources maintained by farmers.

In **Poland**, Professor L. Kazanowsky pioneered collection and conservation of plant diversity in the country. During the Second World War, nearly all accessions were lost, and the work on collecting and conserving PGR resumed only in 1951, when the Plant Breeding and Acclimatization Institute (IHAR) was established in Radzikov. In 1979, a PGR Department and a genebank were set up at IHAR. At present, the Institute performs functions of the national coordinator by managing collections of plant resources held in Poland by agricultural institutes. Currently, the national programme is decentralized. Besides the coordinator institute, it includes 3 universities, 6 departments at various institutes, 7 breeding stations, and the Botanical Gardens of the Academy of Sciences. The national genebank keeps about 50 000 accessions (23 000 cereals, 20 000 forages and grasses, 10 000 legumes, 1 700 industrial crops, etc.). The total *ex situ* collections in the country amount to 92 000 accessions. In recent years, Poland has been extensively involved in international PGR programmes, and has maintained close contact with international centres and organizations. The national programme is controlled by the government. The main directions of future activities are *ex situ* and *in situ* conservation of national plant diversity, intensive collecting of endangered local varieties and species, and total completion of passport and evaluation databases, the creation of which was started in the 1980s as a measure to help curators of crop collections. Within the ECP/GR European Crop Databases programme, Poland is responsible for *Secale*, *Pisum*, *Lupinus*, *Dactylis* and *Festuca*. In addition, the country is responsible for the regional *Pisum* collection and the world *Secale* collection. The BARKA Foundation was set up in Poland with the objective of rendering assistance to farmers engaged in on-farm conservation of local varieties and species in danger of extinction.

After the separation of **Slovakia**, there arose the problem of creating an infrastructure for carrying out its own activities with cultivated plant diversity. Upon signing the CBD and ratifying it by Parliament in 1994, the government entrusted the Agricultural University in Nitra with developing a long-term programme entitled *Conservation of national plant diversity in Slovakia*. The programme had the following priorities: collecting unique local plant species, old local varieties, and wild population ecotypes from different regions of the country; evaluation of the accumulated diversity; its multiplication for long-term storage; and creation of a national genebank to store national PGR, including material to be repatriated from abroad. To support the programme financially, the government has passed a decree establishing a Slovakian Fund for PGR Conservation. The Crop Production Institute at Piestani, which possessed extensive experience in PGR activities through participation in the COMECON programme, has served as the coordinating institute. Priorities of the national programme are the development of documentation on PGR in accordance with international descriptors aimed at creating compatible databases, providing access to PGR and related information for national and foreign users, and the organization of joint research with foreign partners in order to accelerate the utilization of the collected diversity in breeding.

The Slovak national programme is decentralized, involving 20 organizations, under the Council on PGR. In 1996, an agreement with the Czech Republic was signed to facilitate coordination and joint activities, including collecting and establishment of duplicate base collections in both countries. At present, 519 accessions from Czech collections are stored in the Slovak genebank, and 1 013 Slovak accessions are in the Czech genebank. The national collection contains 15 500 accessions of 180 plant species, including 4 395 accessions of cereals (wheat and barley, most of which came from VIR as part of COMECON cooperation), 2 505 industrial crops, 2 135 grain legumes, and 1 575 fruit crops. Attributing special importance to conserving local diversity, a series of collecting missions have been conducted in the country in recent years, yielding about 4 000 plant samples, primarily of *Festuca*, *Trifolium*, *Poa*, *Papaver* and *Medicago*. Following the construction of a genebank at the coordinating institute, in 1996, it became first priority to consolidate the national collection in state-controlled long-term storage, because of the intensive privatization of breeding institutions involved in the national programme.

In the **Czech Republic**, a significant role in PGR activities has been played by the Research Institute of Crop Production (VURV, Prague-Ruzyne), which coordinated the national system of 31 institutions dealing with individual crops or groups of crops prior to the split of Czechoslovakia. Since 1992, coordination of PGR activities in Czech Republic has been performed by the National Council for PGR at VURV. The enrichment of *ex situ* collections was carried out by traditional methods, namely collecting missions, exchange with foreign countries, and receipt of new national breeding lines. A long-term storage facility was constructed in VURV in 1989, and offers good conditions for maintenance of seed samples. The whole complex of activities concerning PGR is coordinated in the framework of the national programme on conservation and utilization of plant genetic resources, with the Czech National Board on PGR as an advisory body. The national programme includes 11 state and private institutions. The national collection has over 51 000 accessions. The largest and most important *ex situ* collections are held at VURV; these are collections of wheat, barley, sorghum, maize, buckwheat, millet, beet (totalling over 13 000 accessions). The IPGRI European Wheat collection is also stored there. The collections of vegetables, spice, aromatic and medicinal plants (exceeding 10 000 accessions) are maintained at the Institute of Vegetable Growing and Breeding (Olomouc). Emergency funds provided by the UK to IPGRI has allowed the valuable *Allium* collection to be saved at the Institute. The collection of over 800 vegetatively propagated accessions held in Olomouc remains under the auspices of ECP/GR. However, following partial privatization of the Institute, the remaining staff and facilities were transferred to the control of the University. After negotiations with the Ministry of Agriculture, the vegetable collection, including *Allium*, is under the control of the national genebank.

In the private sector, the largest collections are held by the Agricultural Research Institute Ltd in Kromeriz (rye, barley, oat - >5 000 accessions), and AGRITEC Ltd in Sumperk (peas, beans, lupins and fibre crops - ca 4 300

accessions). Of 14 collections in the national PGR network, 9 belong to the private sector, mainly for crops of economic importance. The flax collection is a part of the FAO-ESCORENA network, and the sunflower collection is a European regional one.

*In situ* conservation has been carried out within the framework of research projects focused on the collecting and maintenance of wild relatives of cultivated plants. Many fruit trees were located in the Sumava National Park, and some of them were transferred to the fruit tree collection in the Research and Breeding Institute of Pomology Ltd., in Holovousy. Some valuable trees have also been recommended for individual care in the framework of general care in the protected areas. Related wild species are usually included in crop collections because they represent an important source of genetic information for crop improvement. Also, valuable old fruit trees are being identified in the landscape (120 trees in 1998) for their further utilization as sources of grafts. Some landraces and obsolete cultivars have been re-introduced from PGR collections to meet special purposes. For instance, emmer wheat landraces collected near the Czech-Slovak border are being tested for their possible use in organic farming.

The documentation system EVIGEZ was launched in the early 1980s. Lost PGR can be tracked by comparison of variety lists with the computerized PGR database. Recently, EVIGEZ contained passport data for 44 095 accessions, representing more than 95% of all accessions. The characterization and evaluation database contains 12 378 records (28%). In the framework of ECP/GR, the European Wheat Database is co-managed with France.

In the past, in **Slovenia**, PGR have been used only for breeding new varieties. PGR were collected, evaluated and used by researchers at the Agricultural Institute of Slovenia, the Agronomy Department of the Biotechnical Faculty at the University of Ljubljana, and the Institute for Hops and Brewing at Zalec. With the exception of maize, seeds collected during the early collecting missions were not stored adequately, but in 1989 the Yugoslav PGR Programme was initiated. After the independence of Slovenia (1991), PGR research was uncoordinated and only partly funded from the state budget. In 1995, the Commission for preparing and operating the national PGR programme was set up and a country coordinator was nominated by the Minister of Agriculture, Forestry and Food. One of the first tasks of the Commission was the preparation of the country report on agricultural and forest genetic resources, which was sent to FAO. Curators were appointed by the Commission for each crop. The Commission reviewed the programmes prepared by three institutions for agricultural plants, and funds were allocated to support the work. The main objectives of the national programme are the collection, characterization, evaluation, regeneration and conservation of autochthonous germplasm that includes Slovenian cultivars, and endangered, vulnerable or rare forest tree species. The programme includes *ex situ*, *in situ* and *in vitro* conservation strategies, and promotes the sustainable use of PGR. Important tasks include the development of a documentation and information service, facilitating international collaboration. The signing of CBD by Slovenia in 1996, and joining Phase V of ECP/GR, stimulated PGR activities in the country.

The national genebank, with a space of 24 m<sup>3</sup> has been constructed at the Agricultural Institute to provide medium- and long-term storage conditions. The total national collection is about 3 000 accessions. These are mostly cereals, fruit species, grain legumes, forages and medicinal plants.

## 2.2 Southeastern Europe

The most advanced national programmes in countries of this group are in Bulgaria, Romania and Yugoslavia, thanks to their history of PGR activities in the framework of STC, availability of comparatively high scientific and technical capability, well-trained staff, and active participation in ECP/GR since 1983. Political and economic disturbances and transformations in the countries of this group have adversely affected the work on collecting and conserving agrobiodiversity. However, thanks to efforts by FAO and IPGRI, these activities have been revived or started anew since the mid-1990s. For the majority of the countries, the needs of special importance are the creation of long-term storage facilities, extensive collection of landraces and obsolete cultivars, monitoring of plant diversity, organization of *in situ* conservation, and repatriation of genetic resources from foreign genebanks.

In **Albania**, a long period of traditional cultivation resulted in a considerable number of autochthonous landraces of wheat, maize, vegetables, grapes, fruit trees, olives, etc. Unfortunately, as in other countries, these genetic resources are currently under threat. Estimates of genetic erosion for the period 1943-1993 are around 50-70% for certain crops. Therefore, collecting and conserving the remaining Albanian autochthonous material is an urgent need. The first collecting mission in Albania was carried out in 1941 by a German scientist. A collection of 290 accessions is still conserved in the genebank at Gatersleben (Germany). Collecting, focused on wheat, maize, white bean, vegetables, alfalfa, grapes, olives and fruit trees, was continued by Albanian scientists and institutes from 1955 through 1990. However, the published information and the documentation related to these expeditions is very limited, and most collections were damaged due to a lack of proper conservation conditions. The most active period of collecting was 1993-1996. During this period, five international collecting missions were organized. Four of them were financed by IPGRI (1993-1995), in cooperation with the Germplasm Institute in Bari (Italy) and the Genebank of Gatersleben. A further mission in 1996 was supported by ARS-USDA. Over 800 accessions of local germplasm were collected and shared between the participants. Unfortunately, the seed preserved in Albania was damaged during the turmoil of 1997, but the related documentation is still available. The germplasm conserved in Albania now mainly introduced from abroad and only a small fraction is autochthonous. *Ex situ* collections maintained by different institutes include about 8 100 accessions of wheat, maize, white bean, etc. About 160 accessions of olive and fruit trees are conserved in field collections.

The Albanian genebank, with a capacity of 20 000 accessions, was established in 1998 and is currently being completed. The National Committee for

PGR has also been set up recently. In order to consolidate the national programme on PGR, it is essential to secure financial support for germplasm collection, conservation, study and repatriation from foreign genebanks. A good example of rendering urgent assistance to the national programme is the provision of seeds of Albanian origin to the Germplasm Conservation Unit of the Albanian Seed Institute (Tirana). Genebanks in many countries have also eagerly responded to the appeal of the Forage Research Institute (Fush Kruj) to help Albania replenish the collection of native forages lost in the course of civil unrest in the country. In 1998, 44 accessions of Albanian origin were dispatched from VIR. The national system for PGRFA unites 10 institutes holding *ex situ* collections, the largest of which are stored at the Agricultural University (about 5 000 accessions of cereals), the Agricultural Institute in Lushnja (over 10 000 accessions of wheat, beans, cotton, sunflower, etc.), at the Institute of Maize and Rice in Shkodra (over 1 500 accessions), and the Institute of Vegetable Crops and Potato in Tirana (around 1 300 accessions).

The initiator of PGR activities in **Bulgaria** was D. Kostov, one of the first students and followers of N.I. Vavilov. He founded in 1940 a Department of Ecology and Introduction at the Central Institute of Land Cultivation (Sofia). The Department existed for several years, but was disbanded because of lack of interest. The collected plant diversity has been irretrievably lost. In 1952, a Department of Plant Introduction was established at the Institute of Plant Production, and research activities were resumed. In 1956, the first collection of local and primitive varieties was initiated throughout the country in order to create an *ex situ* collection. It was this collection that served as the basis for establishing the Institute for Introduction of PGR (IIPGR) in 1977 in Sadovo. The enrichment of collections was carried out by means of international germplasm exchange, collecting missions within the country, and accumulation of cultivars and breeding lines. During the period 1978-86, Bulgaria received 22 166 accessions of various crops from 57 countries. From the mid-1980s to 1990, specialists of IIPGR carried out collecting missions together with representatives from COMECON countries. As a result of political and economic reforms in the early 1990s and lack of state funding, PGR activities have nearly ceased. The IIPGR genebank experienced hard times and was on the brink of closing. Thanks to the assistance of IPGRI and FAO, the situation has been stabilized, but inadequate financing is still a factor that prevents any expansion of activities.

The national programme is coordinated by IIPGR and concentrates on both *ex situ* and *in situ* conservation. Priorities of the programme are the documenting and evaluation of PGR, and coordination of activities at the national level. The national programme includes five scientific organizations, of which the main ones are the Institute of Vegetable Crops, in Plovdiv (over 5 000 accessions), and the Experiment Station for Potato and Flax, in Samonov (over 1 000 accessions). In terms of *in situ* conservation, efforts are ongoing to conserve ecosystems of forage grasses and grain legumes, e.g. *Medicago*, *Trifolium*, *Vicia*, *Festuca* and *Lathyrus*. Recently, special attention has been paid to traditional landraces cultivated on small farms. Participation in COMECON and ECP/GR allowed the creation of a

passport database for almost 30 000 accessions conserved *ex situ*, and intensive work went into the creation of characterization databases. Within the ECP/GR Databases programme, Bulgaria is responsible for developing the database on *Agropyron*. The total *ex situ* collection amounts to 56 000 accessions, the largest of elements being the collections of cereals (about 20 000), of grain legumes (about 5 000) and of industrial crops (over 2 000).

In 1978, **Romania** joined cooperation on PGR within the COMECON system, but in 1986 officially withdrew its participation. In 1990, by a special government resolution, a genebank was established at the Academy of Agriculture and Forestry at Suceava. All PGR activities are coordinated by the National Committee, presided over by director of the genebank. The Committee is composed of representatives from all major crop institutes, including the Institute of Forage Crops (Brasov), Institute of Cereal and Industrial Crops (Fundulea), Institute of Fruit Crops (Pitesti-Maracineni), and some experiment stations maintaining working collections. The national system embraces 15 crop research institutes. *Ex situ* conservation is concentrated mostly on old local cultivars, wild species and relatives of cultivated plants occurring in the country. The total *ex situ* collection amounts to more than 96 000 accessions, the largest parts being *Solanum tuberosum* (about 31 000 accessions) and cereal crops (22 000). The Institute of Cereal and Industrial Crops (Fundulea) maintains collections of sunflower (over 5 000), wheat (5 000), flax (2 500), maize (2 000), barley (1 800) and soya (1 600). The national genebank in Suceava holds over 10 000 accessions of 111 crop species. Old local cultivars of maize, wheat, beans, flax and some vegetable crops are cultivated in a traditional way on small farms. Due to inadequate financing and lack of modern technical means, the documentation aspect is insufficiently developed, thus making the utilization and exchange of germplasm complicated. FAO is currently providing support through a Technical Cooperation Programme (TCP) project for upgrading the genebank storage facility, staff training, the development of the meta-data, and germplasm collecting.

During the decades of being part of the USSR, **Moldova** received initial breeding material from VIR. Collecting missions visited this republic repeatedly, and the collected PGR were conserved in the VIR genebank. Only in 1991, after Moldova separated from the USSR, was a Laboratory of Genetic Resources established at the Institute of Genetics. The Laboratory possesses a medium-term storage facility that houses about 10 000 accessions of various crops. Other collections are maintained by 10 institutes; they contain mostly breeding lines and accessions that had been received from VIR. The country urgently needs long-term storage facilities, and collecting of the local agrobiodiversity, training of staff for PGR work, and creating databases. On-farm conservation is carried out on small farms and in private gardens where crops are grown for personal consumption or selling at local markets. A collection of special significance is that of grape; it has over 2 600 accessions and is maintained, studied and used at the Institute of Viticulture and Wine-Making. *In situ* conservation has been established in five reserves on over 19 300 ha (0.6% of the total territory of the country), for fruit

species (*Pyrus pyraster*, *Malus sylvestris*, *Cerasus frutescens*, etc.), vegetables (*Asparagus*, *Portulaca*), as well as some forage species.

**Yugoslavia** joined COMECON as an observer, and was never an active participant in the activities of the STC. In the sphere of PGR, emphasis was on bilateral cooperation on the basis of agreements between the involved institutes and breeding centres in the USSR. For instance, an agreement on cooperation and germplasm exchange was signed with VIR. In this framework, Yugoslav breeders received accessions for breeding purposes and created working collections of their own. The establishment of a genebank in Yugoslavia, with financial support through an FAO project, had been scheduled for 1992. An Expert Council was set up as a coordinating body and to prepare a national programme for PGR. Meanwhile, the Committee for Agriculture was formed within the Federal Government to work on the development of the programme and its funding.

The main institutes forming the national programme were the Institute of Maize in Zemun Polje (maize, sorghum, millet), the Institute in Novi Sad (wheat, maize, sunflower), the Institute of Vegetable Growing in Smederevska Palanka, and the Research Institute of Horticulture in Cacak. Also, departments of several agricultural educational institutions were planned to be part of the national programme. However, ethnic controversies, wide-spread armed conflicts in the country and its consequent splitting into independent states disrupted these plans. By 1998, the *ex situ* collections in Yugoslavia totalled 60 000 accessions of cereals, vegetables, fruits, forages, etc., with seven institutes engaged in the study and evaluation of these crops. The base collection of over 35 000 accessions was located at the Institute of Maize (Zemun Polje) and stored in special chambers at +4 C. The work on database creation was carried out using lists of descriptors developed by IPGRI. Realization of the necessity of conserving PGR diversity and coordinating these activities at the national level led to the establishment of the Institute of Plant and Animal Genetic Resources. At present, there is an urgent need to restore PGR collections, develop facilities for PGR study and conservation, and to improve coordination within the country.

In 1991, **Croatia** started to develop the Croatian Plant Genebank of for collecting, conserving and evaluating national plant diversity for the needs of the agricultural community. The Bank is located at the Agronomy Department of Zagreb University. It has been charged, in particular, with coordinating activities on PGRFA carried out by 14 various institutions, including universities and breeding institutes holding working collections of landraces, and with identifying appropriate areas for *in situ* conservation. An acute need for the country is the construction of long-term storage facilities for conserving the national *ex situ* collections, numbering over 16 000 accessions. Insufficient funding and lack of equipment are the major obstacles to implementing the national programme. Croatia has approached FAO for possible support through a TCP project.

In **Bosnia and Herzegovina**, they have just started developing their national programme for agrobiodiversity conservation and utilization. Assistance from international organizations and countries with developed economies will certainly

be required. The involvement of the country in ECP/GR activities may enhance *ex situ* and *in situ* conservation activities, priorities and goal setting.

The joining of ECP/GR Phase VI by **Macedonia (FYR)** marked the most important step in PGRFA conservation in the country. In 1995, a project envisaging *inter alia* organization of a genebank was drafted, and the Ministry of Agriculture, Forestry and Water Economy was to finance its implementation. Also, the project would involve four institutes holding *ex situ* collections, assigned responsibility for mandate crops. These were the Institute of Agriculture (Skopje), which possesses a collection of about 250 accessions of local cereals and 100 fruit trees, the Institute of Agriculture (Strumica), with a collection of 110 accessions of vegetable and industrial crops, the Institute of Tobacco (Prilep), which preserves 25 accessions of local tobacco cultivars, and the Institute of Rice (Kochani), which maintains over 200 rice accessions, including 37 local ones. According to the project proposal, the Institute of Agriculture (Skopje) was appointed national coordinator for all biodiversity conservation and the genebank holder.

In the late 1960s and early 1970s, several collecting missions were conducted in the country on the basis of bilateral agreements, mostly with the USA. Since Macedonia (FYR) lacked long-term storage facilities, the collected material is conserved in genebanks abroad. In creating the national *ex situ* collection, Macedonia (FYR) is planning to repatriate these accessions. In 1998, through the mediation of IPGRI, Macedonia (FYR) forwarded to the USA a request for original accessions collected in the country in the early 1970s and conserved in the USA National Plant Germplasm System (NPGS). The US Genetic Resources Information Network (GRIN) could identify and provide data on 1 500 accessions of *Brassica*, *Cucumis*, *Daucus*, *Foeniculum*, *Malus*, *Pyrus* and *Petroselinum* of Macedonia (FYR) origin. The process of repatriation will take several years, but just the fact of such cooperation is a good example of its efficiency.

### **2.3 Russia, Ukraine and Belarus**

VIR is the only research institution in the **Russian Federation** whose activities include PGR collection, conservation and study. This institute, its accomplishments, and role in maintaining the global *ex situ* collection are well known worldwide. Its global PGR collection represents plant diversity encompassing 320 000 accessions of 155 botanical families, 2 532 species of 425 genera. For instance, the collection includes 95 000 accessions of grain crops, over 43 000 of legumes, 52 000 of groat crops, 26 000 of industrial crops, 28 000 of fodder crops, about 10 000 of potato, and 50 000 of vegetables. About 200 000 accessions were placed in long-term storage in the genebank built in 1976. VIR also maintains a herbarium of 260 000 specimens. The VIR network includes the institute's headquarters, 9 plant resources departments, 13 basic research laboratories, and 12 experiment stations in different geographic zones of Russia.

The institute's collections, donors and sources identified and developed by VIR scientists have played a decisive role in breeding. Utilization of germplasm materials from VIR by breeders in Russia alone has resulted in the release of over

2 500 cultivars, of which 450 are now cultivated on an area of 63 million ha, including 80% of wheat cultivars. Primary evaluation helped to identify about 4 000 sources of valuable breeding characters. Genetic investigations localized 77 sources, including 27 sources of resistance to the pathogens of wheat, barley, oats, peas, etc., and 9 sources of earliness in oats, maize and sunflower. The annual mean percentage of released cultivars bred on the basis of VIR collections is 45% of all cultivars released nation-wide, with 77.7% of all potato cultivars, 66.1% of new cultivars of grain crops, 54.7% of legumes, and 50% of vegetables. The collection is used not only for national benefit, but also in the best interests of the international community. For example, VIR furnished the USA with several dozen old American varieties that were lacking in the USA genebank. They were used as sources of resistance to Russian wheat aphid that was damaging wheat fields in the USA. VIR also supplied Ethiopia with over 200 accessions of Ethiopian origin that had become extinct. VIR met a request of the Nordic Gene Bank for unique accessions of cabbage bred by Swedish breeders in 1923, which were preserved only in VIR. In the past five years, VIR sent abroad about 40 000 samples. VIR collaborates with the ex-USSR republics and continues to supply plant materials upon request from breeders. From 1996 through 2000, these countries received over 14 000 samples of various crops. In recent years, reflecting the CBD, many countries have displayed interest in repatriation of their own PGR, and VIR tries to meet such requests.

Under modern socio-economic conditions, VIR is facing serious problems. In this transition period, the main objective of VIR scientists is to overcome the existing crisis with minimum losses in the genetic diversity maintained in the collections. The international community has demonstrated understanding of the collections' value and provides assistance to VIR. In these efforts, special credit should be given to IPGRI. Also worth mentioning is the help of USAID funds that made it possible to fill the most urgent for securing safekeeping of the collection. Currently, construction of a long-term storage facility is being completed in St. Petersburg. It is designed to maintain a safe duplicate base collection and working collection. It will also provide the possibility of safety duplication of germplasm from foreign countries, if such requests are made. Since 1996, 14 collecting missions have been organized cooperatively with foreign partners. Russia is not a member of FAO, but has joined the IU and participates when possible in the work of the FAO Commission on Genetic Resources for Food and Agriculture. VIR has established efficient cooperation with more than 40 countries of the world. Joint projects with CGN (Netherlands) and with ZADI (Germany) were very important as they helped to computerize almost all accession passport data and place them on the Internet. The next stage, which has already started, will be modification of the Vavilov Global Collection Information and Documentation System to give users a better opportunity to optimize data on the largest and most important crop collections. The Nordic Gene Bank participates in these activities.

On-farm conservation is poorly promoted in Russia due to the underdevelopment of private farming. In some regions of the country and in suburban areas people have small individual farms or orchards (ca. 600-1000 m<sup>2</sup>),

where they plant local varieties, but such farming is an insignificant portion in the national economy and cannot be regarded as on-farm conservation. VIR is planning to pay more attention to this aspect of PGR activities, in particular to make landraces from the collection available to those who wish to revive their cultivation.

Lately, experts of VIR have developed a structure for a national programme, which has been submitted to the Russian Government for consideration and approval. This proposal once again emphasizes the necessity for regional and global cooperation, and sets forth its objectives and tasks needed to intensify activities in conservation and sustainable utilization of PGR, and to enhance closer collaboration with IPGRI, FAO, IARCs, and genebanks of the world.

In Soviet times, two of VIR's experiment stations were located in **Ukraine**, namely the Crimean Pomological Station (Bakhchisaraysk), for conserving southern cultivars of fruit- and nut-bearing crops, and the Ustimovskaya Experiment Station (UES), near Poltava, for studies on groat crops, cereals, grain legumes, oil-bearing crops and vegetables. In 1992, the Ukrainian Academy of Agrarian Sciences launched a programme to collect, introduce and study plant diversity, and set up a genebank to conserve it. For developing and coordinating the programme at the national level, the Centre of Plant Genetic Resources of Ukraine was established at the Yurjev Institute of Plant Breeding (Kharkov), incorporating the Laboratory for PGR Introduction and Conservation, the Cereals Laboratory and the Grain Legumes Laboratory. Since the CBD places a stronger emphasis on *in situ* conservation of local plant material, the Centre is devising a relevant programme. Old local cultivars are maintained mostly by small farmers and have not been registered, so far. The national system includes 42 research and breeding institutions, among which are the Nikita Botanical Gardens (NBG), the Central Botanical Gardens, and the Institute of Forest and Forestry.

The total collections of the country amount to over 136 000 accessions. For instance, NBG maintains over 40 000 subtropical and about 10 000 fruit plants, over 2 000 ornamentals, and over 1 000 medicinal plants, etc. The UES holds the largest Ukrainian collections of *Triticum* spp. (over 3 000 accessions), *Phaseolus* spp. (about 2 000), *Panicum miliaceum* (over 3 500), *Hordeum vulgare* (about 1 300), *Zea mays* (over 1 300), *Fagopyrum* spp. (around 1 500), *Papaver* spp. (more than 1 200), vegetable crops (about 2 000), and grain legumes (over 2 500). These are mostly duplicates from the VIR global collection. Comparatively big germplasm collections are conserved and studied at the Yurjev Institute. For example, it holds about 4 000 accessions of barley and around 7 000 accessions of wheat. The Institute of Vegetable and Melon Growing (near Kharkov) holds a collection of various vegetable crops that numbers 4 000. Financial constraints and lack of equipment, such as hardware, are the main factors preventing intensification of envisaged activities. Among priorities is the creation of a comprehensive passport database for the national *ex situ* collection, which is needed, for instance, for identifying duplicates within the collection, and the creation of conditions for the base collection long-term storage. In ECP/GR, Ukraine is represented by the Centre as an observer. FAO and IPGRI are

supporting efforts to provide technical and methodological assistance to the national PGR structure.

At the initiative of the **Belarus** Academy of Agricultural Sciences, the national programme on agrobiodiversity was adopted in 1999. Following a decision of the government, the National Centre for PGR was to have been established at the Research Institute for Agriculture and Forestry (Zhodino). However, due to an extremely difficult financial situation in the country, the rate of activities on plant diversity is low. For Belarus, VIR remains the main source of initial material for breeding. From 1996 through 2000, breeding institutions in Belarus received from VIR about 1 000 samples of various crops, mainly cereals, grain legumes and forages. The existing *ex situ* collections in the country, totalling about 4 000 accessions (mostly duplicates from other genebanks and breeding lines), are spread between different institutes and breeding centres. Databases for the collections are in effect absent, and there are no appropriate conditions for *ex situ* collection conservation. Low salaries have led to a brain drain of the best-qualified PGR specialists. Old local varieties are “conserved” on small farms and in private household gardens, but there is no proper registering of this work or support on the part of the government. Evidently, without extensive international assistance, it will be difficult to solve Belarus’ problems with agrobiodiversity conservation at an appropriate level.

#### **2.4 Baltic states**

The Baltic states received initial breeding material from VIR. After these states gained their independence, in 1991, they faced the need to conserve their own PGR. In cooperation with the Nordic Gene Bank (NGB), the republics began to create a national network for PGRFA conservation. The Nordic Council of Ministers has provided funds to develop effective *ex situ* and *in situ* conservation, together with training for documentation, information management and germplasm characterization and evaluation. On the basis of signed agreements, NGB holds duplicate collections of the Baltic states’ material on a “black box” principle. Joint expert groups have been set up for developing activities and setting priorities for the region. For all Baltic states, the repatriation of native germplasm conserved in foreign genebanks is a major priority. Taking into consideration the importance of the VIR global collection, as well as the fact that St. Petersburg belongs to the Baltic Region, specialists from VIR have been invited to participate in the work of joint groups.

From 1920, plant breeding in **Estonia** was carried out by the Jogeva Plant Breeding Institute. Since then, the Institute has maintained a working collection, which currently has the status of a national collection because the Institute has been appointed national coordinator for PGR. The country, however, has no proper genebank of its own. The total *ex situ* collection numbers about 4 000 accessions and is shared by several institutes. *In situ* conservation is carried out mostly in national natural reserves. Some farmers are cultivating old local varieties of small-fruit crops and sell their harvest at the market. The national network also includes the Tallinn Botanical Gardens, which maintains 8 000 taxa, of which 2 000 are

tropical plants grown in glasshouses. The government has realized the importance of biodiversity conservation and has set up a National Council at the Ministry of Agriculture. The Council is composed of experts from various institutes dealing with biodiversity and ecological issues, and is charged with coordinating appropriate activities, preparing databases on the available diversity, as well as planning and setting priorities.

In 1993, the **Latvian** Society of Geneticists and Breeders established the Working Board for Cultivated PGR, which included six working groups: cereals, grain legumes, potato, horticulture, root crops, and vegetables. The Board also included representatives from big breeding and research institutions. Its activities are supported and financed by the Latvian Council of Science and the Ministry of Agriculture through the Academy of Agricultural and Forestry Sciences. Besides coordination of activities, the Board has the following tasks: the compilation of a national inventory of PGR; the localization in and repatriation from foreign genebanks of germplasm of Latvian origin; establishment of a national centre for the management of databases on the country's *ex situ* collections; and the development of strategies for PGR conservation that will take into account joint actions by the Baltic states and international organizations (for instance, FAO and IPGRI). There are approximately 10 000 accessions in the national *ex situ* collections, include various agricultural crops conserved at seven institutes. The largest collections are housed at the Institute of Farming (1 000 accessions of forages), the Priekuli Plant Breeding Station (900 cereal, 300 potato, 100 grain legume accessions), the Stende Plant Breeding Station (1 200 cereals), and the Dobele Training Station (about 1 200 small fruits).

In 1994, a national PGR programme was launched in **Lithuania** under the guidance of a Coordinating Centre. The National Council was also set up to determine major directions that PGR activities should take and to set priorities for the programme. The Council brings together representatives of various institutes, Vilnius University, Academy of Agricultural Sciences, Pedagogical University, and Kaunas Botanical Gardens. In 1998, a five-year plan was adopted to be implemented by ten research and educational institutions. *Inter alia*, the Plan envisages the development of databases on the existing *ex situ* collections, including evaluation data, and the species conserved *in situ*. Animal genetic resources conservation would also be documented. Thanks to cooperation with NGB, passport databases on the preserved germplasm have been established, long-term storage facilities for the base collection have been created, and staff have been trained in PGR work. Legal aspects of PGR conservation and exchange are being elaborated. Also, the Plan includes the development of a monitoring system for agrobiodiversity, which will facilitate *in situ* conservation approaches for landraces, wild relatives of cultivated plants and forest genetic resources. The total national *ex situ* collections of agricultural crops amount to about 13 000 accessions; the largest collections are of *Triticum aestivum* (370 accessions), *Vicia faba* (800), *Hordeum vulgare* (600), medicinal plants (280), and ornamentals (around 4 000 accessions).

## 2.5 Caucasus and Central Asia

Agricultural development in countries of this group has always played an important role for their food security and their economies. Cultivation of irrigated land is a characteristic feature of land management in the region. Harvests are low due to the outdated vehicle and tractor fleet and difficult agro-ecological conditions. Another challenge is to correct distortions in the current range of varieties introduced during communist times. Under the extensive cropping system of the former USSR, predominant rotations included one season of fallow, in which large areas remained unsown each year. The opportunity exists to both intensify and diversify production by replacing fallow with alternative crops. Crops that had received little attention in the past are now being given priority as alternative crops for agricultural diversification. One of the major constraints to improving agricultural production is a lack of access to germplasm. With most countries of this group, VIR has signed agreements whereby it continues to supply germplasm to them. In 1999, CIS countries signed an intergovernmental agreement on cooperation in the sphere of PGR, but the total lack of funding is a serious limiting factor for its realization. The Leipzig Conference (1996) served as a powerful impetus to develop national programmes in the region, where the problem of agrobiodiversity has attracted serious attention at governmental level. All the countries, with the exception of Uzbekistan, are members of FAO.

In 1995, in **Azerbaijan**, the State Committee on Plant Genetic Resources (SC PGR) was established as an attachment to the Ministry of Agriculture. The SC developed a national programme on PGR with the Research Institute of Agriculture (Baku) as the coordinating body. Working groups were established on cereals, legumes, berries, vegetable, melon, industrial crops, wild edible plants, medicinal and aromatic plants, fodder and pasture crops, and forest genetic resources. The whole range of PGR activities, including regeneration of lost agricultural crops and their wild relatives, is performed by a number of institutions. At the moment, there is no specialized genebank in the country. The total *ex situ* collections in Azerbaijan amount to about 25 000 accessions. Working collections are stored in relevant research institutes. This material is also duplicated at VIR. Since 1995, the establishment of working relations with IARCs (ICARDA, CIMMYT, IPGRI and ICRISAT) and with genebanks in Germany, Hungary, Turkey, Iran, etc., has helped to enrich the collections. A lot of attention has also been directed towards rescuing collections assembled in previous decades.

Besides the formal collections, farmers are also making a contribution to the conservation of traditional crops by cultivating them. Azerbaijan has a rich diversity of local varieties of cereals, grain legumes and fruit trees. Much work has been carried out to collect wild relatives and indigenous varieties. Eighty wild relatives of cereals, 25 local cultivars and 15 wild relatives of legumes, 200 wild relatives of 60 vegetable species, over 3 000 wild forms and 1 000 local varieties of 22 fruit species and more than 500 indigenous grape varieties were found by collecting missions. This germplasm is adapted to local conditions and with resistance to diseases and pests. However, due to low productivity in many cases, local varieties have been replaced with new cultivars. A database has been

developed to improve information and material exchange at both regional and international levels. A number of laws to protect, conserve and utilize PGR have been adopted by the Parliament. However, there is still no clear mechanism for the implementation of these laws. Also, the conservation of PGR is complicated by the fact that local authorities are not yet involved in these activities.

Due to the diversity of geographical conditions, the vegetation in **Armenia** is extremely rich (ca. 3 200 species of vascular plants of which 125 are endemic to Armenia). Wild relatives of cultivated plants are abundant in the Armenian flora. A national programme will be established to unite representatives from different institutes, as well as the Ministry of Nature Protection, the Forest Service, the Forest Research Centre, the Agricultural Academy, and the National Academy of Sciences. The Laboratory for Cultivated and Wild PGR, housed in the Armenian Agricultural Academy (Yerevan), has been charged with coordinating PGR activities. However, due to extremely difficult economic conditions, the national programme is experiencing a lack of funds for PGR activities. Due to lack of hardware, there is no database on plant diversity. To augment the efforts of FAO and IPGRI, assistance of the world community is required to implement the aims of the national programme. Thanks to GEF, a project on *in situ* conservation was launched in 2000. In Armenia, there are 5 natural reserves and 22 protected territories, but they also suffer from financial constraints. During the last two years, cooperation with ICARDA and IPGRI has increased. For example, training has been provided to national specialists and the creation of a national database for the available *ex situ* collections has been initiated.

PGR activities in **Georgia** are coordinated by the Academy of Agricultural Sciences (Tbilisi). The total *ex situ* collection of the country is about 10 000 accessions (wheat - 3 000, grapes - over 3 000, apple - 1 300, barley - 585). Due to the current harsh socio-economic conditions, there is widespread concern that the diversity of plants existing *in situ* and on farms may be lost. The number of farmers cultivating landraces decreases because many of them prefer to grow potato, so local landraces are being replaced with potato, which together with animal products, provide the only source of income available to many farmers. Nevertheless, some of them are involved in the *in situ* conservation programme. They carry out the activities to revive the cultivation of autochthonous species or races, and to identify and select such Georgian taxa and species as show promising characters. Schools and colleges are also providing experimental plots where local varieties are sown and used as teaching aids. Other ongoing conservation and re-introduction activities include a type of on-farm conservation and home garden systems. These activities are conducted by NGOs, including the Biological Farming Association “Elkana” (established 1996) and the Agrobiodiversity Protection society “Dika” initiated in 1998. To date, Dika has been involved in a German-funded project that aims at maintaining and reviving Georgia’s agrobiodiversity. Dika disseminates information on the conservation and sustainable use of crop genetic resources in an effort to raise the awareness of the society, politicians and governmental officials. Elkana has assisted the Botanical Institute to preserve working collections that were in danger of total destruction.

In **Kazakhstan**, in 1933, the Aral Sea Experiment Station (ASES) was set up in Chelkar. It was the first scientific institution in the USSR working on the development of desert sandy loam soils. Forage, cereal, vegetable, fruit and industrial crops have been accumulated at the Station and studied for further cultivation under the dry farming conditions. At present, the Station is subordinate to the National Academic Centre for Agricultural Research. In 2000, the government adopted a national programme and set up the Council for Agricultural Plant, Animal and Micro-organism Genetic Resources as the implementing body. The Centre operates a network of 14 institutes involved in the conservation and sustainable use of agrobiodiversity. The total *ex situ* collections amount to 31 000 accessions including 18 000 cereals, 4 500 fruits and 3 000 vegetables. The greater part of them, around 10 000 accessions of various crops and wild relatives, is preserved at ASES. Most accessions have been duplicated at VIR. During the last five years, six joint collecting missions, with the participation of VIR and foreign countries, were conducted in Kazakhstan and yielded over 2 000 germplasm samples. Though a special budget has been allocated by the government for the implementation of the programme, the financial situation in the country is strongly limiting PGRFA activities.

In **Turkmenistan**, the Garrygala Experiment Station was established in 1927 by N.I. Vavilov. The main task of the Station is to collect, conserve and study genetic resources of fruit (fig, pomegranate, persimmon), nut-bearing crops and grape. At present, the Academy of Agricultural Sciences is coordinating the work of some institutes and the Garrygala Station. The national *ex situ* collection maintained at the Station numbers about 5 000 accessions. The absence of a national programme prevents systematic work on PGRFA conservation and utilization.

At the initiative of N.I. Vavilov, a Branch of VIR was set up in **Uzbekistan** in 1924. Since then, activities to collect, conserve and study agricultural plants has been carried out in Central Asia, with a focus on local germplasm. In 1991, the Branch was transformed into the Uzbek Research Institute of Plant Industry, which currently is one of the largest in the region. The *ex situ* collection of the Institute is the biggest among countries of the group. It numbers over 54 000 accessions of vegetable, melon, fruit crops, grapes, cereals, industrial crops and grain legumes. In fact, it possesses the highest potential as a source of genetic diversity for crop improvement in the area. Research work is carried out by nine specialized PGR departments and at two experiment stations. The staff is actively involved in joint collecting missions, in cooperation with quite a number of countries, including Greece, Korea, China, Egypt and Australia. In collaboration with ICARDA, documentation of their *ex situ* collections has been initiated and funding proposals have been drafted to build a medium-term storage facility at the Institute. The national programme on agrobiodiversity conservation has been adopted and working groups on major crop types have been set up. The programme implementation is guided by the National Coordinating Council.

In **Tajikistan**, practically no work is being done on collecting and studying plant diversity, despite the fact N.I. Vavilov had identified it as one of the centres

of origin of cultivated plants. This is mainly due to the complex and unfavourable political and economic situation, with occasional armed clashes in the country.

In **Kyrgyzstan**, the Horticulture Breeding Station served as the basis for establishing the Research Institute of Agriculture, which focused on vegetable and fruit crops. In the early 1990s, the Institute started developing *ex situ* collections of vegetables, fruits and grapes, cereals and forages, which currently amount to 23 000 accessions, i.e. 81% of all *ex situ* accessions in the country. The largest collections are of wheat (17 000), barley (3 000), maize (2 000), ornamentals (2 500), fruits and grapes (1 500) and vegetables (1 040). The National Botanical Garden conserves some 3 600 plants. The total national *ex situ* collection is about 29 000 accessions. Crop working groups have been set up to collect and utilize PGR. People continue to grow old local varieties on household plots for consumption and marketing. Plant genetic diversity of the country is still poorly studied, though it is a rich potential source of initial material for breeding or direct use in agriculture. International collaboration is essential for raising PGR activities to the desired level.

Thus, despite the fact that Central Asia and the Caucasus are the centres of origin of a number of important crops, and possess a wealth of genetic diversity, national activities for the *ex situ* and *in situ* conservation and sustainable utilization of PGRFA are carried out at an inadequate level. The international community, including FAO and the IARCs of CGIAR, are trying to render assistance by establishing and developing national programmes. Regional offices have been opened by CIMMYT in Kazakhstan, and by ICARDA and IPGRI in Tashkent. Pursuing the goal of better coordination, the Central Asian and Transcaucasian Network, involving all countries in the region, was set up in 1999 with direct participation of IPGRI and ICARDA. To manage the Network, a Coordinating Committee was formed, and nine working groups organized (cereals; forage and pasture crops; fruit, small fruit, subtropical crops and grapes; vegetable and melon crops; industrial crops; wild-growing, aromatic and medicinal plants; grain legumes; forest and nut-bearing species; and cotton). Members of the Committee have been appointed Heads of the working groups. The Network and its Committee should facilitate the development of national programmes and their concerted action.

### **3. CONCLUSIONS**

To conclude the review, it should be noted that in all groups of countries legislation concerning germplasm of cultivated crops and their wild relatives is either absent or still under development. At the same time, nearly all countries have a Red Book of their own that lists rare and endangered plant species placed under governmental protection. Some countries have computerized databases for the *ex situ* collections, developed using international lists of descriptors (e.g. Bulgaria, Czech Republic, Hungary, Poland, Russia, Slovakia and Uzbekistan). In some countries, such as Croatia, Georgia, Macedonia (FYR), Tajikistan, Kyrgyzstan and Turkmenistan, databases either do not exist at all, or are in the process of creation. Practically all the countries are experiencing shortage of funds

for PGR activities, even though the importance of the problem has been realized at government level. The involvement of all the countries in activities of regional programmes such as ECP/GR and WANA/CAC NET is a factor helping to achieve success in joint activities at the regional and global level.

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