



AZERBAIJAN:

COUNTRY REPORT TO THE FAO INTERNATIONAL TECHNICAL CONFERENCE ON PLANT GENETIC RESOURCES

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CHAPTER 1

Introduction to Azerbaijan Republic and its Agricultural Sector

*"The Lord mixed the ashes with
water And created his palace of clay"*
Imadeddin Nasimi (XIV Century)

The Azerbaijan Republic which has the territory of 86,600 square kilometres and the population of 7,200,000 is situated in the southern part of the subtropical zone that runs across the mountain slopes of the Great and the Lesser Caucasus, with its eastern border line, 800 km long, running across the water table of the Caspian Sea. In the north Azerbaijan borders on the Russian Federation, in the north-west and in the west - on Georgia and Armenia, in the south - on Turkey and Iran. The Nakhichevan Autonomous Republic is a part of the Azerbaijan Republic. Almost half of the territory of Azerbaijan is occupied by the mountains. 27 per cent of the area is 1,000 m above sea-level and 18 per cent - below sea-level. The vast expanse of the Kura-Araz Lowland is a granary of Azerbaijan, while the mountain systems of the Great Caucasus, the Lesser Caucasus, and the Talysh, which are extremely rich in minerals, are covered with forests and meadows.

Soil, Climate, Water Resources

Since the occurrence of highlands is a characteristic feature of the country the types of climate vary from a climate of moderately warm deserts and dry steppes with dry summer to that of mountain tundras. Almost all types of soils which are met all over the world can be found here. In the lowland there are grey and meadow-grey soils, in the area of foothills mountain-chestnut and mountain-black soils, and in the mountain area grey-brown and mountain-meadow turf soils. Over 80 per cent of the crop is grown on irrigated land. An annual reserve of water resources amounts to 25-30 billion cu m of which 8-10 billion cu m are only used in the agricultural sector. The main forest-forming species of the country are beech, oak and hornbeam, with 85 per cent of the forests having been formed with the said species. The beech forests take up 32 per cent of the whole forest area of the country and are spread in the zone of the Great Caucasus, the Lesser Caucasus, and the Talysh. The oak forests can be found in all the forest tracts of the country. The hornbeam forests stretch in



the areas of mountain-forest tracts, foothills and lowlands. The total area of the forests is 1,213,700 hectares. Forests take up about 11 per cent of the country's territory. The common average increase in wood is low (1.45 million cu m).

An annual per hectare increase in ancient stock of forests in the republic is 1.83 cu m, including 1.80 cu m in that of hard-deciduous forests and 2.1 cu m in that of soft-deciduous ones. Such a low common average increase in both wood and stock of forests is to be generally attributed to the fact that a considerable area is taken up by the sparse forests and those having inferior "bonitas" characteristics, and that the economic activities of Man can hardly be considered rational. A certain kind of work is being done in the republic to grow the forests by utilizing the indigenous aboriginal species and the introduced ones. Yet, the area of the forest tracts is likely to decrease. Azerbaijan is to be referred to those countries of the world in which irrigation-based agriculture numbers a few thousand years. Long ago the country was capable of not only meeting the requirements of its population in agricultural products but also of exporting the produce of cotton-growing, sericulture, grapes, rice, fruit (including subtropical one).

The priority of developing the most of these trends is being maintained nowadays, though much importance is attached to the development of grain farming, cotton-growing, vegetable-growing, tea-growing and a number of trends of subtropical farming. The natural (including bioclimatic) agricultural potential of Azerbaijan is enormous. About 60 per cent of the territory of the republic is situated in the subtropical, zone, up with the sum of active temperatures exceeding 38-40°C. There are considerable thermal resources in the tree of foothills and partially in the middle-mountain zone where viticulture, grain farming, tobacco growing, horticulture (including various kinds of nuts) are the main trends of agricultural production. Large areas are used as pastures.

About 80 per cent of them, being located on the territory of plains and foothills, are to be referred to winter ones, while those located in mountains are considered to be summer pastures. Their lower boundary is at the height of 1,700-1,800 m and their upper boundary - about 3,500 m above sea-level. The industrial agroclimatic division of the territory into districts to determine both the belts versus the availability of thermal resources and the areas to be irrigated, has made it possible to specify the areas for basic crops, including such valuable crops as olive, pomegranate, fig, almond and persimmon.

Agriculture in the Azerbaijan Republic is of a diversified nature. Its key branches are cotton-growing, grain farming, viticulture, and vegetable-growing. At the same time all branches of cattle breeding is being developed in



the republic. The agricultural reform carried out in the republic is aimed at creating farms and small peasant farms. The main trends of the agrarian policy of the state nowadays lie in the transition to multi- structural economy and marketing.

On the whole, the republic has produced 1.4 million t of grain, 850 thous.t of cotton-wool, 65 thous.t of tobacco, 300 thous.t of potato, 900 thous.t of vegetables, 150 thous.t of water-melons, melons and gourds, 500 thous.t of fruit, 1.6 million t of grapes, 40 t of tea leaves. The level of agricultural production does not make it possible to meet the requirement of the population of the republic. Thus, the volume of grain realized by the farms and collective farms only constitutes 35-40 per cent from that required. The basic reason for a low level of agricultural production lies in a low crop capacity. On the whole, the average per hectare yields in all the farms and collective farms of the republic have been as follows centres (cent.) of grain. 25 cent. of cotton-wool, 40 cent. of tobacco, 50 cent. of cotton-wool, 230 cent. of vegetables, 100 cent. of water- melons, melons and gourds, 50 cent. of fruit, 100 cent. of grapes, 40 cent. of tea leafs. The republic exports 85 per cent of cotton-wool, 70 per cent of tobacco, 90 per cent of wine and other produce.

The republic produces the high-quality seeds of agricultural plants, i.e. cereals, leguminous plants, oil-yielding crops, vegetables industrial crops, and fodder crops. An efficient network of institutions has been created in the republic to solve the problems of selection and seed-growing. The research institutes (the authors of the existing seed varieties) produce the required quantity of seeds of the best and super specimens in the nurseries of primary seed-growing. The high quality and highly productive seeds of agricultural crops grown in them are distributed for reproduction among the specialized seed-growing farms of the second echelon situated in various regions of the republic. In accordance with the zonal pattern of land cultivation the said seeds of the best specimens and those of the first reproduction obtained are distributed by the Ministry of Agriculture among the district farms for the second and third reproduction to satisfy their needs in them. This procedure of seed distribution has proved efficient.

The original seeds of the previously delivered varieties are being periodically imported to the republic for renovation in order to preserve their biological and economically valuable features and properties. There are enough seeds to supply the farms of the republic with the fruit-tree seedlings. They are grown in 8 nurseries functioning in various soil-climatic zones of the republic.

The grafts and seeds for these nurseries are taken from the material gardens. No seeds are imported to the republic from abroad. Natural calamities (drought, downpour, hail), plant diseases, shortage of aerotechnical means and



that of organic manure and mineral fertilizer, in availability of pesticides in the areas of mountains and foothills decrease the crop capacity and bring about losses which constitute 40-50 per cent. Diversified agriculture and multiplicity of natural conditions favour a mass reproduction of various specific pests and weeds and spread of diseases which cause a serious damage to the agricultural crops. To eliminate them, an integrated system of measures, combining aerotechnical biological and chemical methods of pest control, has been worked out to be applicable for various zones of the republic. A great damage to the fruit-growing of the republic has been lately done by quarantine pests such as *Diaspidiotus perniciosus* Comst., *Hyphantria cunea* Drury, *Grapholitha inglesta* Busck. No chemical preparations are available in the republic to be used against them, that is why the fruit yield has sharply decreased. The second reason for fruit-yield drop accounts for ineffective implementation of agrotechnical measures. The fruit trees of indigenous varieties grow well even under unfavourable conditions and keep on growing and yield better than those of introduced varieties.



CHAPTER 2

Indigenous Plant Genetic Resources

*You have cognized the word of the
Lord but you are not a wise man yet, even
if you are not a wise man you will not be beast.*
Imadeddin Nasimi.

2.1 FLORA

Azerbaijan has a rich flora (5,000 species) of supreme, cryptogamic and flowering plants. The richness of flora is to be attributed to the exceptional variety of physical-geographic and natural-historical conditions of its territory as well as to the complicated history of flora whose formation was greatly affected by the neighbouring and even far remote floran areas.

The land of Azerbaijan is rich in relic species referred to the Tertiary period; their specimens can be found in all the zones of the republic but the majority of them are concentrated in the area of the Talysh. To be referred to the tertiary relic species are *Parrotia persica*, *Albizzia julibrissin*, *Quercus castaneifolia*, *Zelkova hyrcana*, *Z. carpinifolia*, *Diospyros lotus*, *Ruscus hyrcanus*, *Danae racemosa*, *Buxus hyrcana*, *Ilex hyrcana* and many others. Besides, over 240 endemic species can be found here. The flora of Azerbaijan has the specimens of all the types of the area, i.e. ancient-forest, boreal, steppe, xerophile, desert, Caucasian, and adventive ones. The historical process of forest vegetation development and formation in Azerbaijan was long and complicated. In the geological past there were tropical and subtropical forests here. Then, boreal forest vegetation has brought here in the course of ice formation.

The survived subtropical and mezophile forest species gradually adapted themselves to the new ecological conditions and changed substantially. That was due to climatic variations and an exeter increasing effect of anthropogen factor on forest biogeocoenosis. Consequently, the processes of the formation of species on the basis of the Caucasian flora and that of the other one kept going in Azerbaijan (and still keep going) during the whole historical period,



Azerbaijan is considered to be a complicated and quite diverse territory in natural respect. It has been sufficiently studied and intensively developed.

The forest resources have been exploited for a long time. The arboreal and shrub flora of Azerbaijan is notable for its richness. It is represented by 435 species of trees and shrubs which constitute 11 per cent of the whole flora of the republic. *Fagus orientalis* Lipsky plays the most significant role in the formation of forests.

The beech forests occupy 32 per cent of the whole forest area of the republic. They are well preserved. Within the territory of Azerbaijan they can be found in the areas of the Great Caucasus, the Lesser Caucasus and the Talysh. The forests in which oak prevails can be met in all the forest tracts, in the lowland, and along the mountain slopes.

The following species are to be referred to forest-forming oak: - *Quercus longipes* Stev. (in lowlands), *Quercus iberica* Stev. (within the lower mountain forest belt) - *Quercus castaneifolia* C.A.M. (in some Talysh regions, in the lowland and in the areas of high mountains, and partially in the area of foothills in the zone of the Great Caucasus). In addition to the said principal species, *Q. pubescens* W., *Q. araxina* Gressh., *Q. castaneifolia*, *Q. hypochrysa* Stev., *Q. crispata* Stev. can be found in some restricted areas.

The hornbeam forests (*Carpinus caucasica*) can be met in all the areas of the mountain forest tracts, foothills and lowlands. All the three species are the principal forest-forming ones. They constitute 85 per cent of all the forests of the republic. In addition to the said species, one can meet other valuable species in the forests of Azerbaijan, such as *Acer campestre* L., *Alibericum* M. B., *A. laetum* C. A. M., *A. platanoides* L., *A. Trautvetteri* Medw. *A. velutinum* Boiss., *Alnus barbata* C.A.M., *A. incana* Moench, *A. subcordata* C.A.M., *Betula litwinowii* A. Dol., *B. pendula* Roth., *Betula raddeana* Trautv., *Castanea sativa* Mill., *Celtis caucasica* Wild., *Diospyros lotus* L., *Fraxinus excelsior* L., *F. coriariaefolia* S., *F. oxycarpa* W., *Juglans regia* L., *Parrotia persica* C. A. M., *Pinus eldarica* Medw., *Pinus hamata* D. Sosn., *Pistacia mutica* F. et M., *Platanus digitifolia* Palib., *Populus* L., *Tilia caucasica* Rupr., *Zelkova hyrcana* Grossh., *Z. carpinifolia* Dipp. etc. Along the southern slope of the Great Caucasus and in the areas of foothills of the Lesser Caucasus and in the Talysh region as well, one can find sparse forest tracts stretching for scores of kilometers. They consist of *Pyrus sp. div.*, *Malus.*, *Prunus divaricata* Led., *P. spinosa* L., *Crataegus sp. div.*, *Corylus avellana* L., *Cornus mas* L., *Morus alba* L., *Morus nigra* L. and a lot of other species related to the drupe, seed and berry varieties. *Fagus orientalis* Lipsky and various species of oak grow in the mountain zone at a height of 600-1,600 m. The inhabitants of the nearest



regions make use of oak-tree acorns and beech seed. Besides these species, *Ficus hyrcana* L. and *Cydonia oblonga* Mill. here and there can be found in the Talysh mountains. The brushwoods of *Sorbus sp. div.*, *Vitis vinifera* L., *Zizyphus jujuba* Mill. are represented at the foothills of the Great and the Lesser Caucasus. There is a great industrial reserve of the fruit of *Berberis vulgaris* L., *Ribes biebersteinii* Ber., *Mespilus germanica* L. 30 regions of the Republic are extremely rich in *Rubus sp. div.*, *Rosa sp. div.*, *Fragaria vesca* L., *Sambucus nigra* L., *Elaeagnus angustifolia* L. is widely spread in the lowlands while *Hippophae rhamnoides* L. can be met in the nearbank areas of about ten large. In the sub-Alps and the Alps of the Great and the Lesser Caucasus there are tens of thousands of tons of *Vaccinium myrtillus* L., *V. vitis-idaea* L. and other species. It is to be noted that the great number of those mentioned above are the endemic ones which only grow in Azerbaijan. Moreover, all the potential of the fruit trees, such as *Cydonia oblonga* Mill., *Punica granatum* L., *Prunus divaricata* Led., *Cerasus ovium* Moenh. and others, judging by the results of repeated studies is concentrated in the republic.

Here, in Azerbaijan, a mighty process of form development manifests itself in full within the limits of Linney species, i.e. from typically wild to extremely gigantic kinds of quince, pomegranate, sweet cherries, cherry-plum. One can observe the form development of such species as *Diospyros lotus* L. the species of the *Pyrus*, *Cerasus*, *Amygdalus*, *Cetlis*, *Ficus*, *Corylus* and many others.

The flora of the republic is represented by:

- a. the root-vegetable species (in the semi-deserts of Gobustan and in the Kura-Araz lowland) and the species of *Bongardia*, *Beta*, *Arctium*, *Allium*, *Crocus*, *Rumex*, *Scozzonnora*, *Nelubbium* (in other regions of the republic), about 100 species of plants in all;
- b. the leaf and caulescent vegetable species (in all the regions, very popular with the population). The species of the *Allium*, *Amaranthus*, *Angelica*, *Arctium*, *Arum*, *Asparagus*, *Atriplex*, *Brassica*, *Copsella*, *Eremurus*, *Prangos*, *Urtica*, *Rheum*, *Solanum*, *Symphytum*, *Tilia* and some others are to be referred to them, about 150 species of plants in all;
- c. the spice species, i.e. *Anethum*, *Apium*, *Armorocia*, *Artemisia dracunculus*, *Brassica*, *Calamintha*, *Carum*, *Coriandrum*, *Crocus*, *Sativus*, *Daucus*, *Foeniculum*, *Glycyrrhiza*, *Lepidium*, *Melissa*, *Mentha*, *Nepeta*, *Origanum*, *Pimpinella aromatica*, *Saxifraga*, *Pistacia*, *Polygonum*, *Rhus*, *Salvia*, *Satureia*, *Sinapis*, *Thynus, sp. div.*, *Ziziphora* and many others (in all the regions of the republic), 75 species in all. The flora of the Republic is represented by some plants whose fruits and leafs are used both as the tea and coffee substitutes and as the components of beverages (*Berberis vulgaris*, *Rubus sp.*,



Ribes, *Pyrus sp. div.*, *Punica granatum*, *Malus sp. div.*, *Origanum vulgare*; *Arctium lappa*, *Asparagus officinalis*, *Cichorium intybus*, *Cornus mas*, *Corylus avellana*, *Crataegus sp. div.*, *Fagus orientalis*, *Hedera helix*; *Chamaenerium angustifolium*, *Dryas caucasica*, *Filipendula ulmaria*, *Fragaria vesca*, *Polygonum alpestre*, *Oxalis acetosella*, *Tilia caucasica*, *Vaccinium sp. div.*, *Rubus sp. div.*) and alcoholic drinks and vinegar (*Carum carvi*, *Betonica officinale*, *Betula sp. div.*, *Heracleum sp. div.*, *Hippophae rhamnoides*, *Cydonia oblonga*, *Humulus lupulus*, *Thymus sp. div.*). The oils extracted from the seeds of the plants (*Capparis spinosa*, *Carthamus sp. div.*, *Onopordon acanthium*, *Silybum marianum*, *Xanthium strumarium*) can be used in food cooking. The starch flour can be obtained from the underground nuts of wild plants (*Butomus umbellatus*, *Nelumbium caspicum*, *Iris sp. div.*, *Phragmites communis*, *Arum sp. div.*, *Typha angustifolia*, *Sorgum halepense*) and others. Some of the wild plants bear good quality grain fit for food, i.e. *Amaranthus sp. div.*, *Chenopodium sp. div.*, *Eolegnus giganteus*, *Hordeum spontaneum*, *Latyrus cicera*, *Lotus corniculatus*, *Pisum clatius*, *Echinochloa crusgali* here are over 20 species of melliferous plants (*Tilia sp. div.*, *Acer sp. div.*, *Clematis sp. div.*, *Cornus mas*, *Hippophae rhamnoides*). There is a great number of fodder crops in the Republic which can be found in all the zones, i.e. from lowlands to highlands, though the quality of fodder grass differs conspicuously.

The plants of this species can be divided into those of:

- a. deserts and semi-deserts (*Aeloropus sp. div.*, *Aegilops sp. div.*, *Agropyrum sp. div.*, *Agrostis sp. div.*, *Alopecurus sp. div.*, *Atropis sp. div.*, *Avena sp. div.*, *Eromopyrum sp. div.*, *Hordeum sp. div.*, *Poa bulbosa*, *Zerna tedorum*, *Medicago sp. div.*, *Onobrychis sp. div.*, *Salsola sp. div.*);
- b. steppes (*Bothriochloa ischaemum*, *Festuca sp. div.*, *Echinochloa sp. div.*, *Cala magrostis sp. div.*, *Bromus sp. div.*, *Koeleria sp. div.*, *Lolium sp. div.*, *Stipa sp. div.*);
- c. forests (*Dactylus glomerata*, *Phalaris sp. div.*, *Poa montana*, *Zerna rubens*, *Melilatus sp. div.*, *Carex sp. div.*);
- d. sub-alps and alps (*Briza sp. div.*, *Festuca sp. div.*, *Nardus striceta*, *Melium*, *Phleum sp. div.*, *Poa alpina*, *Poa pratense*, *Zerna variegata*, *Hedysarum sp. div.*, *Lathyrus sp. div.*, *Teifolium sp. div.*, *Carex sp. div.*).

Few countries, inclusive of Azerbaijan, might boast of such a large amount of wild plants used in folk medicine.



The flora of Azerbaijan is rich in:

- a. cardiacs (*Digitalis sp. div.*, *Adonis vernalis*, *Periploca graeca*, *Erysimum sp. div.*, etc.);
- b. vascular remedy (*Ephedra sp. div.*, *Viscum album*, *Senecia sp. div.*, *Gnaphalium sp. div. sp.div.*, etc.);
- c. styptic remedy (*Viburnum*, *Achillea milliefolium*, *Polygonum sp. div.*, *Capsella bursa-pastoris*, *Rumex sp. div.*, etc.);
- d. nervous system stimulants (*Peganum harmala*, *Papaver orientale*, *Pyrethrum sp. div.*, *Salvia sp. div.*);
- e. nervous system sedatives (*Valeriana officinalis*, *Leonorus sp. div.*, *Atropa caucasica*, *Datura stramonium*);
- f. diuretics (*Betula sp. div.*, *Asparagus*, *Primula*, *Arctium*, *Equisetum*, etc.).

2.2 CULTIVATED PLANTS

Agriculture in Azerbaijan is one of the ancient branches. The farms, irrespective of the type they belong to, grow the plants of aboriginal, selective and introduced series. The high yielding intensive varieties of the majority of cultures have been developed and introduced in the Republic for a comparatively short period of time. Cereals, i.e. wheat, barley, triticale, rye, oats, rice, maize are the principal cultures to take up over 500 thous. hectares of the area under crop. The grain yield in good years amounts to 26 cent. per hectare, with the gross yield of grain being 1,400 t. Wheat (*Triticum*) grows in all parts, i.e. in the areas of lowland (below sea level) and in those of highland (up to 2,000 m above sea level). Such a scope of cultivation leads to a zonal distribution of the species and varieties of wheat. The recent hybridization of short-stature varieties of the world genetic fund has made it possible to develop and distribute among the districts of the Republic the intensive varieties of hard wheat (*Tr.durum*), such as Mirbashir-50, Garagylchyg-2, Terter, Vugar, Shiraslan-23, and some others. For the most part, the wheat of these varieties grows in the lowland and foothill areas. The hard wheat (*Tr.durum*) of the indigenous varieties, such as Sary bugda, Ag bugda, Garagulchyg, Gara bugda and some others, has also been sown in the said areas. The soft wheat (*T.aestivum*) of the zonal varieties, such as Perzivan-1, Mirbashir-128, Aran and the; introduced varieties of Spartanka, Olimpia-2, and Bezostaya-1 has been sown in the areas of lowlands, foothills and mountains. The soft wheat of the old varieties of folk selection, such as Gurgane, Khyrda bugda. Ghyrmyzy



bugda, Kosa bugda, *Betula sp. div.*, *Asparagus*, *Primula*, *Arctium*, *Equisetum* Zardabugda, etc., was sown at one time. The intensive low-stature varieties developed by the selectionists are resistant to strong winds and diseases and are capable of assuring a yield of 50-60 cent. per hectare provided that the farms are supplied with sufficient amount of farm machinery and irrigation job is done properly. About 50 per cent of all the area sown to wheat falls on the said varieties. They no doubt are good varieties, but even their adaptability, whatever high it may be, can not assure the highest possible yields in all the soil climatic zones because they differ conspicuously and where there is a shortage of fertilizers, pesticides, and water for irrigation.

Barley (*Hordeum sativum* L.) is the principal forage culture. Its high-yielding zonal intensive varieties, such as Karabag-7 and Karabag-21, and the introduced varieties (Cyclone, Roland, Rosaria and Babylon), as well as Pallidum-595, a variety of the indigenous selection, are grown in the Republic. Some varieties of folk selection Ag arpa, Kara arpa, Nutans have also been grown.

Rye (*Secale cereale* L.). The Mirbashir-46 variety has been developed on the basis of the indigenous population and found its practical application. As to Triticale, there are no practically applicable varieties, though Layagatly-2/17, its intensive, high-yielding variety developed. is with the State Commission on variety tests. Rye and Triticale are more resistant to severe conditions and grow in the areas of mountains and foothills.

Oats (*Avena sativa* L.). Azerbaijan-60, its only . variety developed from the indigenous population through selection, has found its practical application. Maize (*Zea Maus* L.). The old varieties of folk selection (Zakataly yellow-grain, Kremny-, Khodzhaly-, Khudat white-grain, Tauz red-grain-, Kuba white-grain ones) were sown until sixties. The Zakataly improved variety of the grain and silo type has lately been developed through selection and has found its practical application.

Rice (*Oryza sativa* L.) is a traditional grain crop. It is used in cooking 36 national kinds of pilau and various dishes. Rice of old varieties, such as Sadri, Masally, Albarbu-white, Etimi, Vilkidzhiri, Ambarbu-autumnal, Mollai, Kosa, Usha, Mamedali, Akula, etc. was sown in some areas. The said varieties were more than once demonstrated at various international exhibitions and won four medals. The varieties of Sadri, Masally, Ambarbu-white, etc. were famous for their quality. The development of cotton growing (1928), tobacco-growing (1929) and vegetable-growing (1963) resulted in that the areas under rice crop in Azerbaijan shrank sharply, and since 1978 the sowing of rice ceased completely. At that time such rice varieties as Aresh, Akkylchyk-36,



Akkylchyk-44 and Azros-637 were developed and applied. Since 1992 the solving of rice in the Republic renewed and the areas under rice crop widened. *Leguminous cultures*, i.e. *Cicer arietinum* L., *Haricot lentil* L., have long been cultivated and are the basic traditional cultures to be widely used in national cooking. The area under *Cicer arietinum* L. is up to 8,0 thous. hectares. Its old varieties of folk selection (white-seed indigenous-, Astrakhanbasar indigenous ones) grow chiefly in a private sector. The zonal varieties (AzNIIZ-304, AzNIIZ-3Q3) have been cultivated in the collective and state farms. These high-stature varieties are fit for a mechanized harvesting. The yield is 9 cent. per hectare on the average.

Haricot (*Phaseolus vulgaris* L.) grows in a private sector. Its various parti-coloured forms and indigenous varieties (Local Dasta, Local Lagher, Talin, Chillobia, Chil-piada, Karmir-lobia, etc.) are sown in many areas. Galibiat local and Piada local have been developed on the basis of the common haricot population through selection and have found their practical application.

Lentil (*Lens esculenta* L.), both small-seed (*ssp. microsperma*) varieties (Azer and Mergi) and large-seed (*ssp. macrosperma*) ones grow in a private sector. Soybean (*Glycine hispida* (Moench) Maxim.). Its Plamya variety is used. As to lunin (*Hupinus albus* L.), there are no varieties used. As far as tobacco is concerned, its varieties (Zakataly-67, large-leaf - Zakataly) have found their practical application in the Republic to take up 60 per cent of the total area under tobacco crop. The introduced varieties (large-leaf Immune-580, Medium-leaf - Trapezond-289, small-leaf Samsun-155 and Kokker-347 of the Virginia type) are cultivated in addition to them. Cotton. Its fine-fibre varieties (2,421, 2,421-improved, 2,833, 3,312, 3,038, Agdash, AzNIKhI-33, Mugan-395, AzNIKhI-104, AzNIKhI-170, etc. whose fibres of the IV and V types are the raw materials for knitted wear industry have found their practical application, inclusive of the MOS-620 fine-fibre variety. The shortage of farm machinery, fertilizers, pesticides is the cause, of the drop in cotton harvest. Vegetables and water melons, melons and gourds take up but 40 thous. hectares of the area under crop. As to tomato, its varieties (Shafag-49, Sevimly, Elim, Ilkin, Vetin-1) have found their practical application. Its old varieties of folk selection (Karatag and Gala) are sown in a private sector. The average per hectare yield is 220 cent., with the gross yield being 260 thous.t.

Auberdine (*Solanum melonena*). Its Zakhra variety, is used. The Gara auberdine and the Lenkoran and Akhsu -indigenous ones grown a private sector. The yield is 180 cent. per hectare, the gross one being 15 thous.t. Pepper (*Capsicum annuum*). Its varieties (Murad sweet pepper and Gek-ghel bitter pepper) have found their practical application. The yield is 160 cent. per hectare, the gross one being 1,200 t.



Cabbage (*Brassica capitata*). Much attention is focused on the indigenous varieties (Derbent and Absheron). The yield is 250 cent. per hectare, the gross one being 250 thous.t.

Cauliflower (*Brassica cauliflora*). Its varieties, i.e. Garantiya, Luvar-74, Adler-679, Spring Adler, Sochi have found their practical application. Two varieties of carrot are used, i.e. winter Absheron for sowing in summer, and Jubilee for sowing in spring (indigenous population).

Cucumber (*Cucumis sativus* L.). The most popular varieties of folk selection are Kirovabad-indigenous, Lencoran-indigenous, Shakh-khiyar (Nakhichevan), etc. They grow mostly on small peasant farms. The yield is 150 cent. per hectare, the gross one being 21 thous.t. The onion folk selection varieties (Masally-indigenous, Masally-white, Flat /Gyanja/, Imishly, Chatal sogan, etc.) are grown in all the vegetable-growing zones of the republic, basically in a private sector. The Kuba-Kusarchai, winter-Kusarchai, Sadaf, Shakhla and Pirshaghi selective varieties are also sown on the collective and state farms. The gross yield is 25 thous.t, the yield being 80 cent. per hectare.

Garlic (*Allium sativum* L.) grows both in private and state sector. The indigenous population varieties, i.e. Shekiindigenous, Kusarchai-indigenous, Shemakha-indigenous, Nakhichevan-indigenous. etc. are very popular. The Jalilabad variety is also grown in all the zones of the republic. The gross yield amounts to 1,100 t, with the yield being 40 cent. per hectare.

Two varieties of *Ph. vulgaris*, L.(Zulal, Sevindge) and one variety of *P. sativum* (Fidan) are grown, with horse bean variety being sown on farms and in private sector. Greens have long been cultivated on farms and personal : plots to be used for food as sauce and spice. Most of them are very popular all over the world, i.e. green lettuce and heads of lettuce, celery, dill, basil, tarragon, mint, sorrel, caraway, spinach, mustard, water-cress, etc. Some of them are traditionally used in the republic, *Citrullua edulis* Pang. and *Cucumis melo* Pang. are basic varieties cultivated. The watermelon honey (bekmez) was made of water melon in the remote past. The indigenous varieties of folk selection, such as Shamkhor garpyzy, Samukh garpyzy, Gara garpyz, Sadai, Jafarkhan garpyzy, Zire Chili, Ag Zire, Pishraz, Gasymkhan garpyzy, etc. were cultivated at that time. During the seasonal period the markets of the cities of Gyanja, Sumgait and Baku are full of the fruit of those varieties delivered from the Shamkhor, Sabirabad, Saintly, Imishly, Agjabedy and some other regions. The cultivation of melon was prevalent in the area of the Near-Kura lowland, in the Kurdamir and Akhsu regions, in the small borough of Garasaggal of the Sarnukh region, in the Nakhichevan Autonomous Republic, on the Absheron peninsula, which are noted for their specific favourable soil-climatic



conditions. The early melon came to the market from the small borough of Garasaggal of the Samukh region, and the fruit of the Bilerjin and Dostujan varieties of the Kurdamir and Akhsu regions as well as that of the Narynjy and Gasanbeki ones grown in Nakhichevan were well preserved almost until the end of winter. Some fruit of the Bilerjin variety. was preserved until a net harvest. Since olden times water melon was grown in the Nakhichevan Autonomous Republic by a method of "dutma" lying in that the only ovary of the bush was covered with earth to protect it from a melon fly., to increase sugar content and to improve gustatory properties. The final produce obtained with the said method was exported in great amount. The Alamdar, Gamkar, Agnabad, Narynjy, Gasanbeily and some other varieties have been selected or developed to grow melon by the "dutma" method. The fruit of these varieties contains more dry substances, possesses excellent gustatory properties, has a fine odour and is fit both for being used in a fresh form and for drying. It can also be used for jam-making while its Narynjy and Gasanbeki varieties are designed for a long preservation. Also the fresh, delicate fruit of these varieties called "duz gyrasy" by the local population may be used as cucumber in a fresh form or for pickling. In addition to the said varieties edible gourd, vegetable marrow, etc. are widely grown on farms and personal plots.

Potato (*Tuberosum*). Its Nevski, Ogonyok, etc. varieties are used. The old indigenous varieties are sown together with those imported from Russia and Ukrain. The yield is 80 cent. per hectare, the gross yield being 120 thous.t.

The history of horticulture takes root in the remote past. Despite the diversity of fruit species and varieties their distribution is very harmonic from the viewpoint of their geographical location. As horticulture progressed, a number of large economic zones became the areas of specialized fruit growing, i.e. the Kuba-Khachmas zone divas specialized in seed-fruit cultivation, the Nakhichevan Autonomous Republic in drupe-fruit growing, the Sheki-Zakataly zone - in nut-fruit growing, the Low-Shirvan and Absheron - in subtropical fruit growing, and the Lenkoran zone - in citrus fruit cultivation. The fruit orchards in the republic occupy about 136 thous. hectares, including 113 thous.hectares taken up by the fruit-bearing ones. Of the total orchard area, 48 thous. hectares are intended for the seed-fruit orchards, 23 for the drupe-fruit ones, 30 thous.hectares - for the nut-fruit ones, 33 thous.hectares - for the subtropical-fruit ones, and 0.9 thous.hectares - for the citrus-fruit orchards.



Seed-fruit species:

Apple (*Malus*) is basically cultivated in the Kuba-Khachmas and the Sheki-Zakataly zone of the republic. The area of the apple orchards is but 34 thous.hectares, of which 27 thous.hectares are in a state sector, with the rest being in a private one. The old indigenous varieties, i.e. Jir, Gajy, red winter Jibir, Mekhti Jiri, Sary tursh, Gara tursh, Gand alma, Kyzyl akhmedi, Ag alma, etc. are widely sown in the said zones. The Azerbaijan, Nailya and Kuba renet selective varieties as well as the introduced European ones (Golden delicious, Starcrenison, Royal red delicious, etc.) have found their practical application in the republic. In lean years the apple yield of the selective and introduced varieties is inferior to that of the old indigenous ones. The apple yield is 80 cent. per hectare. Pear is represented by the old varieties, such as Abas-beghi, Nar Armudu, Akhmedkazy, Nurunburun, Ismeghi, etc. The selective varieties, i.e. Lyatifa and Antiga, as well as the European ones, such as Bere-box, Williams, Saintgermen, etc. have lately been developed and introduced for sowing. The total area of the pear orchards is 5 thous.hectares of which 2 thous.hectares are in a state sector, with the pear yield being 60 cent. per hectare.

Quince (*Cydonia Mill.*). Its indigenous folk selection varieties (Sary-aye, Karayva, Chilyachi, etc.) grow all over the territory of the republic both in the forest tracts and in the orchards. The yield of the Rajably-1 and Rajably-2 varieties is superior to that of the indigenous ones. Quince is basically cultivated in private sector. The total area of its orchards is 3 thous.hectares with the yield being 50 cent. per hectare. Drupe fruit species.

Cherry (*Cerasus L.*). **White cherry (*Cerasus avium*)** is represented by the indigenous Isfahani and Gara ghilas varieties, with the selective Narmin, Khalida, Shirin, etc. ones being widely used. The total of the white cherry orchards is 3 thous.hectares, with the yield being 20 cent. per hectare.

Plum (*Prunus L.*). Its old varieties, i.e. Khatyny. Zardobi, Kara-albukhara, Sary albukhara, and the introduced ones in particular, i.e. Anna Shnet, Vengherka-common, Renclod Altana, are cultivated in both state and private sector. The plum orchards in the republic take up the area of 7 thous.hectares, with 2 thous.hectares being in a state sector. The yield is over 70 cent. per hectare.

Cherry-plum (*Cerasus prunus cerasifa*) is represented by the indigenous Gheycha-sultana, Aresh, Shabrany, Paiyz memsi, Kara alcha, Ag alcha, etc. varieties. The yield is 350 cent. per hectare. Apricot (*Armeniaca*). Its folk selection varieties, i.e. Abutalybi, Shalakh, Salami, Novrast, Ag tabarda, Badam, Eric, Akhverdi. etc., whose fruits are used for food both in a fresh and



dry form are basically cultivated in a private sector, especially in the Nakhichevan AR. The yield is 200 cent. per hectare.

Peach (*Persica Mill.*). Its most popular folk selection varieties are Zafarani, Ordubady, Salami, Narynjy, Ag Nazly, etc. Its Fadan and Malik varieties are basically grown in a private sector, especially in the Nakhichevan AR. The yield is 80 cent. per hectare.

Cornel (*Cornus mas L.*) is noted for its old varieties as Armudy-zogal, Sary-zogal, Kara-zogal, etc. The yield is 30 cent. per hectare.

Nut-fruit species. The old indigenous varieties of nut (*Corylus avellana*), i.e. Atababa, Aslan-baba, Gala, the selective varieties as Ashrafi, Yagly funduk, Gyanja funduk, Kyzyl funduk, Galib, Firaven, Barly, and the introduced ones, such as Cherkets-I, Cherkets-II, Trabson, Badem, etc. have found their practical application. The yield is 20 cent. per hectare. Walnut (*Yuglans regia*) is noted for its indigenous varieties, i.e. Feldar, Ilgar, Ordubady, Novrast, Seifi, Sugra.

Chestnut (*Castanea*) grows in a private sector and is mostly represented by its indigenous folk selection varieties, such as Khanlyg, Ashlyg, Farash, Sultani, Bargugava. The kernel yield is 75-87 per cent., with the chestnut yield being 50 cent. per hectare.

Almond (*Amygdalus communis L.*) is a rare culture for our republic. Its indigenous Dash badam and Nazik-kabukh varieties are mainly sown in dry subtropical zones and are used as food in a fresh form. Pistachio genuine (*Pistacia vera*) grows on the Absheron peninsula.

Subtropical species:

Olive (*Olea europaea L.*). Its selective varieties, i.e. Azerbaijan-zeitunu, Baku-zeitunu, Shirin-zeitunu, Buzovna-zeitunu, as well as the introduced ones, i.e. Askalano, Saint catarina, Pickvalik, etc. are cultivated within the area of the Absheron peninsula. The yield is 25 cent. per hectare

Fig (*Ficus carica L.*) is represented by its indigenous SaryGyanja, Bozov-burnu, Sary-Lob and Sary-Absheron varieties basically grown in a private sector. The yield is 80 cent. per hectare.

Pomegranate (*Punica L.*) has long since been cultivated in the republic. Its indigenous varieties, i.e. Bala-Mursal, Velesh, Gulosha, Azerbaijan, Shakh-nar, Kyrmyzy-Kabukh, etc. are widely sown. Its Azerbaijan, Oleg varieties have found their practical application. The yield is 60 cent. per hectare. *Ziziphus* is basically grown on the Absheron peninsula and in the Nakhichevan AR. Its



Azeri and Nasirni varieties have found their practical application. The yield is 120 cent. per hectare.

Eastern persimmon (*Diospyros kaki* L.). Its introduced Gosho, Ghibrid-27235, Kiakume, etc. varieties are widely cultivated. The yield is 300 cent. per hectare. Feijoa is basically cultivated in the Lenkoran-Astara zone. Its indigenous Irimeivali, Aidyn, Khazar, Lencoran and Shirali varieties have found their practical application.

Citrus species are represented by the introduced varieties of:

- **orange** (the yield is 80 cent. per hectare);
- **lemon** (the yield is 90 cent. per hectare);
- **tangerine** (the yield is 120 cent. per hectare).

As to saffron, cultivated since long, its introduced varieties have been imported from the Iranian Azerbaijan (the yield is 6 kg per hectare).

Tea (*Thea*) is sown on 65 farms including 26 specialized state farms in which processing industry has been developed. Its indigenous selective varieties, i.e. Ghysa davarnly, Azerbaijan-I, Azerbaijan-II, Azerbaijan-III and Azerbaijan-IV, have found their practical application.

Mulberry (*Morus* L.) grows in many areas of the republic. The leaf of the mulberry tree is widely used as an indispensable feed for silk-worms which spin silk to form cocoons. The fruit of the mulberry trees is delicious and nourishing. It is rich in sugar substances and vitamins. The fruit is used in a fresh or dried form. Bekmez, jam, juice, pastila, vinegar can be made of it. Its wood is used to manufacture high-quality furniture, musical instruments, rifle stocks, barrels, wheels, etc. Its fruitful varieties (Shakh-tut and some others) and the industrial ones (Agdash-tut, Sykh ghez-tut, Zarif-tut, Khanlar-tut, Ghezal-tut, Zakir-tut, etc.) are widely cultivated in the republic. About 30 thous.hectares are taken up by mulberry plantations and a lot of separate linear ones. The mulberry trees annually produce 6 thous.t of silk cocoons. Grape, as Homer noted, had been cultivated in Azerbaijan long before A.D. Viticulture development was based on the utilization of wild grape. A rich fund of aboriginal varieties (about 200) of various industrial significance was established as a result of the natural and artificial selection. Nowadays, such unique varieties of folk selection as Ag shany, Gara shiny, Tabriz, Bendi, Divichi kyzyl uzum, Nakhshabi, Sary ghilya, Marendi, Shemakha, Shafei, Ag Kurdash, Kara Kurdash, Ag geibandan, Aziz, Agabash, etc., as well as its technical varieties, i.e. Matrasa, Gamashara. Bayan shire, Khindogny, Shirvanshakhi, Malaghi, Kara sarrna, Kara aldara, Ag aldara, Arnagrna, Miskaly, Tatly, etc., are widely cultivated in the republic.



CHAPTER 3

National Conservation Activities

*You, ignorant, unconcerned man, wake up.
Don't confide in a fleet life, wake up.
Let the course of this life not be eternal, wake up.
Derive something from eternal truth, wake up.
Imadeddin Nasimi (XIV century)*

3.1 WILD VEGETATION FORESTS

The present condition of forests in Azerbaijan calls for drastic measures to be taken to preserve them and their ability to reproduce as well as to increase, their per hectare productivity and to make it possible for them to perform their environment protection functions. Particular emphasis is to be placed upon the preservation of the valuable (from the point of view of national economy) trees and bushes which constitute more than 10 per cent of the highest flora of the republic. Some unique species, such as *Gleditschia carpi* Dest., *Albizzia julibrissin* Dur., *Ruseus hyrcanus* G. Nor., *Taxus baccata* L., *Caucasion persimmon*, edible chestnut, walnut, *Taxus baccata* L. and other species of the relic flora are on the verge of extinction. The preservation of unique species within the framework of the living natural ecosystem is of a great scientific significance since no introduced collections are able to substitute for the natural ones. It is to be believed that the rare and very valuable species in the republic must be preserved in all the regions in order to study the interaction of a rare and vanishing species with other components of phytocoenosis. Such measures are to be taken urgently to preserve the genetic fund under various ecological conditions. Foresters, botanists and other natural historians of the republic place particular emphasis upon the preservation of the genetic fund of such valuable and highly-productive species as *Pinus sosnovsky*, *Pinus eldarica*, *Pistocia mutica*, *Quercus castaneifolia*, *Acer ibericum*, *Zelkova carpinifolia*, *Parrotia persica*, *Diospyros lotus*, *Ficus hyrcana*, *Punicagranatum*. It is common knowledge that national parks play a significant role in preserving nature and its genetic fund of valuable species. They have contributed much to the reproduction of and the increase in the number of specially valuable



(in economic and scientific respect) forest, aboriginal, relic and vanishing species. The first national parks in the republic were created for the period from 1925 to 1930 (Ghek-Ghel, Zakataly, Ghyzyl-agaj), with the Ghirkan one, etc. being established in 1936. Nowadays, there are 15 national parks in the republic with the total area of 6,501 hectares. A great number of reserves was created in addition to the national parks. Moreover, some Nature's rare masterpieces which are of a great scientific, historical or cultural-aesthetic significance are preserved and declared the monuments of Nature.

Alongside the forest growing based on the utilization of the indigenous aboriginal species appropriate measures are taken to introduce various species of trees and bushes brought from the various regions. For example, over 350 units of the said varieties have been tested in the dendrological garden in the Barda region (the city of Barda), which is a part of the forestry system, with the most efficient ones being recommended for practical application. There are cases when some indigenous species of forest flora have been sent to other countries. But it is usually done on one's own initiative on the basis of reciprocity. Thus, Bulgaria has been supplied with the seeds of *Pinus eldarica* for a long time. The Bulgarian Forest Institute used them to grow forests in an arid zone, i.e. Saidansk. The seeds of the said species have also been sent to California (the USA), Uzbekistan and some other countries.

3.1.1 Botanical Gardens

The Botanical gardens of the Institute of Botany was established in 1934. Since that time over 2,000-kinds and forms of plants have been collected as a result of the scientific studies carried out. 1,000 of them have found their practical application in Azerbaijan for the first time. Of the total number of the species collected:

- 250 have been imported from East Asia (Japan, China, the Far East),
- 254 from the Middle East,
- 120 from North America,
- 52 from the Mediterranean countries,
- 434 from the Caucasus,
- 200 from South Africa,
- 350 from Central and South America, 5 - from Australia.



As to their genera, the species are represented by:

Crataegus	70
Cotoneaster	50
Rosa	105
Berberis	40
Pinus	25
Malus	25
Cupressus	10
Crocus	9
Iris	30
Tulipa	9
and some others	

Over 100 species are to be referred to rare, vanishing aboriginal ones. They include almost vanished species of *Galanthus* and those of *Allium*, *Iris*, *Tulipa*, *Colchicum*, *Juniperus foetidissima*, *Vitis sylvestrius*, *Hedera pastuchovii*, *Taxus baccata*, *Parrotia persica*, *Gleditscra caspia*, *Danae racemosa*, *Albizzia julibrissin*, etc.

3.1.2 Seed collection of the Institute of Botany of the Azerbaijan Academy of Sciences

Till 1988 the Botanical Gardens of the Institute were active in exchanging seed material with more than 100 botanical gardens of the world. To accomplish this the Institute was (and still is) provided with an appropriate building, quarantine plot, seed store-house, premises to process seeds to test their viability, roentgengrading laboratory, etc. In the course of exchange the seeds of both aboriginal and introduced exotic species were proposed (including those being on the verge of extinction or genetic erosion). “*Index seminum*” periodically published during those years. The catalogue exchange was carried out with more than 100 botanical gardens of the world. In some years over 700 seed species contained in the seed catalogue were proposed for exchange. The equivalent quantity of seeds were kept at the Institute where they were received once or twice year. Now we run the risk of losing the said collection. All the work has ceased because of the shortage of financial resources required for maintaining the building, store-house, laboratory and for collecting and delivering the seeds and publishing “*Index Seminum*”.



3.2 CULTIVATED PLANTS

Cereals and leguminous plants. The wheat genetic fund of the Research Institute of Agriculture attached to the Ministry of Agriculture can be considered as one of the best collections in the republic. The uniqueness of this collection lies in that the seeds have been selected in accordance with their photosynthetic characteristics. The collections of the control station of the All-Union Plant-grooving Institute located in Daghestan (near the city of Derbent) have been widely used in creating this compact genetic fund. The genofund has also been replenished by the genotypes of wheat and maize (Intern.Maize and Wheat Improvement Centre, CUMMIT; Intern.Center for Agricultural Research in Dry Areas, ICARDA). About 4,000 forms of wheat and 2,000 forms of barley have been collected in the republic to be used as the basic material for developing new varieties. The collection of cereals and leguminous plants is distributed among the Research Institute of Agriculture of the Ministry of Agriculture of the Azerbaijan Republic (Baku), the Terter and Zakataly zonal experimental stations of the said Research Institute and the Institute of Genetics and Selection of the Academy of Sciences of the Azerbaijan Republic.

There is also a collection of indigenous species, selected from the world ones, i.e. those of:

	species
soft wheat	1,000
hard wheat	800
barley	500
triticale	400
maize	4,000
<i>Cicer arietinum</i> L.	200
Haricot	140
Lentil	230
Soy-bean	100
lupin	150

Other plants. The distribution of the collections of other plants is as follows: that of tobacco - at the Zakataly zonal experimental station of the said Institute of Agriculture (the city of Zakataly), that of vegetable plants at the Research Institute of Vegetable-growing (Baku). that of fodder crops - at the Research Institute of Fodder crops, Meadows and Pastures (Baku), and that of cotton - at the Research Institute of Cotton-Growing (Gyanja).



The working collection of the said plants basically consists of the indigenous species, i.e.:

tobacco	120
tomato	2,800
aubergine	500
pepper	300
cabbage	500
cauliflower	100
lettuce	80
carrot	120
cucumber	200
onion	200
garlic	110
haricot	1,000
pea	500
water-melons	300
melons	200
potatoes	440
cotton	160

Nut-fruit plants. Walnut, owing to its exceptional polymorphism, consists of a great number of forms. The Azerbaijan Research and Designing and Prospecting Institute of Forestry has been engaged in the studies of form varieties of walnut and in their selection for many years. As a result of the stock-taking of nut tree and the nut trees grooving on the personal plots of the inhabitants of separate regions over 136 prospective forms have been selected.

On their basis (by way of engrafting) elite orchards have been established in the dendrological area of the said Institute (Barda) and on a number of forest farms. Over 30 forms have been recommended for practical application. The species of 18 forms of valuable thin-cortex oil nut is preserved in an elite orchard in the Nakhichevan AR. The "Arzu", "Decorative Red Azerbaijan", "Ordubad Kazakhi", "Cluster Sheki" and some other hybrids have been recommended for practical application. All the said hybrids are used in timber industry and in afforestation. It is to be noted that nut-forest, nut-forest-orchards, and nut-plantations occupying the area of more than 18,000 hectares have been created in Azerbaijan since 1936. Now they are cut down in certain areas to provide for a better care on a selection basis, for detecting pests to work out the measures to eliminate them.



Fruit-berry plants. The inspection of forest tracts, valleys and rivers, forests, private yards of peasants and citizens of Azerbaijan has made it possible to reveal and select a great number of wild forms and old fruit varieties of folk selection whose specimens have been reproduced to be concentrated at the Sheki zonal scientific base and the Karabakh scientific experimental station of the Institute of Genetics and Selection of the Academy of Sciences of the Azerbaijan Republic where nowadays there are more than 770 species of fruit-berry plants representing 22 species, i.e. 270 - of folk selection and - 500 forms of wild kin. A similar inspection of the Kuba-khachmas and the Kazakh-Shamkhor regions, in the course of which the opinions of the peasants of private yards were considered and taken into account, has resulted in revealing more than 390 wild forms, of fruit-berry plants and old fruit varieties of folk selection (248 cultivated plants and 150 wild ones), such as *Malus*, *Pyrus*, *Cudonia* mill, *Prunus divaricata*, *Prunus Spinosa*, *Cornus mas*, medlar, persimmon, barberries, *Crataegus sp.div.*, *Hippophae*, etc.

All the said plants have been reproduced and transplanted in the genetic-fund garden (their permanent place). Some plants are preserved at the Institute of Genetics and Selection of the Academy of Sciences of the Azerbaijan Republic. At the Research Institute of Horticulture and Subtropical Plants attached to the Ministry of Agriculture of Azerbaijan as well as in the pomological collections there are 1,200 specimens and 8,000 hybrids of fruit, subtropical, nut-fruit plants.

Of 15,000 plants, delivered by the expeditions from various countries (Africa, America, Australia, Asia Minor, the Mediterranean area, etc.) and tested at the Mardakyany experimental station, 450 ones have been acclimatized in the area of the Absheron peninsula and 200 new species of wood shrub exotic plants and over 1,200 specimens of subtropical fruit (pomegranate, fig, *Lizzphus* mill, *Oleaceae oloa*, *Diospysos Ilaki*, Japanese medlar, etc.) and 57 specimens of citrus fruit - in the Lenkoran zone. The collection of fig and pomegranate have been transferred to the Gheokchai control station of the Institute of Horticulture (the city of Gheokchai). The genetic fund of mulberry (mulberry tree) numbers over 200 varieties and forms and it is preserved in a permanent, place, i.e. in the collection garden (in the Gheranboi region) of the Institute of Sericulture attached to the Ministry of Agriculture of the Azerbaijan Republic. 500 specimens of grapes have been selected for the collection garden of the control station of the Institute of viticulture and wine-making in Gyanja. The scientists (geneticists, physiologists, selectionists, etc.) of the appropriate state institutes of the country use the materials of the species, varieties and populations funds. The farmers and amateur gardeners are rare users of the fund materials. The analysis of the present condition of preservation of genetic resources in the country shows that there is no centralized system of selection,



preservation and inventory of plant resources. Yet, the scientists and the parties concerned are engaged in finding the ways and means of creating a unified system of preserving the genetic resources of plants. But despite the high professional level of scientific personnel the republic is incapable of allocating appropriate financial resources for these purposes.

Group of green, spicy and rare vegetables. This group of plants is represented by a great number of species. To be referred to the greens are *Lactuca sativa*, *Spinacia oleiacea*, *Anethum*, *Rumex racemosa*, *Rheum*, *Asparagys officinalis*; and to be referred to the spice plants are *Carum carvi*, *Pimpinella anisum* and etc.. Many of them, being used fresh or as spice for vegetable preserving, are called "Sabza taravaz" in Azerbaijan. *Raphanus sativus* and *Pastinaca sativa* are also to be referred to "Sabza taravaz". The soil-climatic conditions of Azerbaijan make it possible to grow all the said vegetables outdoor. Some of them grow outdoor in the irrigated lowland regions all the year round. Coriander, watercress, dill, parsley, celery are also to be referred to such plants. Many of these plants. i.e. coriander, *Foeniculum vulgare* Mill., etc. are widely spread in Azerbaijan and are used daily. For the period from 1960 to 1970 the Institute of Vegetable-growing selected in the regions of Azerbaijan, introduced (from other scientific centres, basically from the All-Union Institute of Plant Growing) and studied more than 350 specimens of green, spicy and rare vegetables, including:

Lettuce	41
Garden radish	24
Black radish	3
Celery	3
Parsnip	3
Parsley	13
Dill	24
Spinach	15
<i>Vulgaris</i>	1
Mustard	1
Tarragon	2
Mint	2
<i>Flibiscus esculentus</i>	25
<i>Hyssophinum officinalis</i>	2
<i>Cucurbita pepo</i>	25
vegetable marrow.	50



The most prospective species and varieties have been selected for Azerbaijan. As to coriander and dill species, the selective work is being carried out, with one variety of coriander and one variety of dill having been submitted to the State Committee on Variety Tests. The "Otello" dill variety has found its practical application in the republic in 1995. Documentation. As a rule, every specialized institute halving a collection of plants is supposed to process, systematize and register it in accordance with established procedure. The materials studied are included into annual accounts and the extracts from them are published in a periodical press and scientific publications. The "*Index Seminum*" magazine has until recently been distributed among the organizations concerned.



CHAPTER 4

In-Country Uses of Plant Genetic Resources

The problem is very important, but since there is no national system of information on collections, varieties, species, etc. the circle of users is narrowed to selectionists, biologists and agricultural experts into usually work at those institutions which own live and laboratory collections. Specific examples of using the collection specimens are given in the preceding sections of the present report.



CHAPTER 5

National Goals, Policies, Programmes and Legislation

*Don't throw stones on the mirror of wisdom.
This is the invaluable glass, it can be broken.*
Imadeddin Nasimi

Unfortunately, there are no State Laws having to do with problem in question. Nevertheless, it is to be noted that the National Majlis has issued the following Laws:

1. Law of the Azerbaijan Republic on Peasant Farming, Baku, 1992.
2. Law of the Azerbaijan Republic on the Basis of Agricultural Reform, Baku, 1995.
3. Law of the Azerbaijan Republic on the Reform of Stateforms and Collective farms. Baku, 1995.
4. Law of the Azerbaijan Republic on Land Reform. Baku, 1995.

We are looking forward to issuing the law on the preservation of the genetic fund of Azerbaijan.



ANNEX 1

1.1 THE AZERBAIJAN STATE PROGRAM ON PLANT GENETIC RESOURCES (PGR)

At present the humankind is worried by diversity between population fast and intensive growth and slow growth of food crops.

With the population increasing the natural resources are faced with continuing pressures. These pressures include forest cleaning, loss of species diversity as forests and water resources, rangelands become deserts. Serious soil erosion, salinization and marshing result in loss of arable land.

The variable plant genetic diversity is threatened by genetic erosion due to new land development, urbanization and cattle breeding processes. Aboriginal old cultivars are adapted to local environmental conditions however are low yielding and therefore are delimited by better sorts. The valuable genes used for new species production will be lost for ever if not to take measures to protect the genetic diversity. In order to prevent the natural resources exhausting urgent measures should be given the priority. There is a need to protect by legislation the valuable plant genetic diversity existing in country to conserve in both *in situ* and *ex situ* before it disappearance for ever.

To prevent the dangerous tendencies Republic has organized state committee of national plant genetic resources (SCPGR) at Ministry for Agriculture of Azerbaijan Republic in 1995. The SCPGR activity is directed to national programme creation for drafting legislation and policies related to the revealing, collecting, investigation, conservation, evaluation, documentation and utilization of local genetic resources.

SCPGR is functioning at ministry for Agriculture and is increasing co-ordination between research institutions on reveal, collecting, investigation, conservation, evaluation, documentation and utilization of indigenous plant diversity genetic funds.

The national programme is funded by state budget and is, on annual basis, approved by government and Parliament.



Chairman of SCPGR is an official and is responsible for genetic resources fate.

To meet population and industry needs the essential increase general food harvest crops and industrial cultures should be provided in republic. Linked to this fact the responsibility is given to plant breeders and plant growers. First of all the selectionist should be provided by essential reliable, variable and multi-qualified original botanic-geographic and genetic material.

Climatic and soil variety exclusiveness, humidity and sunny days sufficiently provide the richness of Azerbaijan vegetation.

70% Caucasus flora belongs to Azerbaijan vegetation. 4,500 higher plant species, 273 endemic out of total and about 10% flora species are considered to be threatened species.

Agriculture developed in Azerbaijan about several thousand years B.C., when all of the main culture plant existing now have been domesticated. A village site found to west from Khanlar at the beginning of 2-nd century B.C. shows evidence of agricultural practices. In Kultepe not far from Nakhichevan were founded the charred wheat grains, attributed to the end of Neolithic age, Misharchay (Djalilabad region) indicate on cereals sowing 5-6 thousand years ago.

The horticulture and vine-growing highly developed still in the middle of the 2 millennium in Azerbaijan. Peach, apricot, cornelian, cherry, pomegranate, almond, grape-vine and other fruit stones have been founded in excavations.

All these facts evidence remote past of history of agriculture in Azerbaijan.

Azerbaijan is rich first of all by its cereals and food legumes and their relatives and is considered to be one of the first world centres. 14 species of wheat, 13 aegilops, 9 species of rye, 7 species of barley and other cereals and more than 400 species of legumes are concentrated here. The food legumes occurring in Azerbaijan mainly those of chickpea, lentil, bean, horse bean, grass plavine and other are cultivated as a food crops still long time. The dense bushes or rare plants of the wild species rldcies and *genera* varieties of wheat, barley, aegilops, rye, oats, pea, chickpea, lentil and other grow on the mountains, foothills, lowlands. Basically they are spread in Nakhichivan AR, Akhsu, Shemacha, Gobustan, Djabrail, Zangelan, but in other regions can be occurred.

289 cereals varieties are investigated but are insufficiently evaluated and characterised, legumes are few studied.



130 *genera* and species of vegetables, 64 - from these are cultivated and 66 are wild types are found in Azerbaijan. Republic is a land of origin some vegetable and gourds plants include these of bulbous, garlic, sorrel, spinach, fennel, asparagus, peppermint, sugarbeet, coriander, horse-radish, biophore, caraway etc. There is a number of endemic plants as a spinach, savoury, fusarium, chervil.

Azerbaijan is one of the most important centre of large number of *genera* and species of wild vegetable gourds crops. Their areals are rather big and spread all over republic. 54 wild species and about 300 old landraces are investigated in detail.

82 wild relatives of indigenous fruit trees and nuts are concentrated in Azerbaijan. The largest species variety of wild fruit-berry plants and sorts of folk selection have a plants growing in forests and rural inhabitants: apple, pear, quince, blackthorn, cornelianchery, persimmon, grape-vine, dog-rose, seabuckthorn, barberry, hawthorn, viburnum, sumac, medlar, garden plum, sweet cherry, cherry, peach, almond, jujube, pomegranate, fig, mulberry, hazel, walnut, chestnut, pistachio, raspberry and many other plants.

A wild forest grape-vine (*Vitis vinifera silv lwd*), which is represented by typical trimmed-foliar forms (*Tynica Nigr.*) is richly growing in many regions. Azerbaijan is a land of cultural grape-vine. There is a greatest number of endemic aboriginal sorts, differing in foetus colour and shape, graves and seeds size and forms.

Genera diversity of wild fruit-berry plants and grape-vine occur mainly on the mountainside of Great and Lesser Caucasus, subtropics of Talysh, in forest area, rivers valley and in definite regions. More than 3 thous. of wild forms and 1 thous. old fruit sorts of folk traditional selection including 22 species are collected and investigated. Wild species of grape-vine are either investigated or selected.

Together with wild relatives, created by nature during centuries, Azerbaijan have a rich diversity of landraces, old sorts, rare productive aboriginal forms and endemic sorts of above mentioned cultures.

Many relatives and progenitors of a number of culture plants are not occurred in nature and are unknown at present. The large plant group is known both as cultural and wild ones.

No convincing evidence exist to justify the given culture species to be originated from definite and at the present existing species.



Despite of such rich genetic fund all *genera*, species, varieties, endemic plants, wild relatives, old sorts of folk selection and their areals are not collected, investigated, provided by proper preservation and are not selected. It's known that wild plants of existing cultivars are progenitor forms of old sorts.

For organization the centralised system of inventories, collecting, restoration, reproduction, documentation and effective use of plant genetic resources it is necessary to set up with help of FAO and republic government the research institute on PGR or scientific centre on PGR.

To create the new high yielding sorts and to improve existing ones it is very important not only to collect a large variety of all crops *genera* and species but it is very valuable to have a genetic fund, created by nature during centuries, by people and by selection in different eco-geographical conditions so that to preserve practically these plants from disappearance and rational utilization for mankind benefit.

In republic, wild relatives of old sorts, aboriginal and endemic sorts of folk selection has got important theoretical and practical meaning in creating ecologically flexible and resistant to extreme conditions and biotic factors new high yielding sorts.

They are distinguished by stability to biotic and abiotic factors and have high quality in comparison to recent selected forms and sorts. These valuable characteristics can be translated to new sorts by hybridisation using a large abundance of all cultivars genefund. Therefore a use of effective genes of high diversity genetic resources has a perspectivity.

Ex situ conservation activity has not been yet organized in the country so far.

Linked to the conversation required conditions absence, the main part of collection is given to the former Vavilov VIR, the smallest part is included into working collection and the rest is diminished.

Being the reason of importance, at present the priority is given to collecting, restoration and indigenous genetic resources conservation.

From 1990, in connection with intensification of selection programme of some crops (cereals, legumes, tobacco, vegetable) and high-quality professional staff training, there has been a tendency to progress in collecting, investigation and selection of PGR.



An aboriginal national sorts of fruit-berry plants are cultivated in private sector and up to now there are not a proper conditions for their preservation. As a result, created during centuries by nature and man the valuable genefund could be totally lost and its restoration would be impossible. Therefore, the revealed areals and private yards are needed to be protected.

Forest genetic resources, national parks, water reservoirs, reserves control becomes complicated linked to non-receiving of Convention on Biological Diversity, financial difficulties and local forces non-implementation.

Agro-ecological conditions of different zones of republic especially in mountains and foothills promote the strong morphogenesis process. A special attention should be paid to the natural-spontaneous hybridization of different cereals, fruit-berry plants and etc., resulting in morphogenesis. Ancient mankind grew valuable cultivars from these forms natural synthesis formerly. It sounds reasonable for selectionists to accept the above mentioned to be really effective ways for original botanic-geographical material use.

National programme main goals

1. Expeditory survey, revealing and goals of plant genetic resources.
2. Collecting, restoration, reproduction and collection creation of indigenous plant genefunds
3. Investigation/characterization, evaluation of plant genetic funds.
4. Sustainable utilization of plant genetic resources.
5. Research of morphogenesis processes of plant genefunds by means of comparison of wild, old and selected sorts in their constant habitat and experimental base conditions.
6. Documentation (passportization) of plant genetic resources and to database bank entry.
7. Conservation of plant genetic diversity.



1.1.1 Elaboration of model for creation of centralized administration of research works, control of protection and coordination in the field of Plant Genetic resources (PGR)

- a.** Creation of administration system for research projects (programmes) preparation and their control
 - planning
 - organization
 - access the results to user's
 - account and to take account etc.
- b.** Set up of State Committee on PGR
 - secretariat on PGR
 - working groups
 - cereals
 - food
 - vegetables-horticultural
 - industrial, aromatic, medicinal
 - pasture and forages
 - biodiversity and forest
 - Academy of Sciences
 - SR institutions
 - Universities
 - Agricultural Academy
 - Ministries.
- c.** Set up a research institute or Scientific Centre on PGR for target organization, planning, administration and activities in this field:
 - organization of regional specialized networks.
 - establishment of linkages with appropriate organizations.



1.1.2 Revealing of areals, collecting, restoration, reproduction and promotion *in situ* conservation of PGR in country

- a. Organization and increasing of number of expeditions for revealing, inventory and collecting of wild relatives of main PGR and their mapping:
 - cereals
 - food legumes
 - vegetables
 - industrial, aromatic and medicinal
 - pasture and forage.
- b. Elaboration of strategies for *in situ* conservation of areals, private sector etc.:
 - set up reserves
 - set up protected areals for some general species etc.
 - enter on a list of Red Book some species.
 - organization and strengthening guaranteed protection of major crops wild relatives, mainly of endangered and threatened species.
- c. Creation of national genebank and elaboration conservation of south fruit crops.
 - Collecting, elaboration of long-term storage of seeds and herbicides.
 - Cell culture and registration methods.
 - Elaboration of low-temperature storage of genetic material.
- d. To create a local genetic fund (collection gardens - field genebank) for fruit-berry crops and grape-vine in different areals:
 - collect and restore
 - reproduce at their sites growing
 - collect into collection for conservation



1.1.3 Establishment of ecosystems and determination of areals with high plant diversity, collecting and elaboration of strategies for preservation and conservation *in situ* and *ex situ*

- a. Inventories of areals and establishment of ecosystems and areals with high biological diversity.
- b. Inspection of biodiversity areals, organization and increase expeditions for collecting of major and minor cultivars/genetic diversity.
- c. Investigation (evaluation) of collection, especially important genetic diversities, sum up.
- d. Promotion of *in situ* and *ex situ* protection and conservation and development of methods to measure sustainability.
- e. To attract and take an interest of local circles to *in situ* protection of Biodiversity especially the areals with plant high biodiversity.
- f. To elaborate additional control mechanisms for enhancement of PGR conservation:
 - forests
 - national parks
 - pools
 - deserts
 - arid zones
 - meadow
 - under-utilized plants
- g. To draw different institutions in the engagement *ex situ* conservation of wild plants, mainly through genebanks.
 - forest species
 - botanic gardens
 - arboreta
- h. Conservation *in situ* some endemic forest species of Talysh.



1.1.4 Collecting, reproduction and collection creation of indigenous genefund in whole volume

a. Seed collecting:

- cereals;
- food legumes;
- gourds;
- forages and pasture;
- industrial, aromatic, and medicinal cultivars;
- wild relatives seeds (species, diversities etc.);
- seeds of indigenous old sorts;
- seeds of recent selected sorts.

b. To multiply (the lost ones), restore and create collection of local genefund in whole volume:

- green, used in food in fresh and dried;
- spices used in food in fresh and processed form.

1.1.5 Development, enhancement and transfer to recent systems of *ex situ* conservation of national genebank of PR

a. Elaboration of strategies and providing of conditions for *ex situ* conservation at sites and set up a control mechanism:

- allocation of sufficient budgets for creation of suitable storage facilities;
- organization of accommodation, mobilization of cold chambers, either storage chamber;
- preparation of samples;
- conservation of samples duplicates;
- reinforcement of control.



- b. Organization of repatriation of local genefund, stored outside the country:
 - organization of collecting of old indigenous sorts, conserved at amateur breeders and farms.
- c. Elaboration of additional strategies for *ex situ* conservation and to implement into WANA and ICARDA activities for mutual and secure conservation of duplicates in long-term storage in WANA countries under FAO auspices.
 - to develop a legislation;
 - to ratify treaties with corresponding WANA countries in the frame of accepted international laws;
 - technical training for material transfer;
 - preparation of *general* information about material and samples;
 - according to commitment the material transfer long-term conservation in WANA countries.
- d. Creation of modern infrastructure systems, for *ex situ* conservation of seeds:
 - to build up a special store houses;
 - to acquire of necessary equipment, special chambers etc.;
 - training of staff in this field;
 - establishment of appropriate communications.

1.1.6 Investigation (complex evaluation and characterization) and sustainable utilization of national genetic fund of PR

- a. To study a wide set of genetic fund and attract to selection in order to create new high yielding sorts with large ecological flexibility and resistance to stress factors:
 - agro-ecological evaluation;
 - evaluation by biotic and abiotic factors;
 - biochemical and technological evaluation;
 - new donors revealing;
 - using in selection;
 - new sorts creation.



1.1.7 Identification of areals (genus, species, etc.) seed collection, collection creation and traditions propagate in national cooking using exotic plant products

- green fresh;
- spicy-taste;
- green used in food in fresh and dried;
- spicy-tasty used in food in fresh and processed form.

1.1.8 Establishment of an early warning mechanism based on integrated system approach to monitor genetic erosion of key PGR

- establishment of warning mechanism of genetic erosion monitoring;
- to reveal especially valuable samples of endangered and threatened species;
- elaboration of early warning mechanism based on integrated system approach to monitor of maintenance of facilities and scientific standards in genebanks, degradation of natural habitats and ecosystems.

1.1.9 Implementing into international system of computerized documentation of PR genebank, improvement of information and materials exchange at a regional and international level

- a. Set up of information centre on PGR;
 - Set up a communication network systems in region and their integration into INTERNET networks system;
 - Encouragement of PGR information and materials exchange, exchange by projects results etc. with other countries and international centres.
- b. Creation of catalogue on PGR
 - list of PGR collected general species etc. and addition news ones;
 - spreading of PGR list, available in country and news addition with technical support from IPGRI;



- c. Creation on database bank
 - characterization and evaluation of PGR;
 - passport of genefund (certification);
 - control on availability.
- d. Publication of materials dealing with PGR
 - to publish materials in local and international editions;
 - to elucidate general question in periodic issues.

1.1.10 Development of strategies for integration to international training system for administrators and managers on PGR. Qualification improvement of administrators, technicians and managers in international centres (IPGRI, ICARDA, etc.) on short and long-term courses

- a. Training should consider planning, management and coordination on plant genetic resources (collecting, restoration, utilization, conservation etc.);
- b. training on project implementation methodologies and experience exchange, information and linkages establishment in field of PGR;
- c. training of juridical aspects, including legislation of national programme and PGR status.

1.1.11 Set up a national education system, re-training and training of supporting staff specialists on PGR and their integration in international education system

- a. Elaboration of policies for propagating PGR culture.
 - at the stage of primary school to implement into general biology discipline special understanding about PGR, mainly about protection and continuing utilization of PGR;
 - at special secondary schools and higher-level institutions to include into programme special course on PGR.
 - to develop education in high-level institutions, especially biological and socio-economic sciences for planning and implementary of programmes *in situ* conservation of biodiversity and forests;



- to improve and deepen the knowledge on methodologies of economic *in situ* conservation.
- b. Set up a short and long-term courses on staff training and retraining in coordination with various research and higher-level educational institutions in PGR area.
- c. For higher-level staff training through probation or post-graduation at international centres the close linkages establishment and assistance are needed (IPGRI, ICARDA, CIMMIT etc.).

1.1.12 Implement propagating and functioning measures to stimulate laws adoption, providing national and international legislation basis for preservation, conservation, utilization, exchange and access to PGR genebank

- a. convention on Biodiversity implementation
- b. "forest" law;
- c. "quarantine" law;
- d. "genefund conservation" law;
- e. "selection achievement" law;
- f. "seed" law;
- g. seed and planting material certification;
- h. financial support.

Establishment and development of letter linkages between regional and international organizations, centres and institutions in the PGR area such as ICARDA, ACSAD, CINEAM, IPGRI, CIMMIT, FAO, UNEP and others.

Reinforcement of collaboration in different fields related to plant genetic resources between national programme and regional centres and countries WANANET, ECP/GR, UMS, Turkey, Iran and others.



ANNEX 2

Azerbaijan Republic Forest Genetic Resources

Azerbaijan forests are one of the most important fields of republic national economy, providing significant amount of wood, food for man and animals. And so on, they have a water-protective, soil, climate, snow-guarding importance and are closely connected to agriculture. Mountain forests are regulating lowland water balance.

Forests in Azerbaijan occupied little more than 12% of entire republic area. They are spread on lowlands, foothills, mountains and even on high-mountains. There are 436 species of trees and bushes in these forests, 107 of which are trees, 167 - high bushes, and 162 - low and semi bushes.

Low-lying forests are presented as a small areas and little tracts of forests on Lenkoran plain, Alazan-Agrichay valley, on Samur-Divichi lowland here and there, in spurs of the Great and Lesser Caucasus, in Karabach and Mugan zones, accordingly, in small amounts. The main forest - forming breeds of lowland are as follows *Alnus barbata* C.A.M., *Acer velutinum* Boiss., *Pterocarya pterocarpa* Koth, *Ulmus foliacea* Gilib., *U. suberosa* Moench. at the forest borders *Quercus longipes* Stev. and wild *Juglans regia* L. etc. These areas are peculiar with the type of *Calystegia silvatica* Ch, *Periploca graeca* L., lianas, winding round of trees, rarely *Clematis orientalis* L. and *Rubus sp.* div. with long climb stems. *Hedera pastuchowii* Wor. is climbing upon the trees.

The forest in the Lenkoran lowland (Talysh) are presented by special (relic) group of forest breeds.

The main breeds in Talysh lowland are as following:

Quercus castaneifolia C.A.M.,
Zelkova carpinifolia C. Koch.,
Z. hyrcana Grossh. et A. Jarm.,
Diospyros lotus L.,
Fraxinus excelsior L.,
F. oxycarpa W.,
Parrotia persica L.,



The main breeds in Talysh lowland are as following:

Juglans regia L.,
Pterocarya pterocarpa Koch.,
Albizzia julibrissin Dur.,
Gleditschia caspia Dsf.,
Alnus barbata C.A.M.,
Corylus avellana L. etc.

At the foothill regions of Great and Lesser Caucasus on the tertiary plateau Bozdag Juniperis are widely presented by 6 species:

Juniperus oblonga Bib.,
J. pygmaea C. Koch.,
J. polycarpus C. Koch.,
J. rufescens Link.,
J. foetidissima Willd.,
J. sabina L. and Pistachio (*Pistacia mutica* L.) open woodland.

Entire *juniper* open woodlands as a small islets occur in Divichi at an elevation from 200 to 400 m. above sea level and also in Lachin and Tauz regions at an altitude of 1,000 m. above sea level.

The tugai forests different parts remained along the arteries of Kura, Araks, Alazan, Yora, Agrichay, Turan-chay rivers, steaming on forestless lowland (desert) regions of republic.

On the banks of small rivers: Terterchay, Khachinchay, Korganchay, Geokchay, Akhsuchay etc. tugai and riverside forests are developed to a lesser degree.

In the past , riverside and tugai forests have been located on low and middle stream beds, but later on they have been cut down; now the areas are remained only as a separate interrupting loops. Along Kura river the tugai forests approached the Caspian sea shore. The tugai forests composition is more or less homogenous at all parts.

Characteristic breeds are as following:

Populus hybrida Bib.,
Ulmus suberosa Moench.,
U.foliacea Gilib.,
Quercus longipes Stev.,
Salix austrolior Anderss.,
Morus alba L.,
M. nigra L.,
Elaegnus caspica Grossh.,



Characteristic breeds are as following:

E. angustifolia L.,
Pyrus sp. div.,
Pistacia mutica L.

Out of the range of bushes, developing under plantation curtains or forming more or less thickets in separate places, are presented accordingly:

Tamarix hohenackeri Bge.,
T. ramosissima Led.,
T. meyeri Boiss,
Punica granatum L.,
Crataegus kyrtostyla Fing.,
Paliurus spinachristi Mill.,
Svida australis Pojark.,
Amorpha fruticosa L. Bushes.

Lianas are characteristic for some river-side kinds of tugai forest:

Smilax excelsa L.,
Periploca graeca L.,
Vitis silvestris Gmel.,

Hippophae rhamnoides L. and *Pyracantha coccinea* Roem. occur in tugai composition in the foothill regions.

Mountain forests compose the most part of Azerbaijan forests, thus making 90% out of all forest ranges. These forests cover of mountain slopes of Great and Lesser Caucasus south small slope system and also isolated Lenkoran mountain massif (Talysh) besides, forests are presented as a separate small islets on the south-west slope of Kanguro-Alazanger mountain range within Shakhbuz region of Nakhichevan AR (Bichanak).

In the mountain forests *Quercus iberica* Stev., *Q. macranthera*, *Fagus orientalis* Lipsky, *Carpinus caucasica* Grossh. and species of *Tilia sp. div.*, *Acer sp. div.* *generas* dominate. In the Talysh *Quercus castaneifolia* C.A.Mey., *Parrotica persica* G. et Mey., *Gleditshia caspica* Dsf., *Albizzia julibrissin* Dur., *Rhus coriaria* L., *Acer hyrcana* F. et M., *A. campestre* L., *Svida australis* Pojark, *Ruscus hyrcana* G. Wor., *Polygonatum polyanthemum* D., *Danae racemosa* Moech etc. dominate.

Thus, 11 species of *Quercus*, 3 species out of them are in the culture (*Q. ilex* L., *Q. suber* L., *Q. occidentalis* J. Joy) and 8 wild species occur in Azerbaijan.



Some species form independent oak forests.

Quercus castaneifolia C.A.Mey;
Q. araxina Grossh.;
Q. longipes Stev.;
Q. erucifolia Stev.;
Q. iberica Stev.;
Q. crispata Stev.;
Q. macranthera F. et
Q. anatolica Sosn.;
Fagus orientalis Lipsky.

6 species of *Ulmus* L. (2 in the culture):

Ulmus laevis Pall.;
U. densa Litw.;
U. suberosa Moench.;
U. foliacea Gilib.;
U. scabra Mill.;
U. elliptica C. Koch.;

6 species *Carpinus* L.(3 species are endemic):

Carpinus caucasica Grossh.;
C. oxycarpa H. Winke-endemic;
C. geoktschaica Radde-Fomin-endemic;
C. schushaensis H. Winke-endemic;
C. orientalis Mill.;
C. macrocarpa H. Winke.;

3 *Corylus* L. species:

Corylus avellana L.;
C. colurna L. (*C. cervorum* V. Petrov) - endemic.

3 *Alnus* species:

Alnus subcordata C.A.M.;
A. incana (L.) Moench.;
A. barbata C.A.Mey.

15 *Salix* L. species:

Salix alba L.;
S. caucasica And.;

**15 *Salix* L. species:**

- S. caprea* L.;
- S. arbuscula* L.;
- S. purpurea* L.;
- S. caspica* Pall.;
- S. triandra* L.;
- S. cinerea* L.;
- S. australior* Anders (and some more 6 species).

12 *Populus* L. species:

- Populus transcaucasica*
- P. hybrida* Bieb.;
- P. tremula* L.;
- P. nigra* L.;
- P. hircana* Grossh. (and 7 species some more);
- Juglans regia* R.;
- Castanea sativa* L.

3 species *Betula* L.:

- Betula raddeana* M. Trantv.;
- B. pendula* Roth.;
- B. litwinowii* A. Doluch.

4 species of *Tilia* L.:

- Tilia caucasica* Kupr.;
- T. prilipkoana* Wagn. et Grossh.-endemic;
- T. platyphyllos* Scop.;
- T. cordata* Mill.

2 species of *Ficus* L.:

- Ficus carica* R.;
- F. hircana* Grossh.

9 species of *Acer* L.:

- Acer laetum* C.A.Mey.;
- A. platanoides* L.;
- A. compestre* L.;
- A. velutinum* Boiss.;
- A. pseudoplatanus* L.;
- A. trautvetteri* Medw.;

**9 species of Acer L.:**

A. hyrcanum F. et Gey;

A. ibericum Bieb.;

A. negundo Mill.;

2 species Frangula Mill:

Frangula alnus Mill.;

F. grandifolia Grub.

3 species Hedera L.:

Hedera helix L.;

H. pastuchowii Med.;

H. colchica C. Koch.

3 species Celtis L. species:

Celtis caucasica L.;

C. glabrata Stev. et Planch.;

C. tournefortii Lam.

2 Zelkova L. species:

Zelkova carpinifolia (Pall.) Dipp.;

Z. hircana Grossh. et A. Jarm.

5 Rhamnus L. species:

Rhamnus alaternus L.;

Rh. cathartica L.;

Rh. pallasii Fisch. et Mey.;

Rh. microphylla Prilipko.

5 Lonicera L. species:

Lonicera caprifolium L.;

L. bracteolaris Boiss.;

L. iberica Bib.;

L. caucasica Pall.;

L. xylosteum L.



3 *Viburnum* L. species:

Viburnum lantana L.;
V. opulus L.;
V. orientales Pall.

2 *Sambucus* L. species:

Sambucus nigra L.;
S. ebulus L.;
Rhododendron luteum Sweet.;
Danae racemosa (L.) Moench.;
Padus racemosa Gilib.;
Ligustrum vulgare L.;
Cornus mas L.;
Cotinus coggygria Scop.;
Rhus cariaria L.;
Ilex hyrcana Pajark.

6 *Evonymus* L. species:

Evonymus japonica L.(cultured);
E. europae L.;
E. velutinus Fet. M.;
E. verrucosus Scop.;
E. latifolius Mill.;
E. leiophloeus Stev.;
Zizyphus jujuba Mill.;
Vitis silvestris Gmel.;
Daphne mezereum L.;
Jasminum officinale L.;
J. fruticans L.;
Spirea crenata L.;
Platanus orientalis L.;
Punica granatum L.;
Hippophae rhamnoides L.;
Elaeagnus angustifolia L.;
E. caspica Grossh.;
Buxus hyrcana Pojark.;
Pistacia mutica F. et M.;
Cotoneastes sp. div.

The angiospermous forests are prevailing mostly in Azerbaijan. Coniferous are represented only by pine woods with Koch pine (*Pinus kochiana* Klotz.) - *Pinus hamata* (Stev) D. Sosn. or *P. sosnowskyii* Nakai - as a small stains in wild form,



with isolated areals, being in the area of Great and Lesser Caucasus and *Pinus eldarica* Medwi - occurs only in one place on the Eldar oyugu mountain range.

Yew grove areas occur there and here among mountaineous leaf-bearing woods, besides of pine woods: junipery woods occur widely in the dry foothill by 6 species: *Juniperus oblonga* Bib., *J. pygmaea* C. Koch., *J. rufescens* Link., *J. foetidissima* Willd., *J. polycarpus* C. Koch., *J. sabina* L. The most large massifs are located on the lower mountain ranges - (Tertiary plateau) of Bozdag. Pine, yew and *juniper* forests occupied only about 2,5% of entire republic forest area, all together.

Azerbaijan forests can be divided on 3 group by their national-economic importance:

I group: reserved (protected) forests - having health-resort - medicinal, soil - and water - protecting importance. Mountain and high-mountain broad-leaved forests belong to this group, making up 65% from entire forest fund of republic. Forest - forming breeds in these forests and first - class beech forests (*Fagetum orientalis*), oak forests (*Quercus iberica* and *Quercus macranthera*), hornbeam forests (*Carpinetum caucasica*) and curved birch forests with *Betula raddiana*, *B. litwinowii* and *Acer trautvetteri* at high-mountains. In these forests composition one may to mark high-trunk breeds in quantity.

II group: mountain broad-leaved, water-and-soil-guarding forests, making up 30% from entire republic forest funds.

III group: Tugai and riverside forests. Insignificant part of these forests is preserved in untouched primary form, but the greater part has been destroyed by man. This group of forests put together 1,9% of total area of republic forests.

Endemic species of Azerbaijan forests:

Dryopteris raddeana Fomin.;
Pinus eldarica Medw.;
Fritillaria grandiflora Grossh.;
Muscari grossheimii A. Schck.;
Iris schischkini A. Grossh.;
Carpinus oxycarpa H. Winkl.;
Carpinus geoktschaica Rodde-Fom.;
Corylus cervorum V.Petr.;
Ficus hyrcana A. Grossh.;
Silene praestans B.Schischk.;
Cotoneaster saxatilis Pojark.;
Scrophularia hyrcana Grossh.;
Pyrus vsevolodii T.Hied.;



Endemic species of Azerbaijan forests:

Crataegus eriantha Pojark.;
Asyneuma talyshense Fed.;
Rubus hyrcanus Juz.;
Rosa sosnovskyi Chrschan.;
Rosa azerbaijdzhanica Novop.ex Rzazade;
Rosa nisami D. Sosn.;
Rosa prilipkoana D. Sosn.;
Rosa karjagini D.Sosn.;
Polygala grossheimii Kem.-Nat.;
Stachys karabachensis Pobed.;
Veronica arceutobia G.Wor.;
Polygonum caspicum Kom.;
Solanum kieseritzkii C.A.M.;
Scrophularia hyrcana Grossh.;
Scrophularia zuvandica Grossh.;
Orobanche transcaucasica Tzvel.;
Tilia prilipkoana Wagn.et Grossh.

Relic species of Azerbaijan forest:

1. Preglacial (paleogen,neogen) or plocenous species of Azerbaijanforests:

Parrotia persica C.A.M.;
Albizzia julibrissin Dur.;
Ruscus hyrcanus G.Wor.;
Ilex hyrcana Pojarc.;
Hedera colchica C. Koch.;
Pinus eldarica Medw.;
Iris hyrcana G. Wor.;
Danae racemosa Moench.;
Buxus hyrcana Pojark.;
Buxus colchica Pojark.;
Taxus baccata L.;
Celtis caucasica W.;
Pinus kochiana Klotzsh.et C. Koch.;
Rhododendron caucasicum L.,
Rhododendron luteum Sweet.

2. Glacial (pleystocenotic) and early postglacial:

Heracleum sp. div.;
Vaccinum myrtillus L.;
Vaccinum vitisidaea L.;



2. Glacial (pleystocenotic) and early postglacial:

Telekia speciosa (Schreb.) Baunig.;

Scrophularia zuvandica Grossh.

The recent areals and vegetation made up by these species are defined more precisely by republic botanists for their inclusion into republic "Red Book"; their protection and restoration ways are elaborating.

Protection of above mentioned endemics and relic plants are indissolubly connected with protection of plant communities, in the composition of what they are entered and appropriate to these communities geographical landscape elements (mountain, high-mountain, low-mountain and lowland). The mentioned endemics and relic should be put in to culture, conserve in botanic gardens, dendroparks and parks.

The areal of oriental oak park (*Quercus macranthera* F. et M.) is strongly reduced during last 50-60 years; the forest upper boundary (1,800-2,000 m. above on sea level) on great Caucasus come down to 100-150 m. and to 200 in some regions; *Acer trautvetteri* Medw. and *Betula sp. div.* and other forest and herbaceous species narrowed its areal in Subalpine forest subzone.

Tugai and riverside forests were subjected to a large degree to anthropogenic changes than mountain and high-mountain ones. There are less relic and endemics, carried the traces of latest species-formation are spreaded in plains and deserts.

Plants of Azerbaijan, subjected to protection are distributed to following groups:

1. Ancient species, disappearing already from wild forest flora of republic (some from them are occurring in botanic-geographical regions or gardens, parks, dendroparks. To this group belong *Paeonia mlokosewitschii* Lom., *Laurocerasus officinalis*, *Padus racemosa*, *Buxus colchica*, *Buxus hyrcana* etc.

2. The narrow areal and being on the verge of disappearance species: *Taxus baccata*, *Pinus eldarica*, *Pinus (hamata)*, *P. kochiana*, *Rhododendron caucasica*, *Cyclamen elegans*, *Carpinus shushaensis*, *Zelkova carpinifolia*, *Ficus carica* etc. *Pinus eldarica* has a highly limited natural areal but as a progressive breed has been included into cultured flora content; and its artificial areal is outside the republic scopr. *Pinus eldarica* is widely cultivated in the arid countries of hear and Middle East.

The I group plants are absent in natural conditions and have a highly limited areal. It is offered to multiply them and the range of whole areal, for that an appropriate reservations and arboretas is needed to be organized.



There are 13 reservations and dozens of nurseries rare, valuable genefund of flora, vegetation and landscape are not only conserved but favourable conditions for species and their populations number increasing, primary vegetation and landscape restoration are created. Nevertheless, there are a lot of valuable objects (genefunds) occurring out of reservations territory. In connection with this we offer to organize 5 state reservations (2 forest reserves) and 4 national parks (there is no one as yet).

It is offered to create the Karayar forest reservation for tugai forests flora and vegetation conservation; for junipers and other types of xerophyte vegetation conservation - Dibrar lime reservation (Altyagach region) with subsidiary in Lachin region (juniper massif).

The national parks vegetation should be the mixed type (forest, meadow, steppe).

The following 4 national parks are proposed to set up:

- 1. Talysh national park** with area of 500 th. hectares, including Astara, Lenkoran, Jardymly and Lerik regions. It is proposed to include into this park 2 existing state reservations (Kizil-Agach and Hyrcan forest reserves). The lower mountain zone becomes bare from forest due to development of cultured plantation in Talysh region. It is necessary to isolate for park a Nascheku massif, covered by well preserved hyrcanic breeds and lime trees.

The yew groves, located between Vedi and Snow villages of middle mountain zone in forest-less environment from rock- and talus type vegetation is needed to include into park. Into the national park official net an immense pomegranate (*Punica granatum*) in Talysh, above mentioned box grove near to Mashkhan village should be included. Wonderful and inaccessible canyons are there in the Talysh mountains, one from these, located along the Orand-chay river at the altitude about 1,200-1,500 m. above sea level, is notable by its broad-leaved forest species *Quercus*, *Parrotia*, *Tilia*, *Carpinus*, *Acer generas* and many other relic species.

Other narrow canyon with the quite sheer sides covered by compact fern carpet (*Dryopteris filix mas* L.) and by single trees, is located along Viljad-chay, not far from Jardimly, nearly at the same altitude.

The Canyon Tepg - the only natural and accessible passage from forestry Talysh to forestless Zuvand is distinguished by its hard accessibility.

The same kind of canyons are in the other botanic-geographical regions of Azerbaijan.



2. **Gey-Gyol national park** has a area about of 200 th. ha, including a Gey-Gyol reservation with its Eldar-oyugu branch (pine). It is proposed to begin the park lower bound from Akhsu river and to continue up to peak of Kyapaz mountain (3,600 m.) with scope of forest , meadow, water-swampy and rock piled vegetation.
3. **Bichenak national park** - Shakhbuz region (including all forest massif territory) - right - left-sides of Nakhichevan-chay with protection and restoration of forest, steppe and mountain-xerophyte vegetation of NAR. Taking account of forest massif of Nakhichevan AR are small and have a fragmenteous character, it is desirable to allot them under reservation and national parks. Bichenak forest massif is thought to be one of biggest in the AR. The valuable wood breeds: *Quercus macranthera*, *Acer iberica* and species of *Fraxinus*, *Junipers*, *Loricera*, *Prynus*, *Crateagus*, *Rosa* and many others are encountered here. Restoration, reproduction and conservation of these rare, endemic species is of a great importance. Bichenak national park is very comfortable still because there are a large number of curative mineral water springs.
4. **Nabran-Shakdag national park** is situated over the range of 3 administrative regions - Khachmas, Kuba and Kusar with the total area of 600 th. ha. The mentioned park lower boundary will be start from Caspian sea and will continue up to Shakhdag massif - to 4,500 m. above sea level. The sandy (psamophyte vegetation , riverside greenwoods, on the mountains - steppe, mountain-forest and on the most high zone subalpine and alpine vegetation is occurring. On the mountain peak - there are the Shakdag glaciers. All types of vegetation that are represented in country occur in the park. Sandy, desert, semidesert, steppe, mountain-xerophyte, water-swampy, meadow and small vegetation is highly represented here.

The later types are represented both in the lowland and mountain, even at high-mountain, Park has a touristic, climate - balneological and aethetic importance. Park is a natural laboratory for students, post-graduated students, pupils, scientific workers.

Academician Aliev G.A. has constantly demand to organize this park and has wrote over and over again about that: A great number of rare, endemic, relic, disappearing species are in the mentioned new reservations and national parks; their conservation and reproduction will promote to increase their population composition and will restore the eroded mountain slopes for account of these species.

Thus, natural resources are not endless. The balance disturbance problem in nature is connected with an activity of man, therefore all forces should be



directed to conservation not only of biosphere resources but also on flora genefund conservation, that have a historical significance.

List of rare wild and bushes breeds, occurring in the Azerbaijan forests-entered into republic Red Book

- Nectaroscordum dioscoridis* Sib. et Smith.;
Ilex hyrcana Pojark.;
Hedera pastuchowii Woronow.;
Aristolochia bottoe Saub. Proch.;
Dryopteris raddeana Fomin.;
Calanthus caucasicus Grossh.;
Telekia speciosa (Schreb.) Banmg.;
Alnus subcordata C.A.M.;
Betula raddeana Trautv.;
Buxus colchica Pojarc.;
Buxus hyrcana Pojark.;
Campanula radula Fisch.;
Evonymus velutinus F. et M.;
Corylus colurna L. (*C. cervorum* V. Petr.);
Juniperus foetidissima W.;
Diospyros lotus L.;
Rhododendron caucasicum L.;
Rh. luteum Sweet.;
Albizia julibrissin Dur.;
Gleditschia caspia Dsf.;
Castanea sativa Mill.;
Quercus araxina Grossh.;
Quercus castaneifolia C.A.M.;
Parrotia persica C.A.M.;
Pterocarya pterocarpa (Mchx.) Kntb.;
Danaë racemosa (L.) Moench.;
Fritillaria grandiflora Grossh.;
Lilium ledebourii Boiss.;
Merendera candidissima M. et Grossh.;
Ruscus hyrcanus G. Wor.;
Alcea kusariensis Iljin.;
Alcea lenkoranica Iljin.;
Ficus hyrcana Grossh.;
Cephalanthera longifolia (Huds.) Fritsch.;
Paeonia mlokosewitshii Lom.;
Pinus eldarica Medw.;
Pinus kochiana Klotz. et C. Koch.;
Calligonum bakuense Litw.;



List of rare wild and bushes breeds, occurring in the Azerbaijan forests-entered into republic Red Book

Cyclamen elegans Boiss. et Buhse.;
Primula juliae Kusn.;
Frangula grandifolia Grub.;
Cotoneaster saxatilis Pojark.;
Lauracerasus officinalis Roem.;
Padus racemosa (Zam.) Gilib.;
Pyrus boissieriana Buhse.;
Pyrus eldarica Grossh.;
Pyrus hyrcana An.Fed.;
Pyracantha coccinea Roem.;
Rosa azerbaijdzhanica Novor. et Rzazade.;
Rosa karjaginii D. Sosn.;
Rosa sosnovsky S. Tam.;
Salix kuznetzowii Zaksch.;
Atropa caucasica Kreyer.;
Staphylea colchica Stev.;
Taxus baccata L.;
Daphne transcaucasica Pobed.;
Zelkova carpinifolia (Pall.) Dipp.;
Valeriana alliarifolia Vahl.;
Woodsia alpina (Bolt.) A. Gray.

Besides of indicated foresty species, entered into Red Book, scientists of republic propose to include into the Red Book more than 200 species, 50 out of which are belonging to forest breeds, in particular:

Acer trautvetteri Medwed.;
Quercus longipes Stev.;
Quercus macranthera F. et M.;
Hedera colhica C.Koch.;
Rosa hadzievii Xrchanowskyi et Isk.;
Amygdalus fenzlana (Fritsch) Lipsky.;
Rubus hyrcanus Juz.;
Carpinus schushaensis H. Winkl.;
Carpinus geoktschaica Radde - Fom.;
Celtis caucasica and others.



Besides of forest breeds in Azerbaijan forests there occur many of wild fruit eatable woody-bushes breeds. A number out of them, became a semi-cultured due to folk selection, their fruits became an eatable ones, population are producing of storages of wild-fruits, in particular:

Seed-type plants

Malus orientalis Ugl.;
Pyrus vsevolodii T. Heid - endemic;
Pyrus boissieriana Buhse.;
Pyrus elata Rubtz.;
Pyrus grossheimii An. Fed.;
Pyrus hyrcana An. Fed.;
Pyrus communis L. - culture;
Pyrus zangezura Maleev.;
Pyrus syriaca Boiss.;
Pyrus voronovii Rubtz.;
Pyrus nutans Rubtz.;
Pyrus eldarica Grossh.- endemic;
Pyrus raddeana G. Wor.;
Pyrus complexa Rubtz.;
Pyrus georgica Sch. Kuthanth,;
Pyrus salicifolia Pall.;
Pyrus medvedevii Rubtz.;
Mespilus germanica L.;
Crataegus pentagyna Waldst. et Kit.;
Crataegus orientalis Pall.;
Crataegus eriantha Pojark.;
Crataegus kyrtostyla Fing.;
Cydonia oblonga Mill.;
Sorbus boissieri C. K. Schn.;
Sorbus balbaceii Deg. et Fritsch.;
Sorbus turcica Zins.;
Sorbus caucasigena kom.;
Sorbus subfusca (Zed.) Boiss.;
Sorbus kusnetzovii Zins.;
Sorbus caucasica Zins.;
Sorbus graeca (Spach.) Hrdl.;
Sorbus armeniaca Hedl.;
Sorbus torminalis (L.) Gr.



Stone-type plants

Cerasus mahaleb (L.) Mill.;
Cerasus avium (L.);
Cerasus microcarpa (C.A.M.) Boiss;
Cerasus incana (Pall.) Spach.;
Cerasus araxina Pojark.;
Cornus mas L.;
Elaeagnus angustifolia L.
Elaeagnus caspica (D. Sosn.) Grossh.;
Prunus spinosa L.;
Prunus divaricata Led.;
Prunus caspica Kov.

Berry-fruits

Rubus bushii (Rozan) Grossh.;
Rubus caucasicus Focke.;
Rubus caesius L.;
Rubus sanguineus Friv.;
Rubus hirtus Waldst. et Kit.;
Rubus georgicus Juz.;
Rubus ibericus Juz.;
Rubus candicans Weihe.;
Rubus dolichocarpus Juz.;
Ribes orientale Dsf.;
Ribes biebersteinii Berl.;
Berberis vulgaris L.;
Berberis iberica Stev et Fisch.;
Berberis densiflora Boiss. et Buhse.;
Sambucus nigr L.;
Sambucus ebulus L.;
Grossularia reclinata (L.) Mill.;
Vitis silvestris Gmel.;
Hippophae rhamnoides L.



Nuts

Amygdalus fenzliana (Fritsh.) Lipsky.;
Juglans regia L.;
Corylus iberica Witt. et Kem.-Nat.;
Corylus avellana L.;
Corylus cervorum V. Petr.;
Fagus orientalis Lipsky.;
Castanea sativa Mill.;
Pistacia mutica Fisch. et Mey.

Subtropical fruit cultures

Ficus carica L.;
Punica granatum L.;
Diospyros lotus L.;
Gleditschia caspica Desf.;
Rosa sp. div.;
Cyclomen iberica L.;
Cyperus aureus Ten.;
Pteridium sp.

Vitamin-contains forest plants

1. Vitamin A group (aksepophthola):

Achillea millefolium L.;
Adonis vernalis L.;
Arctium minus (Nill.) Bernh.;
Aristolochia clematitis L.;
Asparagus officinalis L.;
Atropa caucasica Kreyer.;
Berberis vulgaris L.;
Betula litwinowii A. Dol.;
Cerasus avium (L.) Moench.,
Clematis vitalba L.,
Coronilla varia L.;
Equisetum arverse L.;
Heracleum asperum Bib.;
Juglans regia L.;
Lapsana communis L.;
Mespilus germanica L.;
Olea europae L.;
Phleum pratense L.;
Pinus kochiana Klotz et Koch.;
Plantago lanceolata L.;



1. Vitamin A group (aksepophthola):

Plantago media L.;
Populus tremula L.;
Primula macrocalyx Bge.;
Pyrus caucasica An. Fed.;
Rosa sp. div.;
Rubus sp. div.;
Rumex acetosa L.;
Sambicus nigra L.;
Sorbus caucasigena Kom.;
Tilia cordata Mill.;
Tussilago farfara L.;
Urtica dioica L.;
Viola odorata L.

In Azerbaijan there are 20 species of plant, containing a vitamin A besides these.

2. Vitamin B1 group:

Corylus avellana L.;
Humulus lupulus L.;
Juglans regia L.;
Pinus eldarica Medw.;
Pyrus communis L.;
Rumex acetosa L.;
Vitis vinifera L.

2a. Vitamin B2 group:

Rosa sp. div.;
Vitis vinifera L.

3. Vitamin C group (ascorbic acid):

Albizzia julibrissin Dur.;
Alnus incana (L.) Moench.;
Althea officinalis L.;
Amygdalis communis L.;
Arctium lappa L.;
Atropa caucasica Kreyer.;
Berberis vulgaris L.;
Betula pendula Roth.;
Calamintha oblongifolia C. Koch.;
Capsella bursa pastoris (L.) Med.;
Castanea sativa Mill.;
Cerasus avium (L.) Moench.;
Cotoneaster racemiflora (Dsf.) Koch.;



3. Vitamin C group (ascorbic acid):

Corylus avellana L.;
Cornus mas L.;
Chamaenerium angustifolium (L.) Scop.;
Dactylis glomerata L.;
Elaeagnus angustifolia L.;
Equisetum arvense L.;
Euphorbia sp. div.;
Filipendula hexapetala Gilib.;
F. ulmaria (L.) Max.;
Fragaria vesca L.;
Fraxinus excelsior L.;
Galium verum Scop.;
Glum urbanum L.;
G. rivale L.;
Gleditschia caspia Dsf.;
Juniperus sp. div.;
Hippophae rhamnoides L.;
Humulus lupulus L.;
Hypericum hirsutum L.;
H. perforatum L.;
Juglans regia L.;
Ligustrum vulgare L.;
Lonicera tatarica L.;
Mespilus germanica L.;
Morus nigra L.;
Paliurus spina-christi Mill.;
Populus alba L.;
P. tremula L.;
Prunus divaricata Led.;
Rhus cariaria L.;
Rhamnus pallasii F. et M.;
Rosa sp. div.;
Rubus sanguineus Friv.;
Rubus saxatilis L.;
Rumex acetosa L.;
R. acetosella L.;
R. confertus W.;
Salix sp.;
Sorbus sp. div.

From this group yet 65 species are noted in the forests. Plants, occurring in Azerbaijan forests have an other kind of vitamins.



Forest medicinal plants

Plants, containing a glucosides.

1. Heart remedies:

Adonis vernalis L.;

Periploca graeca L.;

Corvallaria transcaucasica Utkin.

2. Vessel remedies:

Viscum album L.;

Rumex sp. div.;

Urtica dioica L.

3. Breeding stoping remedies:

Viburnum opulus L.;

Achillea millefolium L.;

Capsella bursa pastoris Med.;

Rumex acetosa L.;

Urtica dioica L.

4. Remedies, stimulating of nervous system:

Salvia dracocephaloides Boiss.;

Pyrethrum parthenifolium W.



5. Remedies, reassuring of nervous system:

Valeriana officinalis L.;

Atropa caucasica Kreyer.;

Senecio platyphyllus (M.B.) DC.

6. Diuretics and gallinative remedies:

Juniperus sp. div.;

Betula pendula Roth.;

Rosa sp. div.;

Calendula officinalis L.;

Helichrysum arenarium (L.) D. C.;

Rhamnus pallasii F. et M.

7. Vermifugal remedies:

Dryopteris filix mas (L.) Schott.;

Origanum vulgare L.;

Mentha longifolia (L.) Huds.

8. Sweated remedies:

Rubus buschii Grossh.;

Sambicus nigra L.;

Tilia cordata Mill.



Traditional - medicinal plants

Buxus colchica Pojark.;
Convolvulus erinaceus Led.;
Diospyros lotus L.;
Mentha longifolia (L.) Huds.;
Quercus castaneifolia C.A.M.;
Ranunculus repens L.;
Rosa sp. div.;
Salvia grutinosa L.;
Ulmus foliacea Gilib.;
U. suberosa Moench.;
Urtica dioica L.;
Sambicus ebulus L.;
Buxus hyrcana Pojark.

150 plant species, having traditional-medicinal means occur in the forests of Azerbaijan. Some estate parks, gardens, having rich collection of foreign wood breeds, the collection being established for decades and representing a great interest for further investigation and utilization are protected by genefund. Valuable parks and gardens in Shemakha in 1846, in Gyandja in 1947, in Zakatala in 1972 and in other provinces of Azerbaijan have been set up. The known millionaire Alfred Nobel has founded a garden "Pertroloe" with area of 6 ha. More than 60 rare local and foreign tree and bushes species have been introduced in this garden. The so called Sardar bagi was founded in Gyandja in 1869. More than 80 species different trees and bushes were introduced there.

Hundreds of exotics were introduced in Lenkoran humid subtropics at the turn of 19 century. Exotics have been introduced also in Nakhichevan from late of 19 century - beginning of XX c. A great number of rare aboriginal wood breeds remained up to present in these gardens.

The East-Transcaucasus subsidiary of the Institute of applied Botany and new cultures (S.-Petersburg) was founded with active participation of academician Vavilov V.I. in 1926. in Mardakyani. Introduction and investigation of decorative plants is carried out here from 1927 up today. Some part of these plants is used in Apsheron peninsuls and Baku planting.

Further, along with oil industry development of Baku, to promote its prosperity and planting, Botanical garden was planted including more than 2,000 species of trees and bushes (both local and foreign).



Botanic garden, 4 dendroparks, many city gardens and parks are created and exist in Azerbaijan. A sections of rare and disappearing species, endemic and relic plant of Azerbaijan flora are organized in dendroparks and botanic garden. Many valuable species are reproduced and widely used in the planting of towns and populated areas of republic.

Artificial pine woods (*Pinus eldarica* Med.) in many regions of republic and woods around Djejrnbatan and Mingechevir reservoirs created. Small wood oasis's around Shamkhor, Terter and other basins were created. Artificial forest belts have been set up in desert and foothill regions of republic. The natural monuments and sights protection idea is penetrated into people's consciousness long before. If at old times this idea was connected mainly with ritual moments, now it is timed to park-construction ideas and towns and populated areas planting and plantation especial value. It is well known that during Ulmus and backberry (*Celtis* L.) cut drowing in Kuba, Zakataly, Belokan and other districts or during forest cut drow the mountain's peak were usually leff dressed by "sacred" groves. Such groves are preserved in many sites and are protected at present. Box (*Buxus* L.) groves under "holy" pupils graves were preserved and thus it protect them from disappearance. The most box grove near Mashkan was transformed into park of this district, was fenced in and is well protected now. Pomegranate (*Punica granatum*) thickets along Caspian Sea between Astara and Kolodag lake are protected by local population, and forest cutting is prohibited there. The rare trees, growing at cemetery are protected as a nature monuments in the Tala (Zakatala region).

A natural oak forest (*Quercus macranthera*) is diligently protected by rural population and say that during recent 50-70 years no oak tree was cut down in this forest at Saribash (Kach region).

Highways from Ismailli up to Belokan constructed on the macro-slopes of Great Caucasus in the middle of 19th century, Juglans regia alleys are growing within 100 km. distance. Secular, valuable trees are protected at present. Secular Platanus orient trees, individual specimens of which are 800-1,000 years in Zakataly, Zangelan, Terter, Gyandja, Geranboy, Agdash regions are protected by population. All these factors are indicating the love and attention of people to words nature.

It would be very interesting to observe the protection by population of the natural monuments all over the republic because we have only a fragmentary material at a time, while this phenomenon is no doubt of a more large character.



Such careful treatment to nature preservation must considerably make easier the further nature protection in Azerbaijan. Unfortunately, 25% of our territory is occupied by Armenian aggressors. 3 unique reservations are situated on this territory: Natural grove of *Platanus orientalis*, in Zangelan, Topkhana State reservation in Shusha and Alagellar alpine-meadow reservation in Kelbadjar region. Besides, there are hundreds secular monuments of natural-endemic relic species, unique alpine and subalpine meadows and pastures, enormous massifs of forests beautiful fruit-berry gardens, agricultural areas (vine-yard, cereals, cotton-yards, vegetable-gardens cultures) in this territory. All these have been destroyed by Armenian aggressors.

Million heads of horned cattle and goats and sheep were captured and exterminated. 8 big cities and 800 villages were completely destroyed and 1 million people become refugees. All cultural and historical monuments located on the occupied territory were completely rare to the growing, Azerbaijanian's personal property was stolen.

The forest areals are mainly under competence of forest economy organs (1,085.2 th. ha) and only 128 th.ha (48%) belong to collective farms and state farms.

Forest economy is governed by industrial enterprises of Azerbaijan Republic forest economy (IE Azerles). Forest economy includes the enterprises of forest farms and forest-reclamation stations with wide of forest rounds.

Forest-farms became complex multi-branched enterprises, busy with growing forest, carrying out state wood storage, providing utilization and realization of forestry waste, engage in subsidiary agriculture, storage of wild fruits, hay, medicinal plants. At present 27 forest farms, 3 forest - reclamation stations, 2 forest nurseries and normative station are functioning.

Scientific research work on forest-farming and agroforest-reclamation is performing by:

Azerbaijan Scientific-research and Project Institute of Forest Economy (ASRPIFE);

Institute of Botany Academy of Sciences;

Institute of Soil and Agrochemistry Academy of Sciences;

Institute of Geography Academy of Sciences;

Agricultural Academy of Ministry of Agriculture of

Azerbaijan Republic.



Linked to huge volume of forest work and significant ratio of planting, seed-farming and nursery farms achieve the exceptional importance. A forest - planting in poorly-forest Azerbaijan is considered to have an important significance, therefore it needs to set up such kind a forest, which occupying certain squares should provide a reception of wood with essential size and quality, stable to disease and vermins.

To proceed from this, application of forest genetics and selection achievements to forest-growing is very important.

"Azerles" IE should give a special attention to selection and seed-farming of valuable, aboriginal, endemic, relic breeds and those ones which have been included into Red Book of Azerbaijan Forest economy intensification - quality and quantity forest improvement is brought forward to the first stage under the conditions of scientific progress.

Natural and artificial forest farming, zone typological based forest farming maintenance, forest technology, zone typological cut forest productivity increase problems, recreational forest utilization, optimal forest-amount definition, preventive measures for forest protection from vermins and diseases and lot of other issues are given the priority recently.

Along with science and technics development the necessity is felt in high qualified staff training both within and outside the country.



ANNEX 3

Azerbaijan Republic State program on forest genetic resources

During the entire historical period with the population increasing the natural vegetation cover of country is faced with anthropogenic pressures. Especially in this respect suffered the lowland, foothill and mountain forests, "come off" riverside and tugai forests.

Mankind continuous intensive industrial activity considerably weakened forest ecosystems. As a result the forest area have not only been reduced, but valuable, wood breeds, sometimes even individual old species (relic and endemic, being nature monuments disappeared.

Due to intensive development of industry and agriculture the valuable genetic forest resources (FGR) also are under threat of disappearance recently. Along with forest massif decreasing, the water resources, salinization and soil erosion are increased and arable lands are reduced that resulted in the nature balance disturbance. Therefore, all efforts should be directed not only to conservation of forest genetic funds but on individual, rare disappearing endemic species having a great importance as a valuable genefund.

In order to prevent these dangerous tendencies state committee of plant genetic resources (SCPGR) at Ministry of Agriculture of Azerbaijan Republic in 1995, was organized. The SCPGR activity is directed to national program creation, the main goal of which is inventory of wood breeds, namely revealing, collection of main forest wood seeds, restoration, reproduction, investigation, rational utilization, documentation and conservation of local genefund of forest flora.

Chairman of SCPGR is an official and is responsible also for Forest Genetic Resources (FGR) fate.

At SCPGR the working group on forest genetic resources is functioning. Centralized coordination, regulation and control on inventory, restoration, reproduction, documentation, rational use and conservation of FGR is also carried out by SCPGR.



To meet a population and industry essential needs in wood and other forest benefit, simultaneously with improvement of forests and their protecting function, there is a strong need to develop the high forest productivity and stability in comparison to the precedent generations.

That is why, forest-breeding is particularly significant task especially in poorly-forest, mountainous Azerbaijan. The fact that the forest should be located in certain areas should be given the priority thus making available the option to produce an essential wood dimension and good quality and the same time having stability to vermin and disease. Linked to this fact the responsibility is given to plant breeders, geneticists, forest experts and geobotanics.

First of all the forest expert should be provided by essential reliable, valuable and multi-qualified original genetic material for the best wood selection, namely, species, quickly growing, steam form, wood quality and stability to disease and vermin. Therefore, during forest farming to do without forest genetics and selection achievements is not possible. To select the essential forms and species Azerbaijan nature soil-climate conditions itself provided forest with different breed content formation. There are 436 trees and bushes species, 107 - high bushes and 162 - low and semi bushes growing.

Despite of such rich forest genetic fund all species, endemics, relics and their areals are not sufficiently revealed, investigated, provided by proper preservation and are not selected. Therefore, it is important to set more accurate definition of wood breeds contemporary areals, especially of forest-forming ones by means of their reproduction and restoration in the natural areals. Endemic and relic species it is necessary widely to introduce in to culture at the botanic gardens, dendroparks, parks and collection lots. Old, species already disappearing from republic wild flora met in botanic-geographical regions or gardens, parks need to be reproduced and protect as natural monuments.

Specific, narrow areal species being on the edge of disappearance should be protected within the whole areal and to get the goal the appropriate reservations should be organized.

The existing reservations (13) are not entirely scoping the valuable forest genefund.

Protection of some rare representatives of aboriginal flora may be carried out by prohibition or limitation their economic utilization and by botanic education.

In this connection, the protection scientific background and rational utilization of forests genetic resources becomes the issue of importance in



Republic. To protect rare endemic, relic woods and useful species new reservations and national parks should be organized.

Valuable aboriginal rare, endemic, relic breeds entered the "Red Book" of Azerbaijan Republic, selection and seed farming should be given a certain and specific attention.

Taking into account the limited number of scientists and highly-skilled specialist lack, the necessity of training and education in this specific area at the country and international centres is felt.

As consistent with above mentioned, the program main goals are as follows:

1. Expeditory investigation and inventory of forest genetic resources;
2. Collection, restoration, multiplying and local forest genefund collection nurseries creation;
3. Investigation (characterization, evaluation) of forest genetic fund;
4. Effective utilization of forest genetic fund.
5. Documentation (passportization) of forest genetic resources;
6. Conservation (protection) of forest genetic resources.

In order to realize the object in view it is needed to carry out the following tasks:

1. Creation of model for centralized system coordination, management of research work and protection control in the field of country FGR.
 - a. Creation of management system and coordination of research projects and their control;
 - planning;
 - organization;
 - access the results to user's;
 - account and registration etc.
 - b. Set up the State Committee on PGR
 - Chairman of SCPGR;
 - Secretariat on coordination of PGR;



- working groups on PGR;
 - Institute of Botany Academy of Sciences;
 - Institute of Geography Academy of Sciences;
 - SRI of forestry and agro-reclamation industrial enterprises "Azerles";
 - Agricultural Academy;
 - Industrial enterprise "Azerles".
2. Expeditory revealing of areals, inventory, collection, restoration, reproduction and promotion *in situ* and *ex situ* conservation of forest genetic resources in country.
- a. Inventory on zones and identification of forest ecosystem and valuable lots of light forest, having rare and relic wood breeds.
 - b. Organization and increasing of number of expeditions for collecting and creation of local forest genetic fund (field genebank) at country different zones:
 - to collect of forest forming breeds seeds and restore them at natural areal;
 - Multiply them at the growing places;
 - to create a collection nursery - at the different botanic - geographical regions and nearly situated reservations.
 - c. To investigate (evaluation and characterization) of forest genetic fund, to sum up and create it in the accessible form.
 - d. To improve of protection and *in situ* and *ex situ* conservation of FGR and elaborate a clear control mechanism.
 - forests;
 - reservations;
 - nurseries;
 - multiplying arboretas etc.
 - e. To elaborate the measures, including attracting of different organization for *ex situ* conservation of forest genetic resources, especially by means of genebank:
 - botanical gardens;
 - dendroparks;
 - fruit-berry nurseries etc.



3. Restoration of damaged forest and conservation of optimal forest area. Promoting to long term production at sufficiently high quantity following usefulness:
 - culture-aesthetic;
 - ecological;
 - improve from a health point of view;
 - wood;
 - agricultural;
 - food;
 - recreation.

4. To elaborate the measures on conservation of Azerbaijan forests intactness, stability and high productivity.

5. To elaborate the measures for conservation and breeding of rare valuable wild species of dendroflora.
 - a. To organize the special forest-seed stations: -collecting of high quality seeds (superelite, elite);
 - to multiply them at the growing places

6. Elaboration of methods for promotion of natural restoration and creation of culture such valuable relic as zelkova, haney loast, silk tree, box hyrcanic.

7. Set up four national parks, at regions with unique phytolandscape and high recreation potential of forest consisting endemic and relic trees, not disturbing traditional forms of forestry.
 - a. Talysh national park;
 - b. Gek-Gyol national park;
 - c. Nabran-Shakhdag national park;
 - d. Bichenek national park;



8. Establishment of an early rational warning mechanism based on integrated system approach to monitor genetic erosion of key forest genetic resources:
 - elaboration of early warning mechanism reflecting of forest ecosystem change for the worse;
 - constant control on especially valuable forest genetic funds samples of endangered and threatened species.

9. Implementing into international system of computerized documentation of forest genebank, improvement of information and material exchange at regional and international regions.
 - a. Set up of information centre on FGR:
 - Set up a communication network systems in region and their integration into INTERNET networks system;
 - Encouragement of FGR information exchange etc. with other countries and international centres.
 - b. Creation of catalogue on FGR:
 - list of families, general, species etc.;
 - distribution of FGR list available in country and news addition with technical support from IPGRI under FAO auspices.
 - c. Creation of database bank:
 - passport of FGR;
 - control on availability.
 - d. Publication of materials dealing of FGR.

10. Development of strategies for integration to international training system for administrators and managers in the FGR field -Rise the qualification of managers, technical workers at international centres (IPGRI etc.) on short and long-term courses.

11. Set up a national education system, retraining and training of low-level staff in the field of FGR and elaboration of measures for their integration into international education system.
 - a. Elaboration of policies for propagating of FGR culture



- At the stage of primary schools to implement into general biology special understanding about FGR, mainly about protection and utilization of FGR;
 - to organize a special secondary schools at the different republic zones;
 - to set up a forestry departments at the State or Technical Universities;
 - to improve and deepen the knowledge on methodologies of economic aspects *in situ* conservation.
- b.** Set up a short and long-term courses on staff training and retraining in close coordination with various research and high-level educational institutions in FGR area.
- c.** For high-level staff training through probation or post-graduation at international centres the close linkages establishment and assistance are needed (IPGRI etc.).
- 12.** Establishment and development linkages between international regional centres and countries and institutions engaged in the forest genetic resources.