



**National Report
on
the State of
Plant Genetic Resources for
Food and Agriculture in
Azerbaijan**



Baku – December 2006

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List of Acronyms and Abbreviations:

Acronyms	Full name
AAA	Azerbaijan Agriculture Academy
ANAS	Azerbaijan National Academy of Science
APGRIS	Azerbaijan Plant Genetic Resources Information System
ASC	Agrarian Science Center Ministry of Agriculture
BI	Botany Institute, ANAS
CBG	Central Botanical Garden, ANAS
CDB	Azerbaijan Central Data Base on <i>ex situ</i> genetic resources
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
ECP/GR	European Cooperative Programme for Genetic Resources
FAO	Food and Agriculture Organization
GPA	Global Plan of Action
GRI	Genetic Resources Institute, ANAS
ICARDA	International Center for on Agricultural Researches in Dry Areas
IPGRI	International Plant Genetic Resources Institute
MAAR	Ministry of Agriculture
NBI	ANAS Nakhchivan Section Bioresources Institute
OCSE	Organization for Collaboration and Security in Europe
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
RIA	Research Institute of Agriculture
RICG	Research Institute of Cotton Growing
RIFMP	Research Institute of Forage Crops, Meadows and Pastures
RIHSC	Research Institute of Horticulture and Subtropical Plants
RISB	Research Institute of Silkworm Breeding
RIVG	Research Institute of Vegetable Growing
RIVWM	Research Institute of Viticulture and Enology
SCSATP	State Commission for Testing and Protection of Selection Achievement
SIA 'ARAZ'	"ARAZ" Scientific Industrial Amalgamation
UNO	United Nations Organization
USDA	United States Department of Agriculture (USA)
VIR	All-Russian Plant-Production Institute (RF)
WSU	Washington State University (USA)

A. INTRODUCTION

1) Geographical Data

Azerbaijan is one of the oldest areas of continuous human habitation. It has contributed to creation, progress and dialectics of the culture of mankind.

The Azerbaijan Republic is an ancient country located on the South-East of the Caucasus Mountains and on the North-West of the Iranian Plateau, at the crossroads of Eastern Europe and Southwest Asia. Its territory is located between latitudes 38°24' and 41°54' north and longitudes 44°46' & 50°51' east and is bounded by Daghystan Republic of Russian Federation to the south, Georgia to the southwest, Turkey and Armenia to the West and Islamic Republic of Iran to the south; It is bounded by Caspian Sea to its east. Its territory is 86.600 square kilometers. By territory it occupies 44th place in the world and by population 42nd place. A total of 8.400 big and small rivers are available here. The highest altitude of Azerbaijan is Bazaar Duzi with elevation of 4.466 m above sea level located in Major Caucasus mountain chain. The costal area around Caspian Sea is as low as 26.5 m below the ocean-level. Major Caucasus, Minor Caucasus and Talysh mountains occupy 2/3 part of the territory of the country. Lowlands and plain areas constitute 57% of the country's territory, low and middle mountains 39,5%, and highlands (above more than 2500 m) 3,5%. Nearly 18% of the territory of the country is below sea-level which represents irrigated grey-meadow soils, grey-brown, alluvial-meadow and saline soils widespread in lowlands and plain areas depending on geomorphological structure and geo-ecological condition, chestnut soils widespread in foothills and low mountain zones, and dark brown and brown mountain forest soils widespread in middle and high mountain zones.

Mountain steppe soils covers a total of 76.000 ha area and predominated by mountain steppe plant cover, which is fragmented into pieces and follows forest area in the middle mountain zone. But in the Lankaran region where humid and subtropical climate is characteristic, yellowish clay soils are widespread in Hirkan forests covering 170,000 of lowlands and foothills.. In Azerbaijan, semi-desert, dry-steppe, mountain-forest, mountain-meadow and nival-subnival soil complexes form highland belts of mountain landscape replacing each other from plain-mountain zones up to highlands. The exception is the Lankaran region where mountain xerophytic soil complex follows mountain-forest landscape. In arid climate condition of the Nakhchivan Autonomous Republic forests are mostly found. Large forest tracts are found in Talysh Mountains, Major Caucasus and in Mountain Garabagh. The territory of Azerbaijan is located in a subtropical climate belt. Annual amount of sunny hours fluctuates between 1900 and 2900. Amount of solar radiation that reaches to the surface of the ground makes up 120-160 kcal/cm². Lowlands and foothill zones are characterized with hot summer and cold winter, but mountain areas with temperate summer and frosty winter. The absolute maximum air temperature in the territory of the country makes up +46^oC and absolute minimum temperature -32^oC.

The rainfall is not properly distributed over the territory and annual amount fluctuates between 150-200 mm (Gobustan and southern part of Absheron Peninsula) and 1600-1700 mm and even more (Foothill areas of Talysh Mountain). However, annual precipitation for almost 65% of the territory of the country is low (less than 400 mm) and therefore agricultural crops are grown in irrigated condition and the area represents desert, semi-desert and steppe plant complexes widespread here.

2) Description of the Country and its Economy

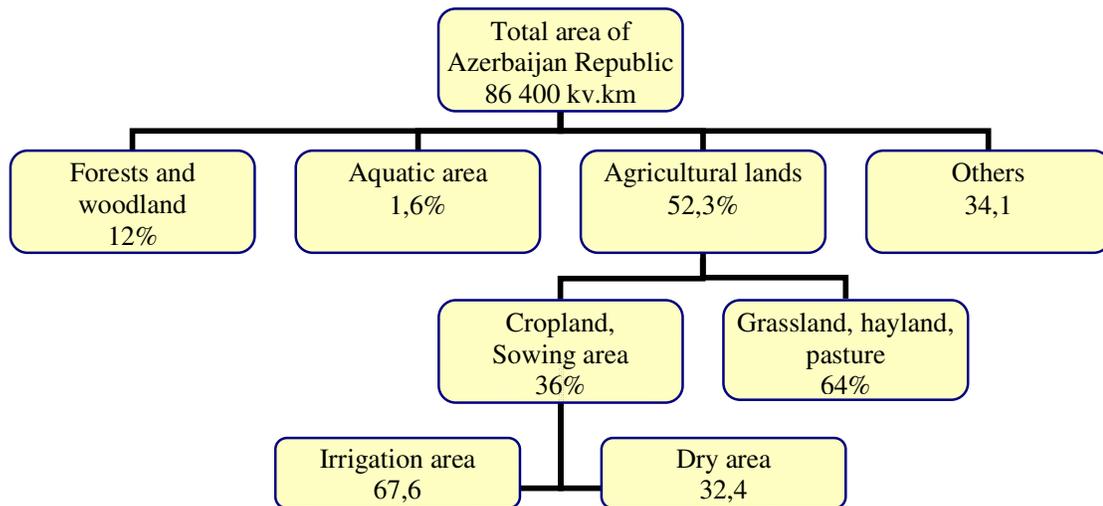
The Republic of Azerbaijan achieved independence in 1991. Formation of the structure of its political system was completed on November 12, 1995 by adopting a new Constitution of the country. According to the Constitution, Azerbaijan is a democratic, secular and legal state which relies on market economy. The economy of Azerbaijan has developed successfully during the last 10 years through strong economical policy and rich natural resources. The total state budget of Azerbaijan has increased 4 fold for the last 5 years and was estimated 5 billion US\$ for

2007. Growth rate of industry has constituted 40% in 2006 compared to 2005. Baku-Tbilisi-Jeyhan oil pipeline and Baku-Tbilisi-Arzurum gas pipeline together with other big projects will contribute significantly in the economy of Azerbaijan in near future. By January 2006, the population of the Republic reached 8 million 500 thousand 51,5% of which is urban population and 48,5% rural population. Average age of population is 31 year. According to statistical records average annual birth rate has been 114 thousand for the last 5 years or 312 births a day. Population growth in 2005 made up 15 persons per 1000 people. Youths with age of 18-34 makes up 29% of total population and more than half live in urban areas. The military aggression of Armenia has resulted in the occupation of 20% of the territory of Azerbaijan and over one million migrants and internally displaced persons lost their lands and houses and are being deprived of sources of livelihood. This has caused serious economic, social and humanitarian constraints for the Republic.

3) Description of Agricultural Sector

Forests cover 12% of the territory of Azerbaijan, water 1,6%, agricultural lands 52,3% and other land 34,1%. About 1630,8 thousand ha or 36,0% of agricultural lands is under crops of which 1102,0 ha or 67,6% is irrigated lands. Last years, utilization of agricultural lands by farmers resulted in increased rural employment. As such, those employed by rural economy and forestry has been 1112,8 thousand persons or 30,8% of total employees in the Republic in 1995, while in 2005 this indicator has increased up to 40%. Total employment in the same period has increased by 3,7% while in agriculture and forestry the increase has been 34,5. People lacking experience in agriculture also started to be engaged in various fields of agriculture along those who were directly engaged in production of agricultural products. Analysis of financial outputs of the activities of agricultural enterprises shows that 1079 farms out of 2295 or 47% sustained a loss in 1995, while in 2005 rate of farms sustaining a loss has been 24%.

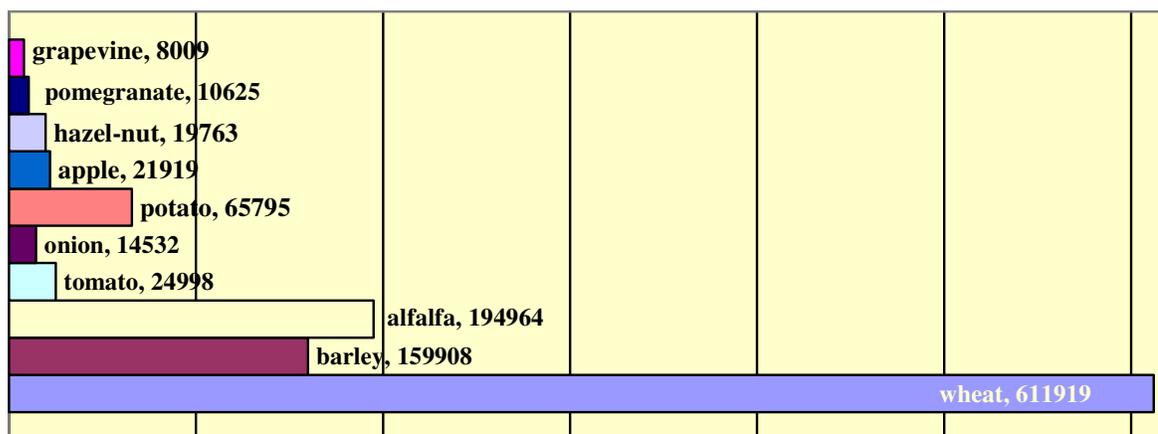
The first phase of agrarian reforms and transition to the free market economy has been completed. The agrarian sector has started to develop, and a foundation of entrepreneurship and a partly free competitive environment have been created. Contribution of local production is growing year by year in meeting demand of the population of the country for foodstuffs. The



share of imported agricultural products including foodstuff is gradually decreasing while the volume and range of export products is growing. The analysis carried out shows that last years private producers in agricultural sector have started to produce more foodstuff independently. Currently 80 -85% of the market requirement is met by domestic production. Thus significant increase in income generated by farmers is occurring. At present there are various types of property including farmer holdings, family holdings, cooperatives, companies and societies.

Around 97% of agricultural products is produced by farmer holdings. In 1996 share of crop products in the content of gross product in agriculture made up 58,6%, while in 2005 it has increased up to 59,1% on account of animal product which fell from 41,4% down to 40,9%. In 2005 production of agricultural products has increased significantly compared to 1995, including production of cereals 2,3 fold, potato 7 fold, vegetable 2,6 fold, melon crops 8,7 fold, fruits 1,9 fold, meat 1,8 fold, milk 1,5 fold and egg 1,9 fold. Per capita cereal production in 2005 has been 165 kg (91,5% of demand), that of potato 97 kg (2,4 fold of demand), vegetables 168 kg (2,2 fold of demand) and fruits 79,4 kg (1,7 fold of demand). Last years significant growth was observed in production of potato (5%), green vegetable (23%) and fruits (25%). Minimum domestic demand for potato, melon crops and fruits is met on account of domestic production. In 2005 total production of cereals has been 2126,9 thousand ton, 1565,8 thousand ton of which is wheat. In the same year production of potato has been 1083,1 ton, vegetable 1127,3 ton and melon crops 363,8 thousand ton, which beat the record. More than 2 million ton wheat was produced in 2006.

In the period of independence much decrease was observed in production and area under cotton. But 2006 became turning point in this area when both production and the area under cotton increased by 2 fold compared to 2005. Though cropped area under forage crops has increased but decrease was observed in the number of cultivated forage species and varieties. The diagram below describes cropped area under major agricultural crops for 2005-2006:



New fruit gardens have been established on 3390 ha during last two years and an additional 316 ha in spring of 2006. Establishment of new grape orchards in 1258 ha in Tovuz, Khanlar, Kurdamir, Shamkir, Shamakhi, Agsu, Jalilabad and in other districts is the result of keen interest in grape production displayed by rural entrepreneurs. Recent years there was no serious shortage of food and agricultural products in market. A number of factors including high cost of machinery, fuel and chemicals along with monopoly and corruption contributed to continuous rise in price of agricultural products in markets. Favorable environment in marketing of agricultural products created by government for farmers contributed significantly to solution of the problem in 2006. For the present, situation in supply of small-sized machinery suitable for new farmer holdings, seed, fertilizer and other operational means is not satisfactory. Though salary of agricultural employees has increased considerably in comparison with 1996, but it is still lower than average indicators in the country by 3,3 fold including that in industry by 5,9 fold, in construction by 6,7 fold, and transport by 3,8 fold. According to our observations, average monthly salary of some advanced farmers is nearly 100-120 manat (AZN). Information shortage is one of cardinal problems of farmers. Lack of information on domestic demand for various agricultural crops, including information on market prices and operational means force farmers to make spontaneous decision about crop area and cultivate those crops which had better marketing price in previous year.

Last years, research activities carried out by relevant research institutes were expanded to meet needs of rural entrepreneurs. For the last 5 years nearly 40 new high yielding crop varieties and forms resistant to diseases and pests, drought, heat and salinity have been developed by research institutes and their quality standardized seeds have been multiplied and provided to farmers. To promote application of research outputs tens of trials were laid in different regions where more than 100 new varieties of various agricultural crops and their efficient production technologies were demonstrated and a number of workshops were held to increase public awareness. Target programs have been implemented by MoA, research institutes subordinated to Agrarian Science Centers, other ministries, Committees, Agencies together with international organizations to provide farmers with necessary information and to improve their knowledge on legal, economic and professional issues.

Today cardinal problems in agriculture can be summarized as follows: financial constraints -credit to small-sized farmer holdings; shortage of agricultural machinery; poor public awareness of farmers; soil salinization; limited markets of agricultural products, undeveloped intensive agriculture; unsuitable contract terms offered by factories and plants; unstable market prices; limited processing enterprises; destroyed village roads; mistakes made in the process of land reforms; high cost of machinery and fertilizers; lack of any organization responsible for application of research outputs, efficient technologies and advanced experiences in farmer holdings. "State Program for Social-Economic Development of the Regions of Azerbaijan Republic" approved by decree of the President of Azerbaijan Mr. Ilham Aliyev dated on February 11 2004 reflects priority development directions that would ensure extension and promotion of second phase of reforms and eliminate existing problems. Creation of nearly 600 thousand job opportunities in accordance with the State Program, development of agricultural processing enterprises, rehabilitation and reconstruction of existing amelioration and irrigation systems, improved water supply of irrigated lands, activities taken against soil salinization and erosion, improved seed production, agro-machinery and agro-leasing services to farmers, promotion of credits to agrarian sector and development of agro-marketing would contribute to rapid development of agrarian-industrial complex of the Republic in future that will lead to improved livelihood of the population of the country.

Following additional measures may also contribute to solution of the problem: allocation of credits from the State Oil Foundation; consolidation of small-sized farmer holdings with relatively big farms; organization of training courses for farmers to increase public awareness; utilization of advanced experiences; establishment of any government institution responsible application of research outputs to provide newly established farms with up to date technologies.

B. MAIN PART

CHAPTER I. The State of Biodiversity

1.1. Basic Value of the Plant Genetic Resources

Extreme diversity of the soil and climatic conditions of Azerbaijan support a very rich diversity of plant genetic resources. More than 4500 higher plants have been registered here, 237 of which are endemic. One can't find any species among them, which is not of importance. The diversity of those crops cultured during the thousands of years of history of agriculture and developed by means of folk selection should be emphasized for preservation. Cereals (wheat, barley, rye, oat etc), grain-legumes (chickpea, lentil, vetch, bean etc), vegetable-melon crops (tomato, eggplant, watermelon, melon, pumpkin, etc), leguminous-forage crops (alfalfa, sainfoin etc), fruits (apple, pear, apricot, bush cherry plum, quince, pomegranate, fig, almond, walnut, hazelnut etc),grape, industrial crops (cotton, sugar beet, tobacco, liquorice) have been cultivated historically to meet the demand of the population for foodstuff and other products. These crops are still considered major agricultural crops in the country. In addition, these crops and their wild relatives along with other wild crops (wild hawthorn, dog-rose, dewberry, nightshade, sea-buckthorn and other shrub plants, thyme, mallow, mint, nettle, fenugreek and other grasses, and other forest plants) are used by people for food, as medicinal crops and for other purposes. Rich plant cover of pastures and hayfields, mountain meadows, forest glades stimulated development of livestock production. Uncultivated idle lands located in semi-desert and dry steppe zone, alpine and sub-alpine meadows, forest border areas are intensively used as pastures. Citrus crops, tea and early vegetable crops grown in Lankaran-Astara region, dry subtropical crops, cotton, cereals, grape in Kur-Araz lowland, grape, potato, cereals in Ganca-Gazakh region, nuts, cereals, in Shaki-Zagatala region, late season vegetable, pome fruits and cereals in Guba-Khachmaz region, dry subtropical crops in Absheron, stone fruits, grape, cereals and forage crops grown in Nakhchivan occupy important place in agricultural system and contributes significantly to meet demand of population for food and other crops and formation of farmers' income.

1.2. Diversity Within and Between Crops

1.2.1. The State of Diversity of Major Crops

Though diversity of cereals, grain-leguminous crops was not subjected to significant changes in the country but slight reduction was observed. The reduction basically refers to wild diversity of cereals and leguminous crops and to old indigenous landraces that once were widely used in agriculture. Radical changes in the use of wheat varieties (the most widely grown crop in Azerbaijan in the period of independence) became stable to certain extent during the past 2 years and were limited with cultivation of the varieties that passed registration at the State Commission for Testing and Protection of Selection Achievements (SCTPSA) and of those introduced. Reduction was also observed in relevant plant samples maintained under *ex situ* conservation. However, the gene fund of Genetic Resources Institute became rich through exchange of materials and genetic materials collected through collecting missions. Main collections of cereals and leguminous crops are maintained at Research Institute of Agriculture (2490 accessions), at the Genetic Resources Institute (2272 accessions) and at Nakhchivan Bioresources Institute (843 accessions).

120 genera and 454 species of meadow-grasses (*Poaceae* family) are found in Azerbaijan of which 25 species are cultivated in the country. Azerbaijan is considered one center of origin meadow grasses. 16 species of wheat (*Triticum* L.) genera are available here. Durum wheat (*T.durum* Desf.) represents 43 species in the country. *Apilikum*, *hordeiform*, *lenkurum*,

melyanopus are widely grown in all lowlands, foothills, and mountainous regions. Bread wheat (*T.aestivum* L.) represents 87 species here. *Eritrospermum*, *ferruquineum*, *sezium*, *barbarossa*, *pseudobar-barossa*, *lyutessens*, *miltrum* and *albidum* are more widespread species. 1862 wheat accessions are maintained in *ex situ* collections.

10 species of barley (*Hordeum* L.) are found in Azerbaijan 2 of which (ordinary, multi-rowed and six-rowed barley (*H.vulgare* L.) and two-rowed barley (*H.disticum* L.) are cultivated in the country. 297 barley accessions are maintained in *ex situ* collections.

5 species of rye (*Secale* L.) are found in the country. Only one of them (*Secale cereale* L.) is a cultural crop. The genepool represents 23 rye accessions.

Only one species of maize (*Zea*), namely yellow grained varieties (*Zea mays* L.) is widespread in the country. It is represented by 549 accessions in genepool.

Only one species (*Oriza sativa* L.) of paddy (*Oriza* L.) – is cultivated in Sheki-Zagatala region, in Kur-Araz lowland and in Talysh. In addition, triticale (326 accessions in genepool), sorghum (*Sorghum* L.) millet (*Panicum* L.) and other genera are naturally widespread in the territory.

400 species of leguminous crops belonging to *Fabaceae* family and being mainly used both for food and as forage are widespread in Azerbaijan. Species of chickpea (*Cicer* L.), lentil (*Lens* L.), faba bean (*Vicia faba* L.), bean (*Phaseolus* L.), pigeon pea (*Pisum* L.), groundnut (*Arachis* L.) vetch (*Lathyrus* L.) and other genera have been cultivated through out history in Azerbaijan and their wild species are widespread over the country. Genepool contains 78 samples of chickpea, 68 samples of bean, 50 samples of vetch, 70 samples of faba bean etc.

Forage crops are especially notable among those threatened to extinction in the flora. Genepool of these crops represents two collections maintained at GRI (373 accessions) and RIFMP (189 accessions). Cultivated and wild species of alfalfa (*Medicago* L.) widely used among leguminous and forage crops (263 accessions in genepool), shamrock (*Trifolium* L. with 121 accessions), sweet clover (*Melilotus* Adans.), trefoil (*Lotus* L. with 17 accessions), sainfoin (*Onarbrachis*) with 29 accessions), *Faba* Garten and other genera occupy special place in the flora. Plants belonging to cereals and legumes families are widespread in natural pastures and meadows.

About 200 species of vegetable-melon crops grow in the country and majority of them are used by people. Among them, species belonging to *Solanaceae* Hall., *Brassicaceae* Juss., *Liliaceae* Hall. and *Chenopodiaceae* Less., *Cucurbitaceae* Hall., *Asteraceae*, *Portulacaceae* Lindl., *Lamiaceae*, *Malvasaea* Juss., *Amaranthaceae* R.Br. and other families should especially be noted by area of distribution, by number of species and varieties, and by utilization for food, for medicinal and industrial purposes. Main collections of vegetable-melon crops available in the country (GRI- 337 accessions, RIVG- 578 accessions, AAA-118 accessions) don't cover existing diversity of these crops in the republic. This area should be in the focus of attention giving consideration to decrease in wild diversity of vegetable and melon crops and trends in replacement of local varieties by introduced ones.

The rich biodiversity of fruits and berries is extremely valuable in regard to their utilization and benefits. Diversity of basic fruit crops and their wild ancestors is also decreasing gradually. Due to various reasons some landraces are left behind, while number and cropped area of introduced varieties is growing. A number of species including *Ficus carica* L., *Rheum ribes* L., *Pyrus raddeana* Woronow, *Pyrus medvedevii* Rubtz., *Sobus persica* Hedl., *Crataegus tournefortii* Griseb., *Crataegus pontica* C.Koch., *Rosa arvensis* Huds. are in danger of disappearance in Nakhchivan Autonomous Republic. Hence, genepool of fruits, berries and grape very valuable. At present accessions of these crops are maintained at GRI (1199 accessions), at Research Institute of Horticulture and Subtropical Crops (1519 accessions), at Azerbaijan Agricultural Academy (57 accessions), at Nakhchivan Bioresources Institute (166 accessions), at "Araz" Scientific Industrial Amalgamation (197 accessions), at Research Institutes of Viticulture and Enology (310 accessions), at Central Botanical garden (120 accessions) and in field collections of relevant research institutes.

Walnut (*Juglans regia* L.), hazelnut (*Corylus avellana* L.), chestnut (*Castanea sativa* Mill.), persimmon (*Diospyros kaki* L.), (*Diospyros lotus* L.), dogwood (*Cornus mas* L.), bush cherry plum (*Prunus divaricata* Led.) and tens of other species available in southern slopes of Major Caucasus and in Guba-Khachmaz region are used by people as food. Folk selection varieties of these species are available at farmer holdings located in this region. Large diversity of apple, pear, mulberry, medlar, dogwood and other crops is widespread in this territory.

At one time, wild and cultivated medlar (*Mespilus germanica* L.), pomegranate (*Punica granatum* L.), sweet cherry (*Cerasus avium* (L.) Moench.), cherry (*Cerasus vulgaris* Mill.), grape (*Vitis sp.div.*) covered large areas in riverbank woodlands together with oak, hornbeam and other forest plants. However, their area is decreasing due to anthropogenic affects. The Talysh region contains valuable varieties of blackberry, fig, pomegranate, bush cherry plum, dog-rose and citrus plants but Absheron contains varieties of grape fig, pistachio (*Pistacia vera* L.), almond (*Amygdalus fenzliana* Lipsky), oleaster (*Elaeagnus angustifolia* L., *E. caspica* Grossh.), mulberry (*Morus alba* L., *M.nigra* L.), quince and pomegranate where these crops grow naturally or cultivated by farmers in their holdings and orchards. Distribution of wild grape, strawberry, raspberry, and other berries over the territory of the republic is known.

At one time a number of fruit crops like cornel, sweet cherry, cherry, pomegranate, quince (*Cydonia oblonga* Mill.), fig (*Ficus carica* L., *F.hyrcana* Grossh.), pear (*Pyrus sp.div.*), grape (*Vitis vinifera* L. and *V. labrusca* L.) and other fruits were widespread in the territory occupied by Armenia, which were used by local people.

Industrial crops like cotton (*Gossypium* L.), tea (*Thea* L.) and tobacco (*Tabacum* L.) cover large area in Azerbaijan being cultivated since ancient times. Last years, though both cropped area and number of varieties of these crops was found decreasing, but their collections (collections of cotton, tobacco, sugar beet, etc) are notable for richness (cotton collection maintained at GRI represents 1370 accessions but at RICG 670 accessions). Only a small part of these samples are grown in the Republic, but the gene fund is valuable in regard to future breeding activities. Other collections of industrial crops includes beet collection (95 accessions) maintained at GRI and collection of ethereal crops (36 accessions) maintained at Agricultural Academy of Azerbaijan.

1.2.2. Diversity of Minor Crops and Underutilized Species

The state of diversity of minor crops and underutilized crops with insignificant agronomic importance was identified through survey. Emphases were placed on the study of medicinal plants, wild grape, sea buckthorn and other plants of potential importance last. More than 350 melliferous plant species have been registered in Azerbaijan, while only 200 species of them are used to certain extent. Examples of underutilized plants may include poppy (20 species are met in Azerbaijan of which only one species *P. somniferum* L. is cultivated), some tanning plants (*Cotinus coggyria* L. – smoke tree, *Quercus sp.div.* – oak, *Rhus coriaria* L. – sumach, *Carpinus sp. div.* – hornbeam), dye plants (65 species to dye yellow, 30 species to dye red, 24 species to dye black, 13 species to dye pink, 22 species to dye blue colour), rubber bearing or other elastic substances bearing plants like maple (*Acer platanoides* L.), dogbane (*Apocynum sibiricum* Pall.), spindle-tree (*Evenimus sp. div.*), *Verruosus* Scop. and other plants. These plant have either not been represented in *ex situ* collections or represented insignificantly (one can meet local and introduced samples of these plants in Central Botanical Garden or Mardakan Arboretum). Resources of these plants and their species are getting decreased as their natural landscape is becoming limited. Diversity of medicinal plants is also in danger of decrease due to intensive utilization of these plants and lack of protection activities. Diversity of some edible grasses or wild vegetable plants is also decreasing due to overgrazing.

Diversity of some plants, used by people with small industrial and sale importance is also in danger of decrease. These plants which once were widespread in the country include shepherd's purse (*Capsella bursa pastoris* L.), barnyard grass (*Echinochoa oryzoides* Fr.), ferula

(*Prongos ferulaceae* Lindl.), caw-parsnip (*Heracleum trachyloma* L.), sorrel (*Rumex* species), caper (*Capparis herbaceae* L.), ordinary sorghum (*Sorghum vulgare* L.), sallaq qushdarisi (*Milium effusum*), chervil (*Chaerophyllum caucasicum*), etc.

Some plants like hackberry, harmal etc. are praised in folk customs, bayati (a kind of poem created by common people) and other folk-lore or even treated as holy plants. Some of these plants are collected by people for decoration, for private use, for medicine, but some are collected to be used in regard to belief (for instance harmal is burned to protect from bad eyes). These plants are sold by farmers to make a profit.

1.2.3. Wild Crop Relatives and Wild Plants for Food Production

Diversity of wild crop relatives and wild plants is gradually decreasing. Wild relatives of wheat have spread in plain, foothill and mountainous regions of Azerbaijan. Three wild wheat species threatened to extinction grow in mountain and foothill zones. These are single-grained wheat (*T. boeoticum* Boiss.), spelt (*T. araraticum* Yakubs) etc. It was found that various species of *T. boeoticum* Boiss. have spread in Bastichay valley in Zangilan district (600-800 m above sea level), in Sharur and Ordubad districts of Nakhchivan AR, and in the territory of Jabrayil district. *T. urartu* species was also found in Azerbaijan. The species of *T. monococcum* - divergence of the species of *T. boeoticum* Boiss. was found spreading in Mountain Garabagh region. *T. araraticum* was found in Shamakhi (at elevation of 800 m) and in Agsu pass (at elevation of 350-700 m). This species is also mfound in Nakhchivan. 9 species belonging to *Aegilops* genus are widespread in Azerbaijan. During survey, some species of this genus were observed in some sites above 2000m. Eight species of wild barley have spread in the country, including wild barley (*Hordeum spontaneum* C.Koch.), blue barley (*H. glaucum* Steud.), bulbus barley (*H. bulbosum* L.), violet barley (*H. violaceum* Boiss. et Huet.), rye-shaped barley (*H. secalinum* Schreb.), hare barley (*H. leporinum* link.). Four wild rye species have spread here. These include *S. segetale* Roshev., *S. vavilovi* Grossh., *S. anatolicum* Boiss., and *S. sylvestre* Host. 17 species of vetch and 40 wild species of sweet pea (*Vicia* L.) have spread in Azerbaijan. In addition the flora of Azerbaijan still represents 2 wild species of sorghum and 3 species of millet (*Panicum capillare* L., *P. dichotomiflorum* M., *P. sumatrens* Roth et Roem).

In southern region species like *Medicago glutinosa* Bieb., *Eremurus spectabilis*, *Solanum sysimbrifolium* lose their natural area.

Physalis L. (two wild species), *Allium* L. (6 out of 41 wild species are endemic), *Amarranthus* L. (6 wild species), *Rumex* L. (17 species), *Polygonum* L. (27 species), *Calligonum* L. (4 species), *Malva* L. (10 species), *Alcea* L. (8 species), *Mentha* L. (5 species are available in Azerbaijan 4 of which are wild) among wild ancestors and relatives of vegetable-melon crops are widespread in Azerbaijan.

The area of wild species of vegetable-melon crops was also found to be decreasing. Some plant species of food importance may be shown among widespread wild vegetable plant used by people. Mallow (*Malva neglecta* Wailler) belonging to *Mavaceae* family. Leaves and shoots of this plant is used making various meals. Marrow of cow-parsnip (*Heracleum asperum* Bieb. –an ethereal plant belonging to *celery* family) is peeled and eaten or pickled. The medicinal importance of knotweed (*Polygonum alpestre* C.A Mey.) is known to people. They use its young shoots and leaves in making various meals like porridge, kata (flat pie filled with leaf vegetable), plov (rice made meal) and dovga (sour milk made soup with leaf vegetable) or its shoots are dried and stored for late use. Young shoots and leaves of nettle (*Urtica dioica* L.) belonging to *Nettle* family is used in making various meals or they are crumbled by adding salt after which becomes edible. Dead nettle, Melissa (*Melissa officinalis* L.) is a perennial plant with aroma of a lemon. Its young shoots and leaves are picked and used as basil. It is also used in perfumery and medicine.

A number of wild plants growing naturally are widely used by people. These plants include fennel (*Foeniculum vulgare* Mill.), bulb onion (*Allium rotundum* L.), asparagus (*Asparagus officinalis* L.), sorrel (*Rumex asetosa* L.), dock sorrel (*Silene* L.), rhubarb (*Rheum*

undulatum L.), ziziphora (*Saturea montana* L.), horse mint (pepper mint – *Menta piperita* L.), coriander (*Anthriscus cerafolium* Hoffm.), hill coriander (*Bifora radians* L.), salsify (*Tragopogon* L.) & tens of other plants.

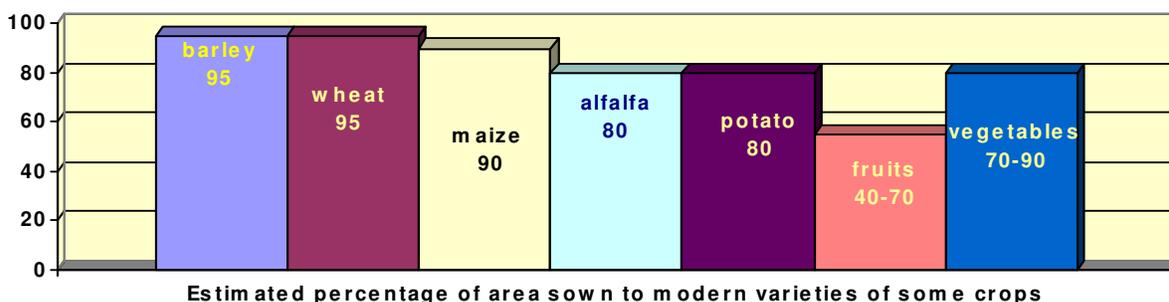
One can found 40 wild forms of apple (*Malus* L.) in large tracts of forest, in river valleys and other places. *P. eldarica* Grossh. and *P. vsevolodi* T.Heid. are endemic wild pear species. Wild forms of quince are found in coastal forest area of Caspian Sea. Decreasing area of these forests are leading a to decrease in diversity. These forests represent service tree (*Sorbus* L.) with 11 species (5 of them are endemic to the Caucasus); hawthorn (*Garataegus* L.) – 9 species; plum (*Prunus* Mill.) – 3 species, almond (*Amugdalus* L.) – 2 species, cherry (*Cerasus* Juss.) – 5 species, strawberry and raspberry (*Rubus* L.) – 14 species and currant (*Ribes* L.) with 2 species. Furthermore, one can found wild medlar (*Mespilus germanica* L.), sloe (*Prunus spnosa* L.), alycha (*Prunus divaricata* lebed.), pomegranate (*Punica* L.), sweet cherry (*Cerasus avium* L.) (Moench.), dog-rose (*Rosa* sp.), sea-buckthorn (*Hippophae rhamnoides*), cornel (*Cornus mas* L.), grape (*Vitis silvestris* Gmel.), nuts and other fruit-berry crops in the forest and shrubberies, and in mountainous and foothill regions of the Republic.

The survey of biodiversity in the territory of Nakchivan revealed that flora of this region represents valuable wild grain crops including *Avena ventricosa* Bal. Ex. Coss., *Hordeum spontaneum* C. Koch., *Secale anatolicum* Boiss., *Triticum araraticum* Yakubz., *Triticum monococcum* L., *Secale vavilovii* Grossh.; leguminous plants: *Onobrychis* sp.div., *O. transcaucasica* (both wild and cultivated forms are found), *Lens* sp.div., *Medicago* sp.div., *Trifolium* sp.div.; bulbous geophytes: *Allium leucanthum*, *allium szovitsii*, *Allium acaca* Gmol. Ex Schult., *Allium mariae* Bordz., *Allium leonidii* Grossh etc. Many of these species are threatened to extinction. In the territory of Zuvand (Lerik region) the area of *Astragalus*, *Allium*, *Beta*, *Hordeum*, *Amygdalus*; in Mountain-Shirvan, Gabala-Oghuz and Lankeran-Astara regions the area of some genera like *Lactuca* and *Triticum* was observed to be decreasing. Some valuable plants of natural pastures like *Ammi visnaga* (L.) Lam., *Achillea nobilis* L., *Inula helenium* L., *Digitalis nervoza* Steud. et Hochst. ex Benth also faces with the same danger. The survey carried out by research staff of the Institute of Botany at southern slopes of Major Caucasus and in the territory of Nakhchivan AR revealed that some aboriginal species like *Dorema glabrum* Fish.et C.A.Mey., *Ferula oopoda* Bois., *Ferula szowitsiana* D.C., *Smyrniopsis aucheri* Boiss., *Grammosciadium platycarpum* Boiss.et C.A.Mey., *Zeravchania pauciradiatum* (Tamamsch.)M. Pimen., *Ferula persica* Willd., *Stenotaenia macrocarpa* Willd., *Prongos acaulis* (DC.)Bornum are threatened to extinction. Some weedy plants like ambrosia (*Ambrosia artemisiifolia* L.), binding weed (*Cuscuta* L.), creeping stagger-bush (pink) (*Acroptilon repens* DC.), spiny nightshade (*Solanum rostratum* Dun.) have spread in the flora and replaced local species.

Furthermore, a number of wild plants of medicinal and industrial importance representing the flora of the Republic are removed and sent to foreign countries by different businessmen. These plants include *Glycyrrhiza glabra* L. (liquorice), *Utrica dioica* L. (nettle), *Betula* sp. div. (species belonging to birch genus) etc. Regulation of harvest of these plants is necessary to ensure their conservation.

1.3. Diversity of Modern Selection Varieties

Selected varieties occupy most cropped area as demonstrated in the following diagram:



High yielding varieties and forms of different agricultural crops adapted to local condition and resistant to biotic and abiotic stress factors have been developed in the republic. Newly released varieties pass registration, are tested and recognized by State Commission for Testing and Protection of Selection Achievements. A total of 240 varieties for 65 crops, including 48 varieties in the last 10 years have been recognized from 1984-2006.

By 2000-2006, 59 varieties for 24 crops have been submitted to State Commission for testing (See: Appendix 4). In the course of the last 6 years new varieties and forms for durum wheat, oat, rye, cucumber, pear, soybean, sunflower, watermelon, melon, onion, potato and other crops have not been submitted to the State Commission.

1834 selections were registered as modern selection variety at Central Database of Genetic Resources Institute responsible for maintenance of information on documentation and characterization for all *ex situ* collections. More than half of these varieties have been developed by crop breeders of Azerbaijan (See: Appendix 4).

A total of nearly 700 selection varieties and forms developed in Azerbaijan have been used in agricultural farms during last 10 years. New varieties for a number of crops have not been recognized during this period (for example rye, paddy, beet, carrot, oat, cabbage, melon, pear, sweet cherry, apricot, peach etc). In addition, utilization of locally selected varieties by large farmer holdings was observed to be declining since introduced varieties of a number of crops started to occupy large area. Hence, some locally selected varieties have disappeared completely due to inappropriate conservation facilities of *ex situ* collections in the past. Locally selected varieties of barley like Pallidium 330/2 and Local Nutans are examples.

1.4. Diversity of Landraces/farmers' Varieties

Valuable local varieties of agricultural crops have been developed by farmers in the past. However, many of these have been replaced by modern varieties or are under danger of disappearance. Examples of such varieties include wheat varieties: "Garagylchyg", "Sari bughda", "Agh bughda", "Gyrmyzy bughda", "Kosa bughda" etc; barley varieties: "Gara arpa", "Dagh arpa", "Agh arpa" etc; maize varieties: "Zagatala", "Khojali", "Khudat aghdenlisi", "Tovuz gyrmyzydenlisi", "Guba aghdenlisi" etc; paddy varieties: "Anberi", "Agh anberi", "Payiz anberisi", "Sedri", "Masally-Sedrisi" etc.

The National Database references 2125 landraces. Only part of them is preserved in *ex situ* collections. According to statistical records for the last 10 years nearly 400 of them have been used in farmer holdings to a certain extent. But this number is decreasing every year.

572 local folk-selection varieties of grape have been registered in National Database 125 of which are used to a certain extent. For apple this indicator is 136 and 43, for pear 254 and 32, and for bean 127 and 16 respectively (See Appendix 7).

Share of landraces in cropped area of relevant crop makes up as follows: wheat - 5%, barley - 5%, vegetable - 15-20%, watermelon - 1-2%, pulses - 25-30%, chickpea - 45%, apricot - 60% and other fruit crops 30-50%.

1.5. Danger of Genetic Weakness

Agro-biodiversity of the republic changes each year. During the last 3-4 years the number of species and varieties for some crops (for instance apricot, pear, grape, tomato, potato, onion, and leaf vegetable) taken to markets by farmers has increased, while for other group of crops (watermelon, cucumber, grain cereals and grain legumes) it has decreased. The number of local varieties available in markets also varies by regions. In Baku markets only 4 varieties of quince are sold, while in Nakhchivan markets one can find 12 quince varieties. 12 varieties of grape are sold in Baku, while in republican markets 15 grape varieties are available. At one time tens of barley varieties were grown by farmers. But at present only 3-4 barley varieties are grown in farmer holdings. Once Azerbaijan was a notable country for the production of melon crops (watermelon, melon), but in recent years the disappearance of local varieties causes serious decline in production.

1.6. Factors Influencing to State of the Plant Genetic Diversity

Evaluation of genetic erosion has been carried out to ensure the information needed to support strategic planning by identifying the precise character, scale and source of threats to biodiversity. It was found that genetic erosion is caused by a combination of factors including frequent replacement of crop varieties, population growth, urbanization and expansion of anthropogenic landscape, intensive and inefficient utilization of genetic resources, high pressure to forests and pastures, inadequate storage facilities of *ex situ* collections, growing impact of abiotic (draught, salinity, cold, high temperature) and biotic (diseases, pests, accession of wild species to flora) stress factors, intensive contamination of soil, water and air, occupation of the territory of Azerbaijan by Armenia (currently there is no information about the state of plant genetic resources in occupied territory, including rare and threatened species) and climate changes. This region has not had expeditions or surveys of target plants in 16 years.

Forest and shrubs cutting as firewood or for construction purposes in northern slopes of Minor Caucasus (Khanlar, Shamkir, Tovuz etc), in mountain and foothill zones of Major Caucasus (Guba, Gabala, Zagatala and other districts), in Nakhchivan AR, in Talysh mountains, in the bank of river Kur, soil salinity in plain areas, irrigation of land with contaminated river water, intensive expansion of agriculture and livestock production cause to serious constraints that results in day by day decrease of diversity of wild flora. Lack of control over grazing in plain areas has spoiled some part of these soils. For example, intensive cattle grazing in semi-desert pastures of Absheron and Gobustan accelerated erosion process and caused to formation of ravines. In general, intensive utilization of pastures in Azerbaijan results in disappearance of natural plant cover and accelerates desertification process.

About 3,6 million hectare lands suitable for agriculture are subjected to erosion. 1,3 million hectare of this soils are weakly eroded soils, 1,15 million hectare moderate eroded soils and 1,14 million hectare severe eroded soils. Soil salinization also causes disturbance of plant communities. More than 1, 5 million hectare of land has become saline soils. Combination of factors including inadequate production technologies applied in agriculture, unsystematic woodcutting, inappropriate soil tillage, unsystematic and soil irrigation beyond irrigation rate, inadequate construction of drainage-collector and irrigation networks and construction of water reservoirs in sensible relief accelerate erosion and salinization process.

Impact of anthropogenic factors on forests has increased due to intensive expansion of crop area and unsystematic cattle grazing.

Flood, stream, landslide and other natural disasters have become intensive as soil protection in woodlands is decreased. Soil erosion in forest bordering zones has increased. Over-utilization of forest genetic resources causes to significant damage first on tugay and plain forests since the area of these forests is very small. Woodcutting, road-building and oil-gas pipeline building in biodiversity rich areas causes landscape fragmentation, and accelerates desertification that expose the ecosystem to heavy danger.

Letting sewage and industrial waste run into water basin without purification, including the Caspian Sea leads to creation of biodiversity related problems and causes to desertification of coastal zones. According to calculations, on average annually 350 million m³ polluted water runs to basin of the river Kur (main source of irrigation) from the territory of Armenia, 330 million m³ from Georgia and 25 million m³ from Azerbaijan. All these cause heavy contamination of the river Kur with heavy metals, phenols, oil products and other noxious substances. One can imagine the scope of danger to which the whole ecological system is exposed, considering that polluted water of the river Kur is main source which is used in irrigation. In Absheron the peninsula 10 thousand hectare land is contaminated with oil and exposes plant cover of the territory to danger. Furthermore, construction activities, new quarries established here and new summer cottage plots cause a sharp decrease of natural landscape.

Special danger is caused by mass utilization of fertilizers, herbicides and pesticides in agriculture without any control. Last years a large amount of chemicals were imported in the country. These chemicals are not tested in most cases. It should be noted that sometimes farmers

don't follow application rate of these chemicals due to lack of knowledge on production technologies.

A number of measures have been taken by the government related to factors influencing the state of genetic diversity to improve both *ex situ* and *in situ* conservation of genetic resources, which include adopted laws, expansion of protected areas, etc. Positive tendencies in provision rural population with electricity and gas and intensified control over woodlands and shrubbery have stopped partially cutting forests and shrubs for firewood.

Though the state of *ex situ* conservation is not satisfactory in general, but improved gene bank facilities for medium-term storage at RIA, establishment of Genetic Resources Institute (2003) on the basis of the Institute of Genetics and Selection of NASA, and putting National Gene Bank with medium and long-term storage facilities into operation (at GRI) and actions taken to introduce proper order in field collections are of positive factors to improve conservation activities and creates firm belief in further development of conservation activities in near future. All these actions should be noted as important measures, but the sector still faces with serious constraints.

1.7. Future Needs and Priorities

Implementation of a National Strategy and Action Plan for Conservation and Sustainable use of biodiversity in Azerbaijan Republic, inventory of existing PGRFA gene fund over the country and permanent control over the state of genetic resources, establishment of Early Warning System to identify threats of genetic erosion in *ex situ* and *in situ* collections and causes of erosion, and the increase of public awareness among population, farmers, executive and legislative power representatives about real value of biodiversity are presently of important priorities.

There is a need for financial support for formation of staff potential with systematic knowledge, for application of up-to-date methods of analysis (for instance, markers, information technology and computer analysis), periodical expeditions, staff training, analytical laboratory studies, for the purchase of up-to-date laboratory equipment in order to carry out complete evaluation of the state of genetic resources and to create favorable political, social and economic control environment against genetic erosion.

Planning and implementation of urgent measures related to conservation of biodiversity beyond protected areas, especially improvement of *in situ* conservation of wild plants used by population for various purposes and wild crop relatives are also of importance.

One of priorities should be enhancement of breeding activities and organization of selection according to international standards.

Maintenance of plant accessions of *ex situ* collections at National Gene Bank decreases the danger of genetic erosion. Furthermore, identification of gaps in collection and regeneration activities are also being addressed. Plans are in place to explore current state of wild plant diversity, area of rare, endemic plants threatened to extinction and their growing habits over all the territory of the country by using GIS. Results of the studies will be used to develop models and system for evaluation of the state of wild crop ancestors and relatives, and the state of other wild plants used for food, and to make recommendations for elimination of danger to biodiversity loss.

CHAPTER II. The State of *In Situ* Management

2.1. Inventories, Surveys & Priority Setting

Considering the necessity for permanent control over preservation of biodiversity and development of preventive measures, serious activities have been undertaken during last 10 years to inventory and the study of current state of PGRFA in the framework of National Program adopted in 1996. The studies have been carried out by GRI, BI, CBG, RIHSC, RIVE, NBI, "Araz" SIA, AAA and RIFMP. The activities for 25 projects related to survey and inventory of PGRFA have been undertaken in the regions of the republic. The survey and inventories have basically focused on southern and northeast slopes of Major Caucasus, northern foothills of Minor Caucasus, Talysh mountain region, the territory of Nakhchivan AR and Absheron peninsula. At present, it was impossible to carry out complete inventory of PGRFA. Insufficient financial resources and lack of experience among the staff engaged in these activities were a matter of some difficulties to explore and inventory of biodiversity in some areas (particularly in plain areas, in Nakhchivan AR, western areas of the republic and mountain belts). A major limitation for the study of current state of biodiversity is the on-going war situation with Armenia.

Threats to biodiversity of agricultural and related crops expose have also serious influence on ecological situation. Landslides, spring drying, disappearance of some plant samples once available in the fauna were observed in southern slopes of Major Caucasus as a result of woodcutting. *In situ* conservation of biodiversity should be in the focus of attention, otherwise a number of species could not be met in previous area within a short period. A number of priority areas were selected to carry out surveys. Such areas include the valley of the rivers Kur and Araz (challenges: irrigation of agricultural fields with contaminated river water, salinization, swamping, high underground water table, desertification), Absheron region (industrialization and pipeline building), Lankara-Astara, Gabala, Guba-Khachmaz regions (forest cutting, expansion of cropping area) and Nakhchivan AR (blockade by Armenia, energy shortage, intensive utilization of wild diversity due to unemployment, soil erosion, expansion of anthropogenic landscape). Attention should be paid to staff development and training of personnel to promote targeted character and efficiency of the studies.

It wouldn't be possible to talk about international standards in the studies without meeting needs for taxonomists, plant researchers, geneticists-ecologists, and documentation specialists with up-to-date knowledge and database management.

2.2. *On-farm* Management and Improvement of the PGRFA

Much work has been undertaken towards *on-farm* management and improvement of PGRFA recently. Participatory research and crop improvement activities are undertaken by research institutes subordinated to Agrarian Science Center (RIA, RIVG, RIHSC,) and by GRI. Trials of newly released varieties and of those introduced are laid out in farmer holdings. In the passed 5-7 years more than 10 projects have been implemented in this field by relevant research institutes and farmers have received methodical support from scientist. At present farmers are willingly participating in conservation of old crop varieties forms with valuable traits and adaptation to local condition through cultivation of them in their holdings and through multiplication and sale of their seeds and seedlings. Close collaboration was established between research institutes and farmers from Tartar, Khachmaz, Saatly, Lankaran, Absheron, Gobustan and other districts. Farmer holdings have been involved in testing of local landraces in comparison with selection varieties, in selection of priority crops for their region, in collecting activities and in participatory research activities.

Regional Science Centers were established in the country to promote farmer participatory crop improvement activities and transfer research outputs, and production technologies, and provide training to farmers. Experimental fields of these Centers are used for field days and

traveling workshops. Farmer fields are also used for demonstration plots. They are offered certified seeds and seedling materials. More than 100 wheat and maize varieties were demonstrated in farmer holdings of Tartar and Saatli regions where farmers were involved in selection and multiplication of high yielding varieties resistant to stress factors with adaptation to local condition. Farmer participatory research activities have been carried out in Ujar (selection of salt-resistant varieties of cereals and pulses) and in Gobustan (selection of draught and frost-resistant varieties of cereals and pulses) regions.

In Astara, a farmer cultivated more than 20 paddy varieties and in Khanlar a farmer cultivated more than 80 grape varieties contributing both conservation of these crops. In Shamkir district, a farmer's orchard is valuable field collection of local landraces and forms of peach and berry. In Guba district, farmers have established nice orchards by grafting wild plants grown around forests with cultivated ones. At present some part of these orchards were cleared, but farmers have rehabilitated and protected these orchards. Farmers of Chayli village of Absheron district farmers are actively cultivate and preserve melon crops, in particular local folk selection landraces of melon and carry out crop improvement activities. A number of leguminous crops (chickpea, lentil, and vetch) are grown by farmers in Talysh region to meet their domestic need for food. In some regions farmers grow exotic plants for different purposes (bed, decoration, clothes, various tableware, baskets, packages etc). In almost all mountain regions farmers collect and sell medicinal crops. With support of researchers farmers cultivate some of them (wild vegetable, edible medicinal plants) which reduce danger of their disappearance.

Collapse of the former Soviet management system as characterized by collective ownership over land and big farms is a matter of some difficulty for *on-farm* management. Land owners who received their land shares as a result of reforms carried out in agriculture were not aware of the real value of biodiversity and folk-selected varieties since most of them represented other fields rather than agriculture (teachers, builders, cultural workers, medical workers, those working in the field of legislative bodies and other professions) and lacked experience in farm management, agriculture and livestock production, and economic legislative knowledge. High priced agricultural machinery, machinery fuel, chemicals, and fertilizers along with cost of irrigation water in irrigated areas aggravated the situation of farmer holdings.

To improve the situation a number of measures were taken by the government of Azerbaijan. A Normative-legislative basis for the agrarian sector was established in the past 10 years. A number of actions have been taken towards requirements of market economy, including renovation of administrative-economic management infrastructure, road building, establishment of new water sources, financing social buildings by government etc. Agricultural production is free of all taxes and previous debts, land taxes being excluded. Farmers have been supported in the framework measures for development of regions and poverty reduction to improve their access to markets and fairs. The credit granting system has been simplified and relevant activities have been undertaken to improve farmers' knowledge and habits.

In spite of all these measures, problems still remain. High prices of industrial products, agricultural machinery, fertilizers and shortage of fertilizers are among major constraints. Farmers and small agricultural producers are always in need of support, machinery and methodical and financial assistance. In particular, the process of establishment of small-sized seed production enterprises with necessary equipment is slow.

Registration of farms involved in cultivation and conservation of valuable plant samples in the territory of the republic, permanent control over these farms, inventory, collection, the study, regeneration and conservation of local landraces and forms, and enhancement of public awareness among farmers are matters of great urgency. For this reason *on-farm* conservation and management of plant genetic resources is considered a priority issue in the framework of National Program. Relevant activities are undertaken towards developing appropriate methodology and strategy, designing new project-proposals and drawing upon world experience.

Furthermore, there is a need for a systematic approach to establish new field gene banks (gardens) in regions, provision of farmers with planting materials of folk-selected varieties,

organization of training and workshops, education activities (meetings, exhibitions, publication of booklets, posters). Assistance of local governing bodies, as well as support of international and regional organizations would be valuable to support these activities.

2.3. Restoring Agricultural Systems after Disasters

Occurrence of natural events, including drought and high rainfall that sometime exceeds the annual norm by several times, temperature increase (0.6^o in the passed 20 years) and sharp temperature fluctuations, and landslide also damage biodiversity. The indifferent attitude of people, lack of preparedness by relevant government bodies increases scope of damage. The government takes appropriate measures (for example, flood-land in coastal area of Caspian sea, floods observed in southern part of the river Kur and in mountain rivers running in southern slopes of Major Caucasus, drought and landslides) related to the compensation of damage, providing farmers with seed and planting materials in case of disasters.

Occupation of the territory of Azerbaijan by Armenia is an example of a great disaster in which both the agricultural system of the country and wild flora suffered seriously. Before the war hundreds of valuable local landraces and forms belonging to different plant groups were cultivated by farmer holdings in Mountain Garabagh and neighboring regions. Unfortunately this valuable gene pool has been destroyed completely. Restoration of the agricultural system in this region will require years and huge financial resources. Fires set by Armenia in occupied territories in 2006 have destroyed green plant cover on thousands of hectares, which damaged rare and valuable biodiversity particularly. The exact scale of damage should be determined by international team. Regeneration of a number of endemic species available in the area is a matter of concern. Project-proposals addressing the need for reintroduction of germplasm suitable for local condition should be developed to restore biodiversity after the territory is released. Support of other countries and international organizations experienced in this field would be useful. Establishment of seedling plots close to the damaged zones for vegetatively propagated plants and maintenance of varieties and forms historically grown in Garabagh would yield a good result. Involvement of farmers in this work would be effective. Such an approach would provide farmers with diversity of germplasm eliminated as results of the war.

2.4. Wild Crop Relatives and Wild Plants for Food Production

In situ conservation of wild crop relatives and other wild plants used for various purposes is considered one of important priorities in National Programs related to both biodiversity and ecology. The programs contain recommendations and plans related to expansion of protected areas for conservation of these valuable biodiversity, elimination of threats of extinction through increased public awareness, involvement of threatened species in *ex situ* conservation and reintroduction into nature etc, and other measures to be taken and on-going activities.

However, for the present there are serious problems in this field. Increased public awareness, involvement of local people and farmers in *in situ* conservation activities are as important as implementation of laws adopted and decisions made by the government toward solution of these problems. There is a need for development of large- scale projects on collection, multiplication of threatened species and their reintroduction, as well as for support of international and regional organizations on staff training.

2.5. Improvement of *In Situ* Management, Priorities and Needs

Recently, a series of important steps have been taken by the government of Azerbaijan to ensure protection of natural landscape and wild flora. The National Plan of Action for Protection of Environment adopted by the government of Azerbaijan (1998), Law of Azerbaijan Republic on Specially Protected Areas and Sites (2000), National Strategy and Plan of Action for

Protection and Sustainable Use of Biodiversity in the Republic of Azerbaijan (2006), establishment of National Parks and reservations (Ordubad National Park named after academician H. Aliyev, Ag-gol National Park, Hirkan National Park, Altiagaj National Park, Absheron National Park, Shahbuz State Nature Reservation Eldar Shamy State Nature Reservation etc) can be cited as an example. Size and status of protected areas were clearly determined.

However, *in situ* conservation activities beyond protected areas are not organized properly. There is a need for involvement of local governing bodies, municipalities, schoolchildren and communities in conservation and information activities, and declaring a fine for damages to biodiversity or calling to account for the damage to biodiversity.

CHAPTER III. State of the *Ex Situ* Management

3.1. Sustaining and Expanding *Ex Situ* Collections

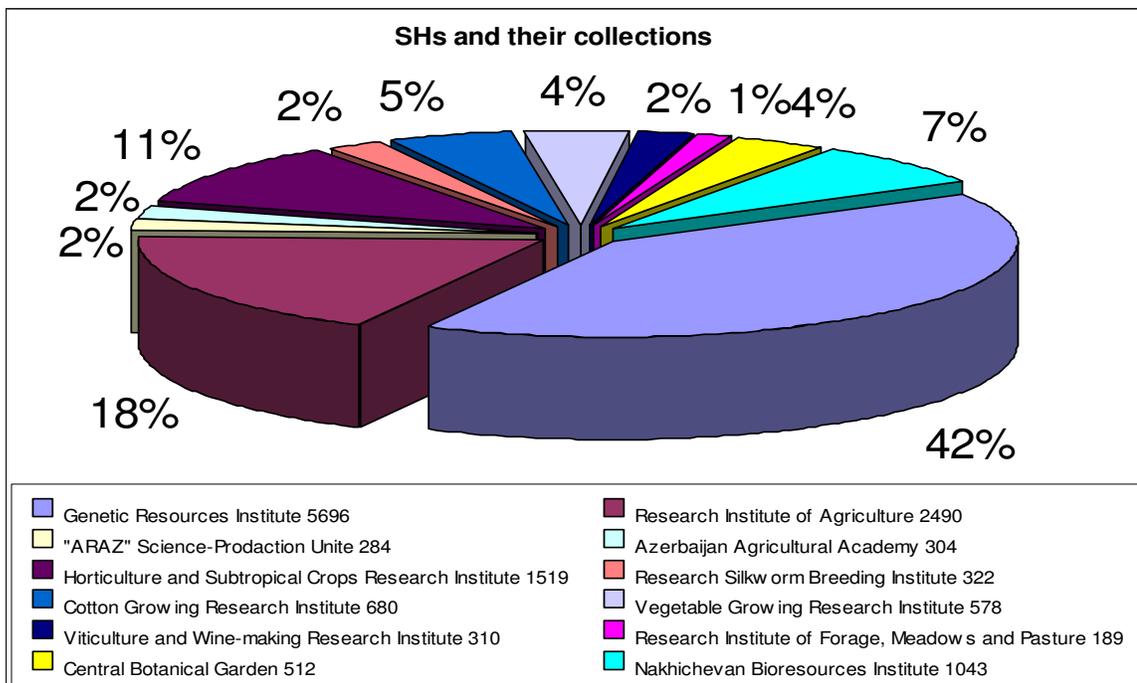
3.1.1. Main *Ex Situ* Collections

Over 13900 plant accessions are available in 34 *ex situ* collections existing in 12 institutions of the Republic. The largest collections are available at Genetic Resources Institute (GRI), Research Institute of Agriculture (RIA) and Research Institute of Horticulture and Subtropical Crops (RIHSC).

Stakeholders	Priority plants
Genetic Resources Institute	All PGRFA priority for Azerbaijan: agricultural crops, their wild relatives. Medicinal, aromatic and oil bearing plants
Central Botanical Garden	All PGR priority for Azerbaijan
The Institute of Bioresources	Wheat, barley, chickpea, bean, lentil, fruit crops, wild flora, useful plants, medicinal plants
Research Institute of Agriculture	Wheat, barley, maize, rye, triticale, oat, tobacco, chickpea, lentil
Research Institute of Cotton Growing	Cotton
Research Institute of Vegetable Growing	Tomato, cucumber, onion, garlic, leguminous vegetables, potato, watermelon, melon, pumpkin, other vegetable, leaf vegetables, spice vegetables
Research Institute of Viticulture and Enology	Grape
Research institute of Forage Crops, Meadows and Pastures	Alfalfa, sainfoin, orchard-grass, oat, other forage crops
Research institute of Horticulture and Subtropical Crops	Apple, pear, quince, fig, almond, pistachio, walnut, hazelnut, chestnut, apricot, alycha, plum, sweet cherry, cherry, citrus crops, medlar, pomegranate, and other fruits and berries, tea
Research institute of Silkworm Breeding	Mulberry
“Araz” Scientific Industrial Amalgamation	Wheat, barley, alfalfa, apple, pear, quince, fig, walnut, hazelnut, apricot, alycha, plum, sweet cherry, cherry, pomegranate and other fruits and berries
Agricultural Academy	Wheat, maize, barley, apple, pear, quince, fig, walnut, hazelnut, apricot, alycha, pomegranate and other fruits and berries, annual and perennial vegetable crops

There are seed gene banks with short-term and long-term storage facilities and field collections in Azerbaijan. There is no information about samples maintained at *in-vitro* and cryopreservation. Sample duplication is being addressed as samples from collections are transferred to National Gene Bank. Four agreements have been signed with international organizations on this matter.

Inventories of accessions available at a majority of collections are carried out periodically but monitoring of their viability is not satisfactory. Nearly 117 publications reflect information on *ex situ* collections. 49 projects supporting collections available at various institutions have been or are being implemented. A majority of these collections have short-term seed storage facilities.



3.1.2. National Gene Bank

Majority of the stakeholders own short-term storage facilities and field gene banks. Only two institutions (Genetic Resources Institute and Research Institute of Agriculture) have medium-term (+5- +7⁰C) storage facilities. Long-term storage facilities are available only at National Genebank established at Genetic Resources Institute. Principle functions of the National Genebank are the acquisition of germplasm through collecting expeditions or by introduction from or exchange with other institutions; its conservation, including preparation of materials for storage, monitoring its viability in storage and regeneration of the accessions when needed; the distribution of samples to users; study of conserved resources, their characterization and preliminary evaluation; and the documentation of information on collecting, registration, characterization, evaluation and management of the accessions in the genebank. A total of 4941 accessions are maintained under medium-term storage facilities in the country. A majority of these accessions are planned for transfer to long-term storage facilities. At present relevant measures are taken to transfer seeds of plant samples maintained under *ex situ* collections to long-term storage. Activities are also undertaken in the search of plant samples of Azerbaijan origin and repatriation of them to National Gene Bank through bilateral agreement and exchange. Appropriate agreements have been reached with VIR, USDA, ICARDA, CIMMYT and other institutions.

3.1.3. Field Collections and Botanical Gardens

Almost all the institutes have field gene banks and gene bank gardens. Field collections available in the republic contain 6193 accessions. Priority issues in management of these gene banks include cultivation, multiplication and conservation of vegetatively propagated plants by relevant institutes and their research bases located in relevant regions. These collections also need support and permanent oversight. Field collection of mulberry established by GRI, fruit orchards established at different regions by RIHSC, field gene banks established at Research Bases and Base Sites of GRI, can be cited as an example. At present the Central Botanical Garden and Dendrology Park in the city of Baku, botanical garden of Bioresources Institute in Nakhchivan are functioning. They contain and preserve valuable, threatened, rare and relict

samples of Azerbaijan flora, including folk-selection varieties of cultivated plants, their wild relatives and other useful plants along with those introduced from different places of the world.

3.1.4. Documentation System of the *Ex situ* Collections

Documentation of *ex situ* collections has been carried out by the institutes for long years and has focused on local collections. All information related to collections was available only in collection-books and rarely in computer formats (in the form of Word tables).

Since 2002 information on all collections started to be transferred to computer system in the framework of EPGRIS project. Passport information of accessions have been collected based on plant descriptors developed jointly by FAO and IPGRI for separate plant groups, and documented properly in the form of tables in Excel program. Establishment of Genetic Resources Institute and a team responsible for documentation have contributed to enhancement of activities towards developing database of *ex situ* collections.

Central Database (CDB) has already established at GRI (by cooperation of ICARDA-GRU) which contains passport and characterization data of significant part of plant samples maintained in *ex situ* collections of the republic. CDB has been loaded to EURISCO internet search catalogue based on "Memorandum of Understanding" between IPGRI and GRI, which is accessible through internet (www.eurisco.ecpgr.org). CDB reflects majority of *ex situ* collections. Only CBG, NBI, "Araz" SIA are poorly represented in this system. At present inventory of collections available at these institutes is going on. Plant samples are documented to be included in database.

Establishment of National Gene Bank has laid down new stage in development of Central Database. Central Database serving as of information base for National Gene Bank is a peerless tool in improving management and organizational mechanisms. By enabling comparative analysis of *ex situ* collections of the institutes it provide favorable environment to increase efficiency of *ex situ* collections and save resources. In addition, the system also contributes to organization and management of field gene banks. CDB is accessible and currently used by relevant research institutes. Representatives of *ex situ* collections and network members enrich database by making changes to the collected information.

3.1.5. Improvement and expansion of the *ex situ* conservation: needs and priorities

Expansion of *ex situ* conservation activities, efforts made towards increasing composition and diversity of collections, improvement of storage facilities and efficient utilization of existing facilities are of particular importance when natural genetic resources and samples of folk-selections are in danger of disappearance. Taking this into account, the studies have been carried out in the framework of National Program on improvement of *ex situ* storage methodology and on new management strategy by relevant research institutes in the republic. Results of these studies are reflected in more than 30 publications. Needs were evaluated as *mean* and facilities as *low* and *moderate* as a result of the studies on improvement of *ex situ* methodology. Most of the institutions that maintain collections need appropriate laboratory equipment, disinfection and disinfection chemicals, labeling materials and facilities necessary for conservation.

In recent years, much attention was given to enhancement of the exchange of materials and information related to expansion of *ex situ* conservation activities, and to establishment of national seed and field gene banks. Implementation of such strategy is suitable from the standpoint of both increasing efficiency of target studies, extension of advanced experience and huge savings of resources. Maintenance of accessions at national level ensures their reliable conservation and release of various collections from extra costs and force. Contribution of the World Bank, ICARDA, International Trust Fund, and USDA should be emphasized particularly in the establishment of National Seed Gene Bank and in supply with required equipment. Training of local specialists on *ex situ* conservation and gene bank management is expected to be organized by involving specialists from ICARDA and other international organizations. Support

of international and regional organizations is also needed to organize field gene banks and field collections properly. Donor support is needed for implementation of relevant projects.

Planning measures for improvement of *ex situ* conservation during the next 10 years is a part of new national strategy. National gene banks and other important collections are in need of necessary equipment and staff training on seed processing and gene bank management. Establishment of *in-vitro* conservation facilities for vegetatively propagated plants is also an urgent matter. Establishment of *cryopreservation* facilities is also envisaged in future.

3.1.6. Genetic Erosion in the *Ex Situ* Collections

Last year, 13 research topics have been carried out on genetic variation and genetic integrity of gene fund materials by 4 institutions. Results of these studies have been reflected in about 40 publications. Lack of required facilities for *ex situ* collections at various institutions of Azerbaijan led to the disappearance of a series of valuable samples. When receiving these valuable materials of national importance from these collections for conservation in National Gene Bank most of them were found to have low germination rate or even no viability. In addition, it was found that a combination of factors, including lack of proper facilities at field collections and gene pool orchards, exact registration, changes in ownership, illegal occupation, and other factors caused loss of some samples. A number of projects have been implemented in the republic on regeneration of threatened *ex situ* collections. A significant part of these projects has focused on vegetatively propagated crops and vegetable crops. There is a need for expansion of the scope of these projects.

Limited amount of seeds of samples of wild plant diversity, low rates of germination, and other constraints faced during regeneration (different agro-ecological environment, lack of proper facilities for isolation of cross-pollinated plants, poor professionalism of staff) increase danger of erosion. It is necessary to carry out inventory across the country with the purpose of revealing the danger of genetic erosion in all collections. Support of international and regional organization should target staff training, technical and methodical assistance.

3.2. Planned & Targeted Collecting

3.2.1. Collecting Activities over the Past 10 Years

A series of local aboriginal varieties and forms developed by amateur farmers and gardeners in the course of long historical period have disappeared or threatened to extinction because of different reasons (for example by replacement of modern intensive varieties). Plant diversity maintained under *in situ* conservation or those beyond this conservation has decreased due to various reasons and a number of species that are carriers of valuable genes are disappearing forever. This valuable genetic richness may be lost forever if they are not collected and conserved in a timely and proper manner. Future generation may also suffer seriously from the loss of genetic diversity. Taking this into account, a number of actions have been taken recently in the framework of National Program for planned collecting and *ex situ* conservation of local, old, valuable landraces and forms of cultivated crops in Azerbaijan, their wild crop relatives, wild plant diversity used for food and agriculture, rare, endemic and threatened species. This issue is one of priorities of National Program. RIA, GRI, BI, AAA, CBG, NBI are of those institutions engaged in intensive collecting activities. Database contains 1308 samples representing grain cereals, grain legumes, vegetable-melon crops, forage crops, fruits and berries, industrial crops, medicinal crops, decorative plants and forest plants collected through 55 collecting missions.

By 1999-2006, valuable samples of grain cereals, grain legumes, forage crops, fruits and berries, industrial crops, medicinal plants, decorative plants and forest plants have been collected through national and international expeditions which targeted most territory of Azerbaijan.

A number of international collecting missions held in 1999, 2001, 2002, 2003, 2004, 2006 with support of international organization and attended by scientists from Germany, Australia, Russia, Japan, Syria, Great Britain, USA, Iran etc may be cited as an example.

For instance, in 2001 about 242 samples of local grain cereals, leguminous and forage crops have been collected through international collecting mission which covered 71 sites in targeted Southern Mugan, Lankaran-Astara, Absheron, Shamakhi-Ismayilly, Shamkir-Gadabay, and Tovuz-Gazakh regions. International expedition for collection of wild vegetable and leguminous crops has targeted southern and northern regions of the republic as a result of which endemic and rare plant species threatened to extinction have been collected. International expedition held in 2004 has covered majority of the territory of the republic as a result of which 670 samples of wild relatives and local varieties of leguminous and grain crops were collected which are maintained at *in situ* collections. Collecting of plant genetic resources for fruit-berry crops and grape is enhanced last years. GRI, RIHSC, RIVE, NBI and other institutions carry out more purposeful activities in this field. Nearly 310 grape varieties of folk-selection have been collected by scientists of RIVE and 160 varieties of folk-selection by scientists of GRI through individual trips and local expeditions, and new gene bank gardens were established. Genetic Resources Institute also maintains valuable collections of almond, pomegranate, pistachio, sea-buckthorn and other crops.

There is a need for periodical expeditions coordinated by one center with the purpose of enriching collections, identifying and filling gaps in collections, regenerating extinct samples and surveying state of plant diversity in all the territory of the republic. Major limitations to carry out these activities include lack of funds, qualified staff and required equipment. The other greatest constraint is lack of special vehicles for expedition.

3.2.2. Major Gaps in Plant Genetic Resources Collections, Ways of Their Identification and Measures to Fill the Gaps

25 projects on regeneration of plant genetic resources have been implemented or are being implemented by 7 institutes (GRI, RIVE, CBG, “Araz” SIA, RIHSC, RISB, RIVG). Eight guidelines describing regeneration activities have been published. Testing viability of accessions, introduction of appropriate methods in sample selection, regeneration activities are main actions in management to identify genetic variation and control loss of genetic integrity. Significant part of regeneration projects focus on vegetative propagated plants and vegetable crops. Coordination of activities from one center organization of management, documentation and registration activities properly would allow identifying samples to be regenerated and save funds of other institutions required for regeneration activities to be undertaken by these institutions.

Required support of international and regional organization should target staff training, technical and methodical assistance.

3.2.3. Research needs and priorities in relation to enhancing planned and targeted collecting

Priorities in relation to enhancing collecting of plant genetic resources include collection of local, old varieties of folk-selections, ecotypes and wild crop relatives. Efforts should be made first on collection and multiplication of rare and threatened species, and to ensure sustainable conservation of these species. From this standpoint, survey of the state of plant diversity in *ex situ* and *in situ* collections and actions to identify gaps should be closely coordinated with collecting activities. It would be more effective if this activity is coordinated from one center and expeditions are carried out by joint efforts of relevant institutions. It would be advisable to develop project proposals with involvement of international organizations, local and foreign donors.

3.3. Assessment of Major *Ex Situ* Needs

Priority *ex situ* needs and measures of the country include: rationalizing collections through regional and international collaboration; improvement of germplasm management; filling gaps in collections; low cost conservation technologies; reliable financing; and safety duplication.

Enhancement of research activities on conservation, searching new methods for conservation and their introduction are matters of urgency. Coordination of gene pool from one center, making appropriate decision on conservation, and allocation of required fund are also important. Creation of relevant facilities for active collection maintained by relevant research institutes also assumes great importance. Lack of funds, staff training, lack of qualified staff and young personnel were found major obstacles in *ex situ* conservation activities undertaken by most research institutes.

CHAPTER IV. The State of Use

4.1. Distribution of Plant Genetic Resources

There is no mechanism and legal base for distribution of plant genetic resources, but mechanism has been established to record the distribution of samples of *ex situ* conserved plant genetic resources to breeding programs. Each crop breeder working at relevant research institute has an active collection but there is a need for enrichment of these collections as well. When there is a need for a particular sample with valuable traits in crop improvement process the breeder may request the sample from collections at the institute or other collections existing in the country. Introduction of outside accessions is carried out through Genetic Resources Institute. Accessions conserved at National Gene Bank under medium-term and long term storage facilities and at Research Institute of Agriculture under medium-term storage facility are available to breeding programs upon request and by consent of manager of gene bank.

4.2. Utilization and Enhancing the Use of Plant Genetic Resources

4.2.1. Actions Taken to Improve the Use of Plant Genetic Resources

Bread wheat varieties “Nurlu-99” and “Azamatli-95” may be given an example which have been developed through utilization of plant genetic resources and recognized in the republic. At present total crop area under these varieties accounts 100 thousand hectare.

One of constraints in terms of improved use of plant genetic resources that the country faced in early years of independence includes lack of proper documentation system and information on conserved germplasm. These constraints have been eliminated during last 3 years. The other obstacle is lack of coordination among researchers, breeders, gene bank managers and farmers. Significant progress is observed in this direction last years. Combination of factors, including establishment of Genetic Resources Institute, enhancement of collaboration between research institutes subordinated to Agrarian Science Center and farmers, increasing number of implemented projects and care taken by the government contribute to progress in this field.

At present base collections are available and breeders have access to these collections, but limited number of accessions in these collections and limited scope of geographical area causes constraints. Establishment of national gene bank, repatriation of accessions of Azerbaijan origin maintained at other gene banks in the world, collection of new samples through collecting mission and material exchange promise progress in future.

At present institutions have different capacity in plant breeding. Breeding activities at RIA are undertaken adequately but other institutes are partially engaged in these activities.

Existing constraints (equipment, qualified staff and financial constraints,) faced by all institutes hamper implementation of research program adequately. There is a need for enhancement of activities on improvement of forage crops since livestock production is one of important sector. Promotion of education and training activities as well as facilities assumes importance along with improvement of breeding programs to enhance use of plant genetic resources. There are a series of constraints to overcome though a number of training courses have been organized recently on account of domestic opportunities as well as with support of international organizations. Hence, there is a great need for investment both by government and donors to eliminate these problems.

Underutilized plants and species, landraces, wild plants are intensively involved in crop improvement activities. New varieties and forms developed by AAA and RIVG through selection among wild vegetable plants may be given an example.

4.2.2. Characterization and Evaluation

Characterization of gene pool accession is important to ensure efficient utilization of genetic resources. The study implies undertaking proper evaluation activities including

evaluation for biomorphological, bio-chemical, physiological and technological indicators, valuable agronomic traits, resistance to biotic and abiotic stress factors based on international descriptors prepared for different plants. During evaluation of PGR various forms with certain donor traits are selected recommended for utilization in breeding programmes.

The accessions maintained in *ex situ* collections at most of relevant institutes of the Republic are studied on the above mentioned parameters. Evaluation on biomorphological and agronomic traits is carried out at all 12 institutions that maintain *ex situ* collection. The study of biochemical traits is possible in most institutions, but it doesn't cover all plant groups. For example at the Research Institute of Vegetable Crops, other crops with exception of tomato and egg-plant are not studied for biochemical traits. Only the RIFMP, CBG of ANAS, SPA "ARAZ" have certain condition for classification on biomorphological a agronomic traits. Some institutes (GRI & RIA) carry out evaluation with difficulty on above mentioned parameters by morally outdated equipment and appliances. Though special laboratories are available at the GRI, but full evaluation is not possible as existing equipment doesn't meet required standards. Efforts are made to comprehensive study of plant samples available in national gene bank and field gene banks in these labs.

About 60 programs and projects on germplasm characterization and evaluation have been implemented in the past 6 years or they are at a stage of implementation. But the analysis of the projects showed different institutions carried out the same research activities. Such duplications should be eliminated through strengthening linkages among institutions. On average 70-75% of plant accessions available in collection have been evaluated for morphological traits, nearly half of them for agronomic traits, 20-25% for biochemical traits & 15-20% have been described for resistance to abiotic stress, and 30-35% for biotic stress factors. For the present evaluation for molecular markers is not undertaken by any institute. Accessions with characterization data make up 10% of total available in information system.

Main constraint on characterization and evaluation of base collection relates to poor facilities and morally outdated equipment. There is a need for appropriate lab equipment and appliances, reagents, high-skilled personnel and well-trained technical staff to increase efficiency of research activities to international standards.

Information system on characterization and evaluation is established on the basis of National Database. Databases on various plants are established here and structural changes are made in these databases to include characterization data along with passport data. Inclusion of characterization data will be entrusted to curators for relevant plants when the system becomes functional. To facilitate these activities the curators will receive training.

4.2.3. Utilization of Genetic Resources in Breeding Programmes

About 50 programs, projects and activities on plant breeding, crop improvement and on genetic enrichment have been implemented last years. In the course of last five years research work carried out by 7 research institutes of Agrarian Science Center cover 12 programs and 78 topics, most of which relates to plant breeding activities.

In the framework of the Competitive Grants Program 52 projects have been implemented in 2001-2005, 32 of which relate to plant production and forages. 12 of these projects have focused on cereals and food legumes, 7 – on fruits, grape and tea, 7 – on vegetables and potato, 3 –on cotton and 3 – on forage crops. Genetic improvement activities on various crops have been implemented by relevant institutes, including activities on wheat, maize, rye, triticale, pea-nut, tobacco, lentil and chick-pea at RIA; cereals, legumes, cotton, fruits- berries etc at GRI; pear, maize and vegetable crops at AAA; 19 fruit crops at RIHSP; melon crops, vegetable crops and potato at RIVG; cotton at RICG; mulberry at RISB; alfalfa, sainfoin at RIFCMP; grape at RIVE; wheat, rye, apple, grape and other crops at SIA "ARAZ" and at NBI.

In addition, a series of projects on plant breeding, variety distribution and variety improvement have been implemented in farmer holdings in collaboration with ICARDA, CIMMYT, Washington State University and other international organizations. Research works

on crop breeding are carried out in consideration with farmers' needs. Through agreement signed between ASC & ICARDA, since 1998 Azerbaijan has joined "Collaboration Programs for Sustainable Development of Agriculture in Central Asia and Southern Caucasian countries". The program involves 9 international centers included in CGIAR system and 8 countries in the region. In the framework of CIMMIT - Turkey - ICARDA crop improvement Program, research works are carried out on evaluation and the study of selection materials at local condition and utilization breeding activities. Research Institute of Horticulture and Subtropical Plants carries out research works on testing and breeding of various fruit varieties in collaboration with Seed and Plant Improvement Institute of Islamic Republic of Iran, Research Institute of Fruit Crops named after Atatürk in Turkey and with Oregon State University of the USA. Research Institute of Viticulture and Enology is collaborating with IPGRI, Milan University (Italy) and Georgia through the project on "Conservation of Grape Genetic Resources in the north of the Black Sea Basin." Research Institute of Vegetable Growing is collaborating with International Vegetable Center (AVRDC) and with International Potato Center (CIP), Research Institute of Cotton Growing is collaborating with INCANA – International Cotton Growing Institute, Research Institute of Silkworm Breeding is collaborating with the institutes of Japan and Bulgaria on crop improvement activities.

The main obstacle in enhancing these activities includes introduction of unknown crop varieties illegally into the country. Seeds of such crop varieties with unknown quality are sold at a low price in local markets (both as food and seed) as food and seed. Because of this reason and due to lack of information on quality seeds of local varieties along with high production cost of seeds impede wide dissemination of them and stimulation of breeding activities. Significant progress on crop genetic improvement can be made through strengthening scientific supervision over the process by research institutes and through farmer participatory research activities undertaken by relevant institutes. Research works supporting breeding programmes have been carrying out intensively.

New varieties are created through classical selection methods (interspecific, intraspecific – distant hybridization). Accessions introduced from international centers and tested in local condition successfully may also be registered as new variety.

The studies on biotechnology, gene engineering, photosynthesis, molecular biology carried out at "Molecular genetic bases of productivity processes" department of the BI under the guidance of academician C.Aliyev also contributes to crop breeding & improvement. Research works on biotechnology are also carried out at RIA and GRI. There is a need of support by international and local donor organizations to strengthen facilities and staff development.

The main objectives and priorities of crop breeding Programs include development of high-yielding varieties and forms adapted to soil-climate condition of Azerbaijan and resistant to diseases and pests through systematic utilization of genetic resources, and by this way reducing dependence of the country on food import. In this respect, the role of PGRFA is unavoidable. The opinion of farmers is taken into consideration in priorities settings. Market related obstacles and monopoly were indicated main constraints in crop diversification by farmers and experts on relevant disciplines.

4.2.4. Reducing Genetic Weakness in Agriculture System

Rural population has been provided with free of charge land as a result of agrarian reforms undertaken in the Country. But full application of agriculture system in such fields is impossible because of small land plots owned by farmers which results in genetic weakness and escape to the wild by plants. The development of complete and scientific-grounded seed production system is the best way against genetic weakness. It is difficult to control this system as the final stage of seed production is implemented by farmers. The farmers are reluctant to sign agreement on this activity with the patent owner.

The resistant to diseases and pests is of special importance in crop improvement activities. Phytopathologists and entomologists are collaborating with other specialists in

breeding programs. Genetic donors against diseases resistance are identified; infection environment and trap nurseries are established. These activities are undertaken in collaboration with ICARDA, CIMMYT, as well as with specialist of Denmark, Switzerland, Iran & Georgia. Rootstock orchard has been established in 1,6 ha in Guba district through introduction of virus free fruit tree seedlings from France as a planting material.

4.3. Seed Production System and Sale Markets

Import of agricultural products has increased significantly in Azerbaijan after independence. This created a pressure to local varieties in markets. Production cost of high quality elite seeds was very high in this period, when farmer holdings started to emerge. Hence, farmers could not afford to buy introduced varieties and forms due to poor purchasing capacity, and therefore they preferred to buy imported ordinary grain from markets and use them as seed. Lack of experience and adequate knowledge by farmers was the main obstacle to achieve progress in this field. The situation mainly relates to vegetable-melon crops, industrial and grains crops. There are enough competitive, traditional, selected varieties and forms suitable to market economy in Azerbaijan. A number of small projects have been implemented in the country related to information on these varieties, distribution of extension materials reflecting their cultivation technology and on dissemination of planting materials and seeds (first of all the RIA & the GRI should be stressed here). But all these have not led significant changes in sale of local varieties. Only fruits and potato sale has made a progress both in home market as well as in export markets. A number of fruit varieties (for instance: “Gyzyl Ahmedi” apple variety) perform well to strong market competitiveness. Local varieties of pomegranate, persimmon, apple, pear, apricot, alycha, grape and other fruit-berry crops have better position in local markets and are sold well in foreign markets as in Russia, Georgia and Turkey. The most serious situation related to distribution, cultivation and sale of local varieties relates to melon crops. One can find only one watermelon variety (gene modified variety “Shaban” of America origin) in Azerbaijan markets. Tens of local watermelon varieties have disappeared or they are grown and preserved by only few amateur farmers. In 2006, increasing sale of local melon varieties in home markets may be explained with positive tendencies observed in this area.. Majority of stakeholders consider that key limitations in establishment and development of markets for local varieties include lack of funds and trained employees, poor seed production system in the Republic which contributes to insufficient planting material of local varieties in the country. Recently attempts were made by the government for establishment of home markets for local varieties. A number of measures taken in the Country including decisions made to create better condition for farmers to access markets, anti-monopoly laws, organization of new sale fairs, relevant agreements with neighbor countries & other measures have yielded positive results. Establishment of farmer holdings and associations on elite seed production under the government patronage and development of existing ones by involving potentials of relevant institution in these activities would allow to achieve significant achievements. In addition, the “Law of the Azerbaijan Republic on Seed Production” was moved amendments to stimulate seed production, which promises to take more local varieties to markets for sale in near future.

4.3.1. Seed Production and its Distribution

To adjust seed legislation to international standards 12 normative documents have been prepared. 78 private seed production entities have been established in 28 regions. In 2005, more than 10 thousand ton of high reproduction seed of cereals, 7 ton of vegetable seed, 10 thousand ton cotton of seed and 65 thousand fruit tree seedlings have been produced by private seed production farms and by regional experimental stations and sold to rural entrepreneurs owners.

In recent years 27 activities have been undertaken related to production and distribution of planting materials by relevant institutes. RIA, RICG, SIA “Araz”, RIVG, GRI, RIHSC, RIFMP, RIVE, CBG, AAA and RISB were more active in this area.

The issues related to registration and recognition of varieties are undertaken by the State Commission for Testing and Protection of Selection Achievements (SCTPSA). The Varieties released are included in the List of Recognized Agricultural Crops for the Republic of Azerbaijan, which is compiled each year.

Shortage of seeds for sale, high production costs, lack of appropriate seed production system are principal obstacles that impede distribution of seeds of various new crop varieties through markets. New varieties of annual crops are disseminated better, but with respect to perennial crops preference is given to landraces.

Primary seed production (super-quality stock seed and elite seed) is undertaken by scientific enterprises under the full patronage of the government. The rest of seeds is multiplied by state agricultural enterprises given to subordination of MoA after agrarian reforms. However, there is no control mechanism for production and dissemination of seeds by other systems. There is no stimulation mechanism for production of high quality seeds of local varieties (landraces) or minor crops. High costs in seed production hinder development of seed production activities at required levels. In the first turn, shortage of agricultural machinery and mineral fertilizers as well as their high costs has negative impact both on research activities and seed production activities. There is a need for serious reforms and support in this area. Application of international experience gained in this field would be useful. To develop super-quality stock seed, elite seed and high-quality stock seed recognized varieties there is a need for development of up-to-date seed production system supplied with machinery, equipments and seed storage facilities, along with application of advanced methods in seed multiplication activities. Capacity of scientific enterprises that engaged in primary seed production should be increased up to international standards to improve seed production and all these activities are recommended to be under the patronage of the government. For production of high-quality stock seed support and control mechanism of the government as well as implementation mechanism should be identified. Production of agricultural crops may be increased on account of high yielding varieties if government patronage grows and private seed production farms develop in the country.

4.3.2. Sale Markets, Needs and Priorities

There are enough competitive, traditional, local and selected varieties and forms in Azerbaijan suitable to the market economy. A number of small projects have been implemented in the country related to propaganda of these varieties, distribution of extension materials reflecting their cultivation technology, and to distribution of planting materials and seeds (Research Institute of Agriculture & Genetic Resources Institute should be stressed). But all these have not led significant changes in situation related to sale of local varieties. Establishment of farmer participatory elite seed production farms and associations under the patronage of the government and development of existing ones by involving potentials of relevant institution in these activities would allow achieving significant achievements.

During monitoring, about 500 local varieties belonging to 60 crops were found in markets. Principal obstacles in utilization of these plant genetic resources includes shortage of funds and trained personnel, poor seed production system in the Republic which contributes to insufficient planting material of local varieties in the country. There is hope for strengthening collaboration with producers in development of new markets, organic agriculture and organization of fairs.

4.4. Crop improvement programmes and food security

Studies are also carried out on evaluation and monitoring of diversity within and between crops, and crop improvement activities through breeding programmes and government-financed projects designed to achieve food security. With application of breeding programs, recently significant improvement was achieved in the state of majority crops that are considered priority

crops for Azerbaijan. Application of these new varieties has contributed to significant yield increase (especially in cereals).

All resources are available to promote utilization of PGR in crop breeding in near 10 years or relevant capacity development is planned. Broadening of important collections, function of National Gene Bank & planned joint breeding programs may be emphasized.

Marketing and commercial obstacles may be stressed as principle limitations to ensure food security in the Country. Regular involvement of farmers in crop improvement programs, their participation in crop multiplication activities, increasing role of science in agricultural production, government care to organization of seed production of new varieties with positive characteristics, refusal of monoculture farming system etc would create favorable environment to stimulate food security and crop improvement programs.

CHAPTER V. The State of the National Programmes, Training and Legislation

5.1. National Programme

Availability of a strong & effective National Program is of great importance with respect to planned and purposeful collection of genetic resources, storage in accordance with international standards, evaluation, documentation, efficient utilization, and conduct of related target studies, coordination of activities, increasing public awareness, training and education. Such a Program was developed in 1996 in Azerbaijan and certain results have been implemented in the last 10 years. In 2001, a State Commission on Genetic Resources of Biodiversity has been established by decree of the President of the Azerbaijan Republic with composition including responsible officials, eminent scientists, representing Cabinet of Ministers, different ministries, National Academy of Sciences etc. In 2002 a National Board under guidance of academician Jalal Aliyev has been established to coordinate the National Programme activities. Implementation of the Programme was involved relevant institutes of the Ministry of Agriculture, the Ministry of Education, the Ministry of Ecology and Natural Resources, the National Academy of Sciences, regional science centers in the Country, farmer associations and NGOs. After establishment of the Genetic Resources Institute in 2003, this institute has been entrusted with important part of the Board's coordinating functions. Establishment of a National Gene Bank at the Research Institute of the Genetic Resources has increased its role in PGR activities.

National Programme for PGRFA is functioning in synthesis with National Strategy and Plan of Action on Biodiversity in close collaboration with programs on breeding and ecology. Research topics (government-financed research projects) of the institutes subordinated to the Biology Department of the ANAS and Agrarian Science Center are reviewed by the National Board approved by the President of the Country. Regular consultations are made among institutes and programs.

At present National Strategy on Plant Genetic Resources has been prepared by National Focal Point (Director of Genetic Resources Institute Zeynal Akparov) based on new requirements of the new era. The new National Strategy is considered as integral part of Regional Strategy prepared for Central Asia and Southern Caucasus region. This program will contribute significantly to conservation and sustainable utilization of PGR if its financial sources are ensured. Necessary infrastructure is available in Azerbaijan for implementation of the program. Legal status of GRI needs to be improved with respect to coordination, which has been considered in the new strategy. Empowerment of the institute (in the first turn in the field of staff development and capacity building) will provide relevant environment to other institutes and organizations to improve their capacity.

Research topics (projects) of the institutes with various disciplines are financed by the government. Though last years certain increase was observed in financing, but this is not sufficient to carry out research activities according to international standards. The institutes is in need of additional funds either from the government or from donor organizations to improve their facilities, training and educational capacity, to buy small-sized equipment for field collections, and for establishment of new laboratories. There is also a need for improvement of existing legislation in force and adoption of new Law on PGR.

Regular operation of centralized management and information system in collaboration with regional and international networks is one of basis of National Program.

5.2. Networks

In the last 10 years, establishment of the network on plant genetic resources for the republic and integration of this network in regional and international networks has been one of principal issues facing the National Program. The network incorporates 14 institutions of the republic. This network has been integrated in Regional Network for Central Asia and Southern

Caucasus established with support of ICARDA and International Trust Fund. The Genetic Resources Institute has played an important role in the establishment of country network on PGR and gives day-by-day advice and leadership to the work of this network.

Institutes have been provided with computers (RI Agriculture, RI Cotton Growing, Nakhchivan Bio-resources Institute etc.) to link network members and necessary actions have been taken to improve their access to the internet (only 2 institutions have no access to internet). Network coordination groups have been developed for separate plants. The work of these groups is also coordinated by Genetic Resources Institute. In addition, each institute has a specialist or group of specialists on documentation and information who coordinates this function with relevant departments of the GRI.

5.3. Education & Training

Staff development in Azerbaijan is undertaken at universities (especially at Baku State University) and at Agricultural Academy (for bachelor and MsD degrees). Post graduate courses are offered at these educational institutions, research institutes and at National Academy of Sciences. Short-term courses organized by international and regional organizations play an important role in development of personnel engaged in activities in the framework of National Program and in acquisition of new knowledge. Such courses are mostly attended research staff of RIA, GRI and RIVG. The national program has received great support for these activities from ICARDA, IPGRI, CIMMYT, and AVRDC and from other regional and international organization.

Last year the Genetic Resources Institute was especially active in this area. Post graduate students and specialists of the Institute improve their educational level through support of ICARDA, CIMMYT and other organizations and carried out research activities in foreign countries at outstanding science centers.

Regular training courses for employees are one of the most reliable tools to enhance activities related to genetic resources. Therefore establishment of regular framework of schools (for instance summer, winter schools etc) for short-term courses on various fields of genetic resources would be advisable. It is impossible to realize this plan without support of international and regional organizations. There is a need for local, regional and international training courses on survey and inventory of PGRFA, on population biology, development of Detailed Information Systems, gene bank management, *on-farm* management, seed treatment, molecular studies, crop breeding, seed production, cultivation technology, and resistance to diseases and pests and on product processing.

5.4. State Legislation

In the last 10 years, *in situ* a series of laws, decrees, legal-normative acts have been adopted in the Republic of Azerbaijan related to conservation and development of genetic resources, protection of ecosystems rich in these genetic resources, agricultural systems and land utilization. These legislative documents ratified by National Assembly (Parliament) and signed by the President of AR have elucidated a series of issues including conservation and utilization of genetic resources, breeders' rights, seed production and sale etc.

The general strategy of economical policy in the agrarian sector of the country was reflected in a number of laws, including "Food Security Program", and "State Program on Poverty Reduction and Economic Development", "State Program for Development of small and medium entrepreneurship". In general, more than 100 laws, decrees, orders, decisions and other legal normative documents have been adopted in 1995-2006.

The table below describes major legislative activities during the last 10 years.

Table

Amendments to Land Code of Azerbaijan Republic	1996
The Law of Azerbaijan Republic on Plant Quarantine	1996
The Law of Azerbaijan Republic on Plant Protection	1996
The Law of Azerbaijan Republic on Melioration & Irrigation	1996
The Law of Azerbaijan Republic on Breeding achievements	1996
The Law of Azerbaijan Republic on Land Reforms	1996
The Law of Azerbaijan Republic on Land Tax	1996
Code of Forest of Azerbaijan Republic	1997
Code of Water of Azerbaijan Republic	1997
Addendum to Law of Azerbaijan Republic on Plant Quarantine	1997
Addendum to the Law of Azerbaijan Republic peasant/farmer holdings	1997
The Law of Azerbaijan Republic on Seed Production	1997
The Law of Azerbaijan Republic on Land Leasing	1998
The Law of Azerbaijan Republic for Joining UN Convention on “Biological diversity”	2000
The Law of Azerbaijan Republic on Cereals	2000
The Law of Azerbaijan Republic on Special Protected natural areas and units	2000
The Law of Azerbaijan Republic on time-limited preferential tax terms to producers of agricultural products	2001
The Law of Azerbaijan Republic on Tobacco and Tobacco products	2001
The Law of Azerbaijan Republic on Tea production	2002
The Law of Azerbaijan Republic on Insurance Stimulation in Agriculture	2002
The Law of Azerbaijan Republic on Viticulture and Enology	2002
The Law of Azerbaijan Republic for Approval of the Agreement on Legal Protection of Crop varieties	2003
The Law of Azerbaijan Republic for Joining International Convention (UPOV) on Protection of new Crop Varieties	2003
The Law of Azerbaijan Republic on Extension of in force duration of the Law of Azerbaijan Republic on time-limited preferential tax terms to producers of agricultural products	2004
The Law of Azerbaijan Republic on Family/Peasant holdings	2005
The Law of Azerbaijan Republic on Phytosanitary control	2006
National Strategy and Plan of Action on conservation and sustainable utilization of biological diversity in the Republic of Azerbaijan	25/03/2006

Activities towards adoption of new laws for improving biodiversity, food security, and agricultural system and in other fields are going on.

5.5. Information Systems

Without information systems, it is impossible to collect and process extremely scattered information, achieve strategic results, and plan further tactical steps. Establishment of a centralized computer database based on passport data, ecological, botanical and characterization information as an integral part of information system has addressed tactical and strategic issues related to collection, reproduction, conservation of genetic resources and efficient utilization of them in crop breeding and food security activities.

In this regard, 9 projects of 5 MT on development and management of the Information system for PGRFA have been implemented.

A new version of DB has been developed (by means of *MS Visual FoxPro* program package) in collaboration and active support of ICARDA-GRU specialists. This version relies on

the project “Development of Information database for genetic resources, their documentation and coordination based on international descriptors”. The database envisages an interactive regime, relevant statistical analysis and accounting, application of electron expert systems, and utilization of multifunctional system for physical and logical organization of information. All links and sections of Database work in English and Russian languages. The Information System of Plant Genetic Resources of Azerbaijan represents wild ancestors of cultural plants, indigenous and traditional varieties, modern variety samples etc. A Central Database covering *ex situ* collections is the basis of Information system. Cereal crops, legumes, industrial crops, fruits and berries, which are considered priority crops for Azerbaijan, make up main part of the Database. Plant samples available in Database represent 385 genus, 904 species and diversity of 1059 plant samples.

PGR IS allows identification of food and agricultural crops, the taxon, their wild relatives and ancestors, and information on plant samples. This assists in the formation of principal directions of future collecting mission activities and allows to identify priority plant species for collection and conservation.. Further development of Central Database will strengthen the search system and improve information on Azerbaijan’s genetic resources. The system enables systematic organization of plant material, information to be exchanged worldwide, and promotes communications with world-important gene banks. This organization of scattered national gene banks enables the preparation of catalogue and development of a proper introduction policy. Information system contributes to planned collection and conservation of plant genetic resources, efficient utilization of plant genetic resources in breeding activities and plant studies by directing strategy and tactics of future activities. Increasing information system with characterization data and broadening utilization opportunities and audience is a top priority.

At present, an inventory of herbaria maintained at various institutes of Azerbaijan and development of relevant information system is underway. Development of an information system for *in situ* collections of PGRFA also is being planned.

5.6. Public Awareness

Increasing public awareness and knowledge of PGR should be appreciated as an important measure to prevent reduction biodiversity and in achieving food security. There is a great need for public education on the importance of biodiversity with valuable genes, rare and endangered species, aboriginal landraces and useful plant genetic resources. In the course of the last 10 years certain activities have been undertaken towards this end. Information on intensive and uncontrolled utilization of genetic resources of biodiversity, benefit of scientific-grounded utilization of genetic resources, and necessity of nature protection etc. have been released in the mass media (telecast, TV film, advertisement, articles and conversations). In addition, a number of workshops, training courses, exhibitions etc have been organized where schoolchildren, officials responsible for decision making, farmers etc have been invited to attend. In general, a number of projects on development of full system of public awareness and its implementation mechanism have been designed and submitted to different competitions.

All these, as well as different publications and their distribution require funds, a trained work force and time. Though a number of projects and certain activities have been implemented in the country with both internal resources and the support of international organizations (OSCE, FAO, FFI, ICARDA, IPGRI), but these are insufficient. Certain amount of investment may be involved by including issues related to public awareness and enlightenment in projects dealing with genetic resources, ecology and agricultural systems. To cover the problem fully and for address sustainable solutions projects targeting special objectives are ended. Assistance of international and regional organizations to find donors for these projects, and in acquisition of methodical supplies and popularization materials is important.

CHAPTER VI. The State of Regional and International Collaboration

6.1. General situation of international relations

Last years, close collaboration was established with international and regional organizations (FAO, ECP/GR, IPGRI, ICARDA, USDA, CIMMYT, International Trust Fund for PGR, AVRDC, etc) and science centers, gene banks and botanical gardens of USA, Russia, Japan, Italy, South Korea, Australia, Great Britain, Germany, Turkey, India, France, Mexico, Southern Caucasus, Central Asia and other countries, agreements were signed and joint activities are on-going.

6.2. International networks

Azerbaijan is actively participating in the work of the international and regional network. Plant Genetic Resources Network of Azerbaijan HAS BEEN member of ECP/GR (European Cooperative Program on Genetic Resources) since 2004 and is represented in working groups of its coordination network for plant groups (barley- N. Geraybayova, wheat- S. Mammadova, forage crops - Z. Mammadova, *Malys/Pyrus* – Sh.Mammadov, *Vitis* – M. Musayev, grain legumes – S. Babayeva, *Beta* – Z. Akparov, onion – A. Babayev, *Cucurbits* – Sh. Aliyev, *Brassica* – R. Ismayilov, medicinal and aromatic plants – A. Ibrahimov, *Solonaceae* – A. Babyev), special target groups (protection of wild species – Z. Akparov, on – farm management – N. Nabiyeva), documentation and information network – A. Mammadov.

Azerbaijan is also collaborating with WIEWS (Global Network of the World Information and Early Warning System on Plant Genetic Resources). 16 institutions in the Republic have been registered in this system and each has a relevant code.

Plant Genetic Resources Network of Azerbaijan is full member of Regional Network – Central Asia and Trans-Caucasus Network and has participated in most projects implemented in the last 2 years including “Regional Gene Banks supporting project”, “Establishment of Regional Network” and “Completion of the Inventory of *ex situ* collections”. National, regional and international networks avoids duplications of activities and provides significant support to the National Program in technology transfer, duplication of germplasm, information and germplasm exchange, technical expertise exchange, training of researchers for National Program, access to advanced research outputs, general characterization and evaluation of germplasm and in strengthening information provision on PGRFA. Insufficient financial sources are main limitations in development of networks.

6.3. International Programs and Agreements

Azerbaijan is participating in international programs and agreements related to PGRFA and environment protection. One of these programs is the European Cooperative Program for PGR (ECP/GR). National Program specialists attend international events and promote collaboration in the framework of this program. Azerbaijan is member of a number of international conventions and agreements including International Convention on Biodiversity (Rio-de Janeiro, 1992), Union for Protection of New Varieties (UPOV, Geneva 2002), Kartahen Protocol on Bio-security etc. The country has joined “International Code for collection and transfer of plant germplasm” (FAO, Italy, 1993), Global Plan of Action on Plant Genetic Resources (Leipzig, 1996) etc. The International Trust Fund has provided technical assistance in establishment of National Gene Bank through regional project based on Provisional Agreement signed between Azerbaijan and International Trust Fund (Obligation of Azerbaijan was signed by President of National Academy of Sciences). Azerbaijan is collaborating with IPGRI (International Plant Genetic Resources Institute) based on Memorandum of Understanding signed on development of PGR Database and EURISCO search catalogue (from Azerbaijan side the Memorandum was signed by national focal point for Genetic Resources). Azerbaijan intends to join the International Treaty on PGRFA. The issue has been submitted to the Government by the National Focal Point. Agreement was achieved to sign the Treaty.

CHAPTER VII. Access to PGRFA, Benefit Sharing Arising out of Their Use & Farmers' Rights

7.1. Access to Plant Genetic Resources

Principles related to facilitation and improvement of access to PGR adopted on international standards are officially accepted in the Republic of Azerbaijan. Significant progress was made in this area after 2000 when the Law of Azerbaijan Republic on Joining UN Convention on "Biological Diversity" was ratified by National Assembly. Official obligations on biodiversity signed by the president of National Academy of Science in front of International Trust Fund in 2005. It implies not only target-oriented utilization of funds allotted to gene bank at this Institute but also free access to accessions maintained here. Over the past 2 years the Institute received requests from science centers and scientists from Australia, New Zealand, USA, Canada, South Africa, Russia and other countries to acquire accessions for research purpose and their requests have been met. Seeds have been sent to different countries with certification received from State Phytosanitary Services. In addition, Azerbaijan has requested from international institutions and gene banks in foreign countries samples necessary to use in crop breeding and research activities. Initially, efforts have been made to get accessions of Azerbaijan origin and agreement in this area was reached with US Department of Agriculture, VIR, gene banks of ICARDA, CIMMYT, Netherlands, and Czech Republic.

7.2. Fair and Equitable Sharing of the Benefits of the Use of PGR

The law of Azerbaijan Republic on specially protected natural areas and establishments (2000) includes regulations related to sharing benefit from utilization of *in situ* protected PGR. But this regulation does not contain a sharing mechanism. Benefit sharing is regulated by means of legal-normative acts developed for separate laws. For instance the Law of Azerbaijan Republic on Breeding Achievements (1996) and the Law of Azerbaijan Republic on joining international convention for protection of new crop varieties (UPOV-2003) include regulations related to sharing benefits generated from development of new varieties. But plant breeders and their affiliated institutions are not able to access benefits from crop varieties developed by them. For instance crop area covered by cotton variety Agdash-3 makes up 40% of total area under cotton, but the author of the variety and the relevant institution do not get any benefit from this. Cereal varieties developed by research staff of Research Institute of Agriculture cover 50% of total cropping area under cereals, but neither researchers nor the institution have access to benefits from these varieties. For this reason owners of genetic resources don't benefit from utilization of these resources in development of new varieties. In 2006, Cabinet of Ministers made a decision on "payments to patent owner for utilization of varieties and awards to variety developers", but it has no mechanism for implementation.

7.3. Implementation of Farmers' Rights

Functions of rural entrepreneurs is protected and regulated by the law of Azerbaijan Republic on "Family (peasant) holdings" (2005) and by Civil Code. The government regulates entrepreneurship activities through its tax, monetary, credit, customs and legal systems. Time-limited tax deduction to producers of agricultural products, establishment of National Foundation for support of entrepreneurship should be highly appreciated. Laws of the Azerbaijan Republic provide broad rights to land owners. They have the right to sell, rent out, use as collateral, or donate lands they own in accordance with legislation in force. Rural entrepreneurs are free from all taxes (with exception of land tax), customs duties for a number of agricultural inputs and seeds. They receive fuel and irrigation water with reduced costs. "Agro leasing LTD" was established by decree of the president of Azerbaijan on October 23, 2004 to facilitate farmers access to agricultural machinery. This decision is bearing its yield. In 2005, 250 combine

harvesters, 330 tractors, 636 various agricultural machinery have been purchased through the program. In 2006, 250 combine harvesters, 464 tractors, and 1443 various agricultural equipment were purchased and will be sold or leased to natural persons or farmers. In addition, 25 thousand tons nitrogen and super phosphate fertilizer were purchased in 2005 and 16800 ton nitrogen in the first half of this year and distributed to rural entrepreneurs. Relevant measures are taken to improve sale of agricultural products by farmers.

They have the right to address the district court in case their rights are violated. Distortions in land reforms, careless approach of some local executive structures and certain corruptions are basic shortages in ensuring farmers' rights. In some cases gaps in legislation also leads to distortions. Farmers face with certain problems related to utilization of forest resources, common pastures, water resources etc.

All these problems may be solved through obeying all laws, improving legislation and by struggling against monopoly, and corruptions.

CHAPTER VIII. The Contribution of PGRFA Management to Food Security and Sustainable Development

National security is one of the major objectives of each country to achieve. Food security is the important part of the national security system that covers significantly broad and multilateral constraints. Food security considers the complex of measures that ensures continuous, long-term and sustainable meeting of demand of population for basic food-stuff in the framework of established quality standards. The government finances breeding program to achieve food security. In addition, official strategies are also available for crop improvement by using advanced methods and technologies. State program in poverty reduction and development of the regions can be cited as an example.

State orders in the framework of research topics of the institutes and the projects implemented in accordance with these orders can also be related strategic planning towards food security.

Though situation in food security is getting better year by year, it is still not possible to stop import of cereals outside. Cereal is imported from Kazakhstan (50% of import) Ukraine and Russia. All measures are taken to meet Azerbaijan's need for cereal products completely. Today Azerbaijan is exporter of fruit crops and grape.

Contributions of PGRFA in the country's economical development and in poverty reduction are multi-branched. In recent years, agricultural sector provided 170 thousand job opportunities in Azerbaijan, important part of which is related directly or indirectly to utilization PGRFA. Food shortage in the country (basically related to refugees) has fallen from 37% down to 21% in the last ten years. It is noted in the report of International Food Inspection for 2006 that 29% of Azerbaijan population lives in poverty level. This figure is significantly low and is continuously getting down (sometimes 2-3 times) compared to previous years in the country and to neighbor countries. This fact has specially been emphasized by Secretary General of FAO Dr. Jacques Diouf at Roma, when receiving the President of Azerbaijan Mr. Ilham Aliiev. Dr. Jacques Diouf specially appreciated participation of Azerbaijan in the projects implemented by FAO on PGR, food security and poverty reduction.

Political course pursued by the government of Azerbaijan, wide-scale research activities with utilization of PGRFA, broadening *in situ* and *ex situ* conservation, efficient utilization of genetic resources as food, wear and in crop improvement activities will continue and lead to elimination of poverty and contribute to welfare of people.

Plant species from Annex 1 of International Treaty which are available in Azerbaijan flora

Majior food plants	Species or number of species available in Azerbaijan flora	Leguminous forage plants	Species or number of species available in Azerbaijan flora	Grass forage plants	Species or number of species available in Azerbaijan flora
<i>Asparagus</i>	7 species	Astragalus	156 species	Andropogon	2 species
<i>Avena</i>	11 species	<i>A. cicer</i>	yes	Agropyron	15 species
<i>Beta</i>	4 species	Hedysarum	8 species	<i>A. cristatum</i>	yes
<i>Brassica</i>	8 species	Lathyrus	18 species	<i>A. desertorum</i>	yes
<i>Brassica napus</i>	yes	<i>L. cicera</i>	yes	Agrostis	8 species
<i>Brassica rapa</i>	yes	<i>L. hirsutus</i>	yes	<i>A. stolonifera</i>	yes
<i>Armoracia</i>	1 species	<i>L. odoratus</i>	yes	<i>A. tenuis</i>	yes
<i>Barbarea</i>	4 species	<i>L. sativus</i>	yes	Alopecurus	11 species
<i>Camelina</i>	6 species	Lotus	6 species	Arrhenatherum	2 species
<i>Crambe</i>	6 species	<i>L. corniculatus</i>	yes	<i>A. elatius</i>	yes
<i>Diplotaxis</i>	<i>D.muralis</i>	Lupinus	4 species	Dactylis	1 species
<i>Eruca</i>	<i>E.sativa</i>	<i>L. albus</i>	yes	<i>D. glomerata</i>	yes
<i>Isatis</i>	12 species	<i>L. angustifolius</i>	yes	Festuca	14 species
<i>Lepidium, etc</i>	14 species	<i>L. luteus</i>	yes	<i>F. gigantea</i>	yes
<i>Raphanus</i>	3 species	Medicago	21 species	<i>F. ovina</i>	yes
<i>Rorippa</i>	4 species	<i>M. falcata</i>	yes	<i>F. pratensis</i>	yes
<i>Brassica, Sinapis</i>	<i>S.arvensis</i>	<i>M. sativa</i>	yes	<i>F. rubra</i>	yes
<i>Cajanus</i>	<i>C.indicus</i>	<i>M. rigidula</i>	yes	Lolium	6 species
<i>Cicer</i>	2 species	Melilotus	7 species	<i>L. perenne</i>	yes
<i>Citrus</i>	5 species	<i>M. albus</i>	yes	<i>L. rigidum</i>	yes
<i>Daucus</i>	2 species	<i>M. officinalis</i>	yes	<i>L. temulentum</i>	yes
<i>Eleusine</i>	<i>E.indica</i>	Onobrychis	22 species	Phalaris	4 species
<i>Fragaria</i>	4 species	<i>O. vicifolia</i>	yes	<i>Ph. aquatica</i>	yes
<i>Helianthus</i>	2 species	Ornithopus	1 species	Phleum	5 species
<i>Hordeum</i>	8 species	<i>O. sativus</i>	yes	<i>Ph. pratense</i>	yes
<i>Ipomoea</i>	<i>I.purpurea</i>	Pueraria	<i>P.lobata</i>	Poa	16 species
<i>Lens</i>	3 species	Trifolium	43 species	<i>P. alpina</i>	yes
<i>Malus</i>	3 species	<i>T. alpestre</i>	yes	<i>P. annua</i>	yes
<i>Oryza</i>	<i>O.sativa</i>	<i>T. angustifolium</i>	yes	<i>P. pratensis</i>	yes
<i>Pennisetum</i>	<i>P.orientale</i>	<i>T. hybridum</i>	yes		
<i>Phaseolus</i>	3 species	<i>T. incarnatum</i>	yes		
<i>Pisum</i>	3 species	<i>T. pratense</i>	yes		
<i>Secale</i>	5 species	<i>T. repens</i>	yes		
<i>Solanum</i>	8 species	<i>T. resupinatum</i>	yes		
<i>Sorghum</i>	4 species	<i>T. subterraneum</i>	yes		
<i>Triticosecale</i>					
<i>Triticum</i>	16 species				
<i>Elymus</i>	<i>E.giganteus</i>				
<i>Vicia</i>	42 species				
<i>Vigna</i>	<i>V. sinensis</i>				
<i>Zea</i>	<i>Z.mays</i>				

APPENDIX 2.

SH's main collections

Stakeholders	Name of collections	Number of accessions	Number of accessions distributed at least once
Cotton Growing Research Institute	Cotton gene-pool	680	25
Viticulture and Wine-making Research Institute	Ampelography collection garden	143	
Central Botanical Garden	Botanical garden	512	100
Nakhchivan Bioresources Institute	Fruit, berry and grape collection	166	26
	Collection of cereals and leguminous crops.	847	16
	Medicinal plants	30	6
ARAZ" Scientific-industrial Amalgamation	Cereals	76	68
	Fruit crops and grape collection	197	125
	Forage crops	11	8
Genetic Resources Institute	Collection of fruits and berries	1199	250
	Cereals	1936	100
	Cotton	1370	170
	Leguminous crops	336	6
	Vegetables, watermelon	327	12
	Oil-bearing., medicinal and non-traditional plants	60	
	Forage crops	373	73
	Beet	95	
Azerbaijan Agricultural Academy	Vegetables, watermelon	118	18
	Fruits, berries and subtropical crops	57	14
	Industrial and other oil bearing plants	36	
	Cereals and leguminous crops	93	7
Research Institute of Agriculture	Cereals	2163	1100
	Forage crops	27	
	Leguminous crops	300	120
Research Institute of Horticulture and Subtropical Crops	Pome fruits	399	120
	Nuts	355	145
	Subtropical crops	606	205
	Stone fruits	145	49
	Citrus plants	14	4
Research Institute of Forage, Meadows and Pasture	Forage crops	189	51
Research Silkworm Breeding Institute	Mulberry	322	32
Vegetable Growing Research Institute	Vegetable and melon crops	385	34
	Greenhouse collection	153	12
	Potato collection	40	13

List of species conserved *ex situ* in Azerbaijan (2006)

Name of taxon	Common name	Number of accessions	Holding Institution
<i>Aegilops</i> sp.div.	Aegilops	27	ARIA
<i>Agropyron cristatum</i>	Crested wheatgrass	1	RIFMP
<i>Agropyron elongatum</i>	Tall wheat-grass	1	RIFMP
<i>Agropyron repens</i>	Quack grass	1	RIFMP
<i>Allium cepa</i>	Onion	16	GRI
<i>Allium cepa</i>	Onion	25	VGRI
<i>Allium porrum</i>	Leek	4	GRI
<i>Allium sativum</i>	Garlic	4	GRI
<i>Allium sativum</i>	Garlic	20	VGRI
<i>Amaranthus paniculatus</i>	Amaranth	1	RIFMP
<i>Amygdalus communis</i>	Almond	9	ASPU
<i>Amygdalus communis</i>	Almond	4	CBG
<i>Amygdalus communis</i>	Almond	70	GRI
<i>Amygdalus communis</i>	Almond	65	HSCRI
<i>Andropogon ischaemum</i>	Beard grass	1	RIFMP
<i>Anethum graveolens</i>	Dill	14	GRI
<i>Anethum graveolens</i>	Dill	3	VGRI
<i>Armeniaca dosycarpa</i>	Alycha-apricot	8	NBI
<i>Armeniaca vulgaris</i>	Apricot	16	ASPU
<i>Armeniaca vulgaris</i>	Apricot	4	CBG
<i>Armeniaca vulgaris</i>	Apricot	12	GRI
<i>Armeniaca vulgaris</i>	Apricot	22	HSCRI
<i>Armeniaca vulgaris</i>	Apricot	20	NBI
<i>Asparagus officinalis</i>	Asparagus	4	GRI
<i>Asparagus</i> sp.div.	Asparagus	4	CBG
<i>Avena sativa</i>	Oats	2	GRI
<i>Avenastrum pubescens</i>	Empty oats	1	RIFMP
<i>Beta</i> sp.div.	Beet	95	GRI
<i>Brassica capitata</i>	Cabbage	27	GRI
<i>Brassica narinosa</i>	Raps	5	RIFMP
<i>Brassica oifera</i>	Raps-kolra	3	GRI
<i>Brassica oleracea</i> var. <i>capitata</i>	Cabbage	15	VGRI
<i>Brassica</i> sp.div.	Cabbage	5	AAA
<i>Bromus inermis</i>	Smooth brome	1	RIFMP
<i>Bromus japonicus</i>	Japanese brome	1	RIFMP
<i>Bromus riparius</i>	Seaside brome	1	RIFMP
<i>Bromus rubens</i>	Red brome	1	RIFMP
<i>Bromus scoparius</i>	Brome	1	RIFMP
<i>Bromus variegatus</i>	Variiegated brome	1	RIFMP
<i>Capsicum annuum</i>	Pepper	21	GRI
<i>Capsicum annuum</i>	Pepper	46	VGRI
<i>Carthamus tinctorius</i>	Safflower	1	GRI
<i>Carya oliviformis</i>	Pecan	9	HSCRI
<i>Castanea sativa</i>	Chestnut	4	GRI
<i>Castanea sativa</i>	Chestnut	41	HSCRI
<i>Castanea</i> sp.div.	Chestnut	3	GRI
<i>Cerasus avium</i>	Sweet cherry	8	ASPU
<i>Cerasus avium</i>	Sweet cherry	6	GRI

<i>Cerasus avium</i>	Sweet cherry	54	HSCRI
<i>Cerasus avium</i>	Sweet cherry	7	NBI
<i>Cerasus vulgaris</i>	Cherry	7	ASPU
<i>Cerasus vulgaris</i>	Cherry	2	GRI
<i>Cerasus vulgaris</i>	Cherry	11	HSCRI
<i>Cerasus vulgaris</i>	Cherry	5	NBI
<i>Cicer arietinum</i>	Chick-pea	185	ARIA
<i>Cicer arietinum</i>	Chickpea	57	GRI
<i>Citrullus vulgaris</i>	Watermelon	28	GRI
<i>Citrullus vulgaris</i>	Water melon	20	VGRI
<i>Citrus limon</i>	Lemon	5	HSCRI
<i>Citrus sinensis</i>	Orange	4	HSCRI
<i>Citrus unshiu</i>	Mandarin	5	HSCRI
<i>Coriandrum sativum</i>	Coriander	11	GRI
<i>Coriandrum sativum</i>	Coriander	3	VGRI
<i>Cornus mas</i>	Cornel	6	AAA
<i>Cornus mas</i>	Cornel	18	GRI
<i>Cornus sp.div.</i>	Cornel	5	CBG
<i>Corylus avellana</i>	Hazel	12	GRI
<i>Corylus avellana</i>	Hazel-nut	169	HSCRI
<i>Corylus sp.div.</i>	Hazel-nut	3	CBG
<i>Cotoneaster</i>	Cotoneaster	15	CBG
<i>Crataegus sp.div.</i>	Hawthorn	17	CBG
<i>Cucumis melo</i>	Melon	28	GRI
<i>Cucumis melo</i>	Melon	25	VGRI
<i>Cucumis sativus</i>	Cucumber	14	GRI
<i>Cucumis sativus</i>	Cucumber	33	VGRI
<i>Cucurbita maxima</i>	Pumpkin	8	GRI
<i>Cydonia oblonga</i>	Quince	4	AAA
<i>Cydonia oblonga</i>	Quince	12	ASPU
<i>Cydonia oblonga</i>	Quince	2	CBG
<i>Cydonia oblonga</i>	Quince	130	GRI
<i>Cydonia oblonga</i>	Quince	49	HSCRI
<i>Cynodon dactylon</i>	Bermuda grass	1	RIFMP
<i>Dactylis glomerata</i>	Orchard-grass	33	RIFMP
<i>Daucus carota</i>	Carrot	17	GRI
<i>Daucus carota</i>	Carrot	3	VGRI
<i>Diospyros kaki</i>	Japanese persimmon	5	AAA
<i>Diospyros kaki</i>	Japanese persimmon	3	GRI
<i>Diospyros kaki</i>	Persimmon	28	HSCRI
<i>Diospyros lotus</i>	Caucasian persimmon	2	GRI
<i>Diospyros sp.div.</i>	Persimmon	4	CBG
<i>Eremopyrum orientale</i>	East wheatgrass	1	RIFMP
<i>Eremopyrum triticeum</i>	Annual wheatgrass	1	RIFMP
<i>Ervum lens</i>	Lentil	20	NBI
<i>Feijoa sellowiana</i>	Feijoa	31	GRI
<i>Feijoa sellowiana</i>	Feijoa	37	HSCRI
<i>Festuca ovina</i>	Sheep fescue	1	RIFMP
<i>Festuca pratensis</i>	Meadow fescue	1	RIFMP
<i>Festuca sulcata</i>	Fescue	1	RIFMP
<i>Festuca varia</i>	Variiegated fescue	1	RIFMP
<i>Ficus carica</i>	Fig	5	AAA
<i>Ficus carica</i>	Fig	5	CBG
<i>Ficus carica</i>	Fig	77	GRI

<i>Ficus carica</i>	Fig	36	HSCRI
<i>Foeniculum vulgare</i>	Florence fennel	6	GRI
<i>Glycine hispida</i>	Soy-been	6	GRI
<i>Glycine max</i>	Soybean	2	ASPU
<i>Glycyrrhiza glabra</i>	Licorice	1	RIFMP
<i>Gossypium arboreum</i>	Cotton	2	CGRI
<i>Gossypium arboreum</i>	Cotton	2	GRI
<i>Gossypium barbadense</i>	Cotton	20	CGRI
<i>Gossypium barbadense</i>	Cotton	93	GRI
<i>Gossypium hirsutum</i>	Cotton	658	CGRI
<i>Gossypium hirsutum</i>	Cotton	1275	GRI
<i>Hibiscus</i> sp.div.	Gumbo	4	CBG
<i>Hippophae rhamnoides</i>	Sea-buckthorn	14	GRI
<i>Hippophae rhamnoides</i>	Sea-buckthorn	1	NBI
<i>Hordeum bulbosum</i>	Bulbous wild barley	1	RIFMP
<i>Hordeum distichon</i>	Barley	6	NBI
<i>Hordeum leporinum</i>	Barley	1	RIFMP
<i>Hordeum</i> sp.div.	Barley	154	ARIA
<i>Hordeum</i> sp.div.	Barley	28	ASPU
<i>Hordeum</i> sp.div.	Barley	5	GRI
<i>Hordeum spontaneum</i>	Barley	29	GRI
<i>Hordeum spontaneum</i>	Wild barley	1	RIFMP
<i>Hordeum violaceum</i>	Violet barley	1	RIFMP
<i>Hordeum vulgare</i>	Barley	198	GRI
<i>Hordeum vulgare</i>	Barley	27	NBI
<i>Juglans regia</i>	Walnut	14	ASPU
<i>Juglans regia</i>	Walnut	2	GRI
<i>Juglans regia</i>	Nut	52	HSCRI
<i>Juglans</i> sp.div.	Walnut	4	CBG
<i>Laser trilobum</i>	Anise	2	GRI
<i>Lathyrus pratensis</i>	Meadow everlasting pea	1	RIFMP
<i>Lathyrus sativus</i>	Grass pea	18	ARIA
<i>Lathyrus</i> sp.div.	Pea	51	GRI
<i>Lens culinaris</i>	Lentil	25	ARIA
<i>Lens culinaris</i>	Lentil	49	GRI
<i>Lens ervoides</i>	Lentil	2	GRI
<i>Linum</i> sp.div.	Annual flax	5	GRI
<i>Lolium perenne</i>	Perennial ryegrass	1	RIFMP
<i>Lolium rigidum</i>	Hard ryegrass	1	RIFMP
<i>Lotus</i> sp.div.	Birds foot Trefoil	17	GRI
<i>Lycopersicon esculentum</i>	Tomato	16	AAA
<i>Lycopersicon esculentum</i>	Tomato	52	GRI
<i>Lycopersicon esculentum</i>	Tomato	220	VGRI
<i>Malus domestica</i>	Apple	16	ASPU
<i>Malus domestica</i>	Apple	152	GRI
<i>Malus domestica</i>	Apple	185	HSCRI
<i>Malus domestica</i>	Apple	19	NBI
<i>Malus</i> sp.div.	Apple	15	CBG
<i>Medicago caerulea</i>	Blue medic	1	RIFMP
<i>Medicago falcata</i>	Yellow alfalfa	1	RIFMP
<i>Medicago grandiflora</i>	Alfalfa grandiflora	1	RIFMP
<i>Medicago minima</i>	Little medic	1	RIFMP
<i>Medicago sativa</i>	Lucerne	1	ASPU
<i>Medicago sativa</i>	Alfalfa	51	RIFMP

<i>Medicago sativa</i> var. <i>varia</i>	Alfalfa	25	RIFMP
<i>Medicago</i> sp.div.	Lucerne	179	GRI
<i>Melilotus albus</i>	White sweet clover	1	RIFMP
<i>Melilotus caspius</i>	Sweet clover caspi	1	RIFMP
<i>Melilotus officinalis</i>	Yellow sweet clover	1	RIFMP
<i>Melilotus</i> sp.div.	Clover	8	GRI
<i>Melissa officinalis</i>	Balm	3	GRI
<i>Mespilus germanica</i>	Medlar	14	GRI
<i>Morus alba</i>	Mulberry	10	CBG
<i>Morus</i> sp.div.	Mulberry	7	ASPU
<i>Morus</i> sp.div.	Mulberry	93	GRI
<i>Morus</i> sp.div.	Mulberry	322	RSBI
<i>Nigella sativa</i>	Cockle	1	GRI
<i>Ocimum basilicum</i>	Sweet basil	5	GRI
<i>Olea europaea</i>	Olive	56	GRI
<i>Olea europaea</i>	Olive	136	HSCRI
<i>Olea europaea</i> subsp. <i>europaea</i>	Olive	4	CBG
<i>Onobrychis arenaria</i>	Sainfoin	1	RIFMP
<i>Onobrychis cyri</i>	Sainfoin cyri	1	RIFMP
<i>Onobrychis</i> sp.div.	Sainfoin	1	ASPU
<i>Onobrychis</i> sp.div.	Sainfoin	20	GRI
<i>Onobrychis transcaucasica</i>	Sainfoin	5	RIFMP
<i>Onobrychis vaginalis</i>	Sainfoin	1	RIFMP
<i>Onobrychis viciifolia</i>	Sainfoin	1	RIFMP
<i>Panicum miliaceum</i>	Millet	2	RIFMP
<i>Panicum miliaceum</i>	Millet	8	RIFMP
<i>Persica vulgaris</i>	Peach	5	AAA
<i>Persica vulgaris</i>	Peach	18	ASPU
<i>Persica vulgaris</i>	Peach	3	CBG
<i>Persica vulgaris</i>	Peach	6	GRI
<i>Persica vulgaris</i>	Peach	23	HSCRI
<i>Petroselinum sativum</i>	Parsley	3	GRI
<i>Phalaris bulbosa</i>	Bulbous canary grass	1	RIFMP
<i>Phaseolus aureus</i>	Mung bean	20	ARIA
<i>Phaseolus aureus</i>	Mung bean	5	GRI
<i>Phaseolus vulgaris</i>	Bean	6	ARIA
<i>Phaseolus vulgaris</i>	Bean	1	CBG
<i>Phaseolus vulgaris</i>	Bean	48	GRI
<i>Phaseolus vulgaris</i>	Bean	20	NBI
<i>Phaseolus vulgaris</i>	Bean	10	VGRI
<i>Phaseolus vulgaris</i>	Bean	35	VGRI
<i>Phleum alpinum</i>	Alpine timothy	1	RIFMP
<i>Phleum pratense</i>	Timothy	1	RIFMP
<i>Pistacia</i> sp.div.	Pistachio	5	CBG
<i>Pistacia vera</i>	Pistachio	60	GRI
<i>Pistacia vera</i>	Pistachio	19	HSCRI
<i>Pisum arvense</i>	Pea	39	NBI
<i>Pisum elatius</i>	Pea	1	ARIA
<i>Pisum elatus</i>	Pea	5	GRI
<i>Pisum sativum</i>	Pea	6	ARIA
<i>Pisum sativum</i>	Pea	39	GRI
<i>Pisum sativum</i>	Pea	25	VGRI
<i>Poa alpina</i>	Alpine bluegrass	1	RIFMP
<i>Poa bulbosa</i>	Bulbous bluegrass	1	RIFMP

<i>Poa pratensis</i>	Kentucky bluegrass	1	RIFMP
<i>Prunus cerasifera</i>	Alycha	15	GRI
<i>Prunus cerasifera</i>	Alycha	14	HSCRI
<i>Prunus cerasus</i>	Alycha	25	GRI
<i>Prunus divaricata</i>	Alycha	11	ASPU
<i>Prunus domestica</i>	Plum	7	ASPU
<i>Prunus domestica</i>	Plum	5	CBG
<i>Prunus domestica</i>	Plum	38	GRI
<i>Prunus domestica</i>	Plum	21	HSCRI
<i>Punica granatum</i>	Pomegranate	6	AAA
<i>Punica granatum</i>	Pomegranate	5	CBG
<i>Punica granatum</i>	Pomegranate	68	GRI
<i>Punica granatum</i>	Pomegranate	249	HSCRI
<i>Pyrus caucasica</i>	Pear	2	CBG
<i>Pyrus communis</i>	Pear	21	AAA
<i>Pyrus communis</i>	Pear	14	ASPU
<i>Pyrus communis</i>	Pear	69	GRI
<i>Pyrus communis</i>	Pear	165	HSCRI
<i>Pyrus communis</i>	Pear	36	NBI
<i>Raphanus sativus</i>	Radish	14	GRI
<i>Ribes nigra</i>	Black currant	2	AAA
<i>Rosa</i> sp.div.	Medicinal Rosa species	250	CBG
<i>Rubus ideaus</i>	Raspberry	3	AAA
<i>Satureja hortensis</i>	Summer savory	3	GRI
<i>Secale cereale</i>	Rye	10	ARIA
<i>Secale cereale</i>	Rye	13	GRI
<i>Sideritis montana</i>	Mountain ironwort	2	GRI
<i>Soja hispida</i>	Soybean	5	NBI
<i>Soja max</i>	Soybean	1	NBI
<i>Solanum melongena</i>	Eggplant	25	GRI
<i>Solanum melongena</i>	Eggplant	55	VGRI
<i>Solanum tuberosum</i>	Potato	40	VGRI
<i>Sorbus</i> sp.div.	Ash berry	5	CBG
<i>Sorghum andropogon</i>	Sorghum	4	RIFMP
<i>Sorghum</i> sp.div.	Sorghum	1	ASPU
<i>Sorghum vulgare</i>	Sorghum	2	GRI
<i>Spinacia oleracea</i>	Spinach	11	GRI
<i>Spinacia tetrandra</i>	Spinach	2	GRI
<i>Thea sinensis</i>	Tea	81	HSCRI
<i>Trifolium ambiguum</i>	Kura clover	1	RIFMP
<i>Trifolium hybridum</i>	Alsike clover	1	RIFMP
<i>Trifolium medium</i>	Clover	1	RIFMP
<i>Trifolium pratense</i>	Meadow clover	2	RIFMP
<i>Trifolium repens</i>	White clover	1	RIFMP
<i>Trifolium resupinatum</i>	Reversed clover	1	RIFMP
<i>Trifolium</i> sp.div.	Clover	114	GRI
<i>Trigonella foenum-graecum</i>	Fenugreek	1	ASPU
<i>Trigonella foenum-graecum</i>	Fenugreek	2	RIFMP
<i>Triticale triticosecale</i>	Triticale	63	ARIA
<i>Triticale triticosecale</i>	Triticale	65	GRI
<i>Triticum aestivum</i>	Bread wheat	820	ARIA
<i>Triticum aestivum</i>	Bread wheat	27	ASPU
<i>Triticum aestivum</i>	Bread wheat	864	GRI
<i>Triticum aestivum</i>	Bread wheat	497	NBI

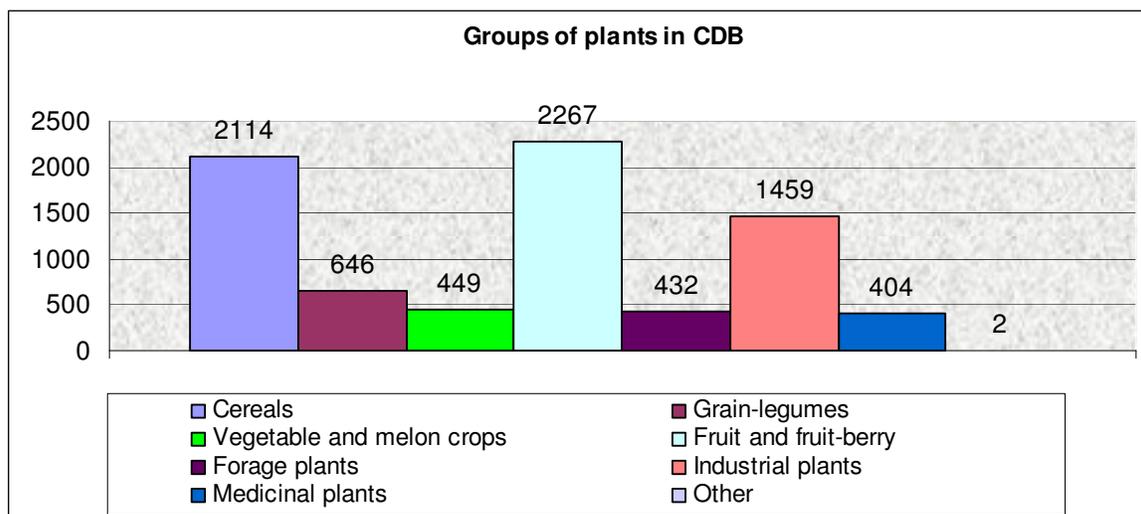
Triticum dicoccoides	Wheat	4	NBI
Triticum durum	Durum wheat	599	ARIA
Triticum durum	Durum wheat	21	ASPU
Triticum durum	Durum wheat	213	GRI
Triticum durum	Durum wheat	228	NBI
Triticum sp.div.	Wheat	12	AAA
Vicia cracca	Sweet pea	1	RIFMP
Vicia faba	Horse been	10	ARIA
Vicia faba	Horse bean	17	GRI
Vicia sativa	Sweet pea	29	ARIA
Vicia sativa	Grey pea	53	GRI
Vicia sativa	Sweet pea	1	RIFMP
Vicia villosa	Sweet pea winters	1	RIFMP
Vigna sinensis	Vigna	4	GRI
Vitis labrusca	Grapevine	2	VWMRI
Vitis vinifera	Grapevine	58	ASPU
Vitis vinifera	Grapevine	80	CBG
Vitis vinifera	Vine	181	GRI
Vitis vinifera	Grapevine	308	VWMRI
Vitis vinifera subsp. sativa	Grapevine	70	NBI
Zea mays	Maize	7	AAA
Zea mays	Maize	490	ARIA
Zea mays	Maize	549	GRI
Ziziphus jujuba	Jujube	4	CBG
Ziziphus jujuba	Jujube	36	GRI
Ziziphus jujuba	Jujube	39	HSCRI
	Annual and perennial vegetables	80	AAA
	Cereals	21	AAA
	Decorative plants	45	CBG
	Essential oily plants	5	AAA
	Forage crops	27	ARIA
	Forage plants	28	AAA
	Forage plants	5	ASPU
	Grass plants	28	GRI
	Green vegetable plants	56	GRI
	Industrial plants	31	AAA
	Leguminous forage plants	7	CBG
	Leguminous plants	25	AAA
	Medicinal plants	30	NBI
	Melons and gourds	17	AAA
	TOTAL	13,927	

APPENDIX 4.

List of crop varieties released and recognized over the past 10 years in the Republic:

Name of organizations	Name of plants	Varieties realized during last 10 years
Research Institute of Agriculture	Wheat	Azamatly-95, Nurlu-99, Mirbashir-128, Giymatli 2/17, Akinchi-84, Azeri, Tereggi, Shir-Aslan 23, Barakatly-95, Turan, Alinca-84, Gobustan, Ruzi-84, Sheki-1
	Barley	Garabagh 21, Qarabagh 22, Calilabad 19
	Triticale	Samur
	Maize	Zagatala-514, Zagatala-68
	Pea	Nail, Narmin
	Bean	AzNIIZ 352
Research Institute of Vegetable Growing	Bean	Zulallı, Sevinj
	Tomato	İlkin, İlyas, Zarrabi, Leyla, Shahin, Shalala, Banovshə
	Potato	Amiri 600
	Eggplant	Ganja
	Pepper	Murad, Shefa, Yadigar
	Cucumber	Azeri
	Onion	Sabir
Research Institute of Horticulture and Subtropical Crops	Apple	Guba shafranı, Guba Reneti, Samed Vurghun, Arzu, Teravetli
	Jujube	Xazari, Azeri
Azerbaijan Agriculture Academy	Maize	Kepez
	Tomato	Elnur
Research Institute of Forage Crops, Meadows and Pastures	Alfalfa	Aran
	Orchard-grass	Az.NİİKLİP 3
	Summer cypress	Gobustan
Research Institute of Cotton Growing	Cotton	AzNİXİ 195, Ganja 2, Ganja 8
Genetic Resources Institute	Cornel	Agh zoghal, Armudu zoghal
Research Institute of Silkworm Breeding	Mulberry	Az.NIISH 7

APPENDIX 5.



APPENDIX 6.

Modern selection varieties registered in the CDB and those developed by national scientists.

Name of plants	Total number of the varieties available in the CDB	Number of selection varieties developed by national scientists
Cotton	651	328
Wheat	354	328
Barley	113	35
Lucerne (clover)	69	9
Hazel	52	33
Fig	51	5
Apple	48	18
Tomato	35	22
Maize	26	18
Almond	27	
Pea	24	3
Persimmon	28	19
Bean	35	11
Cabbage	19	12

Landraces registered in the CDB and state of their utilization:

Name of plants	Number of landraces (folk-selection varieties) in the CDB	Number varieties currently utilized
Grapevine	572	125
Wheat	350	3
Pear	254	32
Apple	136	43
Bean	127	16
Pomegranate	72	36
Barley	67	2
Pea	62	3
Lucerne (clover)	50	2
Fig	41	14
Lentil	38	3
Hazel	34	15
Adonis	30	2
Walnut	29	21
Quince	22	5
Mulberry	21	6
Vetchling	20	2
Apricot	17	34
Cornel	15	5

APPENDIX 8.**Members of the Steering Committee for the National Information Sharing Mechanism on PGRFA**

	Name and Surname	Position
1.	Acad. Jalal Aliyev	Academician of ANAS, Member of Presidium of the Azerbaijan National Academy of Sciences, member of the National Assembly (Milli Majlis) of Azerbaijan, Head of National Program for PGR
2.	Dr. Zeynal Akparov	Director of the Genetic Resources Institute of ANAS, National Focal Point on Genetic Resources
3.	Acad. Musa Musayev	Academician of ANAS, Academic-Secretary of the Biology Sciences Section of ANAS, Director of the Zoology Institute of ANAS
4.	Acad. Vahid Hajiyev	Academician of ANAS, Director of the Institute of Botany of ANAS
5.	Dr. Asad Musayev	General Director of the Agrarian Science Center of the Ministry of Agriculture
6.	Prof. Salim Musayev	Corresponding member of ANAS, Head of a Department of the Institute of Botany
7.	Dr. Tariyel Talibov	Director of the Institute of Bioresources of the Nakhchivan Section of ANAS, member of the Parliament (Ali Majlis) of the Nakhchivan Autonomous Republic of Azerbaijan

Stakeholders participating in the Establishment of the National Information Sharing Mechanism on GPA Implementation

1. Genetic Resources Institute

Subordination: *Azerbaijan National Academy of Sciences*

Address: *155, Azadlig Avenue, Baku - AZ1106*

Tel: *(+994 12) 449 91 29*

Fax: *(+994 12) 449 92 21*

E-mail: akparov@yahoo.com

Web: www.biodiversity.az; http://www.cac-biodiversity.org/aze/aze_instgen.htm

Field of activity: *Genebank (collection of long-term conservation, midterm conservation and short-term conservation, field gene bank); plant studies; Management.*

Priority plants: *All PGRFA which are priority for Azerbaijan, including: Agricultural crop, wild crop relatives, medicinal, aromatic and oil-bearing plants*

Number of accessions in the collection: *5696*

2. Institute of Botany

Subordination: *Azerbaijan National Academy of Sciences*

Address: *40, Badamdar Street, Baku-AZ1073*

Tel: *(+994 12) 497 59 45*

Fax: *(+994 12) 497 59 45*

E-mail: botanica@baku.ab.az, v.gadjiev@yahoo.com

Web: <http://www.science.az/en/botany/index.htm>

Field of activity: *The Study of the flora; Herbarium Fund*

Priority plants: *wild flora; useful plants*

3. Central Botany Gardens

Subordination: *Azerbaijan National Academy of Sciences*

Address: *40, Badamdar Street, Baku-AZ1073*

Tel: *(+994 12) 438 11 72*

Fax: *(+994 12) 438 11 72*

E-mail: cbg@lan.ab.az; vahid.botany@bakililar.az

Web: www.aznabatat.com

Field of activity: *Botanical Gardens; plant studies; Laboratory.*

Priority plants: *All PGR priority for Azerbaijan*

Number of accessions in the collection: *512*

4. Institute of Bioresources

Subordination: *Nakhchivan Section of Azerbaijan National Academy of Sciences*

Address: *10-Babek Street, Nakhchivan - AZ7000*

Tel: *(+994 99) 45 05 01*

Fax: *(+994 99) 446580*

E-mail: tarivel_talibov@box.az, ttalibov@yahoo.com

Field of activity: *Botanical Garden; the study of the flora; Gene Bank (short-term conservation);*

Priority plants: *wheat, barley, pea, bean, lentil, fruit plants, wild flora, useful plants/crops, medicinal crops*

Number of accessions in the collection: *1043*

5. Research Institute of Agriculture

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*

Address: *Pirshaghi Village, Farm N 2, AZ1098*

Tel: *(+994 12) 4974931; 5516130*

Fax: *(+994 12) 4974931*

E-mail: talai_akinchi@box.az

Field of activity: *Selection; crop studies; Seed production; Gene Bank (moderate- term conservation);*

Priority plants: *wheat, barley, triticale, maize, tobacco, leguminous plants*;
Number of accessions in the collection: 2490

6. Research Institute of Cotton Growing

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*
Address: *Samukh, Institute Settlement, Ganja, AZ4788*

Tel: (+994 22) 59 54 79

E-mail: faxm@rambler.ru

Field of activity: *Selection; crop studies; Gene Bank (short-term conservation)*;

Priority plants: *Cotton*

Number of accessions in the collection: 680

7. Research Institute of Vegetable Growing

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*
Address: *Pirshaghi Village, Baku, AZ1098*

Tel: (+994 12) 451 61 14

Fax: (+994 12) 497 21 36

E-mail: azetti@bakinter.net

Field of activity: *crop selection; crop studies; Gene Bank (short-term conservation); seed production*;

Priority plants: *tomato, cucumber, onion, garlic, bean vegetables, potato, water-melon, melon, pumpkin, other vegetable, leaf vegetables*

Number of accessions in the collection: 578

8. Research Institute of Viticulture and Wine-Making

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*
Address: *Mehdiabad Village, Baku- AZ0100*

Tel: (+994 12) 443 53 31

Fax: (+994 12) 495 59 06

Field of activity: *grape selection; crop studies; Field Gene Bank; wine processing technology development*

Priority plants: *Grape*

Number of accessions in the collection: 310

9. Research Institute of Forage, Meadows and Pastures

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*
Address: *Low Guzdek Village, Baku- AZ0111*

Tel: (+994 12) 443 96 28 and 443 97 71

Fax: (+994 12) 443 96 28

E-mail: rasib620@box.az

Field of activity: *Selection; crop studies; Gene Bank (short-term conservation); Field Gene Bank*

Priority plants: *clever, sainfoin, orchard-grass, oat and other forage crops*

Number of accessions in the collection: 189

10. Research Institute of Horticulture and Subtropical Plants

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*
Address: *Zardabi Settlement, Guba, AZ3171*

Tel: (+994 169) 4 41 17; 4 43 41

Fax: (+994 50) 319 43 70

Field of activity: *Selection; crop studies; Field Gene Bank*;

Priority plants: *apple, pear, quince, fig, almond, pistachio, walnut, hazelnut, chestnut, apricot, alycha (cherry-plum), plum, sweet cherry, cherry, citrus fruits, medlar, pomegranate and other fruit and fruit-berry plants*

Number of accessions in the collection: 1519

11. Research Institute of Silkworm Breeding

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*

Address: 45-Khatai Street, Ganja, AZ2002

Tel: (+994 22) 55 76 57

Field of activity: *Selection; crop studies; Field Gene Bank;*

Priority plants: mulberry

Number of accessions in the collection: 322

12. “Araz” Scientific –Industrial Amalgamation

Subordination: *Agrarian Science Center of the Azerbaijan Ministry of Agriculture*

Address: *Nakhchivan City*

Tel: (+994 50) 424 90 67, (+994 99) 45 27 03

Field of activity: *Selection; crop studies; Seed production; Extension activities; Gene Bank (short-term conservation); Field Gene Bank;*

Priority plants: *wheat, barley, clever, apple, pear, quince, fig, walnut, hazelnut, apricot, alycha, plum, sweet-cherry, cherry, pomegranate and other fruit and fruit-berry plants*

Number of accessions in the collection: 284

13. Azerbaijan Academy of Agriculture

Subordination: Ministry of Education of the A.R.

Address: 262- Ataturk Avenue, Ganja, AZ2000

Tel: (+994 22) 56 17 31

Fax: (+994 22) 56 03 53

E-mail: ramil_78@rambler.ru

Field of activity: *Education; Selection; plant studies; Gene Bank (short-term conservation); Field Gene Bank;*

Priority plants: *wheat, maize, barley, apple, pear, quince, fig, walnut, hazelnut, apricot, alycha, pomegranate and other fruit and fruit-berry plants, annual and perennial vegetable crops*

Number of accessions in the collection: 304

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