TURKEY:

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

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Note by FAO

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CHAPTER 1
Introduction

Turkey is located in the subtropic zone in between 36°-42° latitudes North and 26°-45°longitude east. The total area is 77,945,000 hectares. The surface area of Turkey is divided by the Dardanelles, the sea of Marmara and the Bosphorus in the west and it is surrounded by Black Sea in the north; Aegean Sea in the west; Mediterranean Sea in the south. Turkey has boundaries with Greece and Bulgaria in the west, Georgia, Armenia, Azerbaijan, Iran in the East; Iraq and Syria in the south. Geographically Turkey is a land bridge between Europe and Asia.

1.1 TOPOGRAPHY

The topography of Turkey exhibits significant variety where ecological factors change greatly over very short distance. The European section (Thrace) of Turkey is a fertile hilly land. The Asian part (Anotalia) of Turkey consist of an inner high plateau with mountain ranges along the north and south coasts. The plateau extends from west to Aegean coast, with many river valleys.

Most of the Anatolia consist of a plateau, rising steadily towards the east and bounded on the north and south by steep mountain ranges which is part of the Alpine-Himalayan System. Southern mountain range (Taurus) at the east curves round in an arc to the South East Taurus Mountain, embracing the outer plateau Fertile Crescent which is the northern extenuation of Syrian Desert. In West Anatolia the plateau falls gradually sea level, and terminates in a series of promontories which face the Aegean Islands.

Throughout most of Northern Anatolia the coast plunges steeply into the Black Sea. In the eastern part of Black Sea region, mountain range is high, continuous and close to the sea, rising at many points to over 3,000 m to west wards of northern mountain range spreads out, the general level of northern range falls off and the highest peaks are set well back from the Coast. Several rivers cut their way on to the plateau.

In south Anatolia the coastline is very steep. The deep gorges separate this mountain range as West, Central Taurus massif. The massif continues North-eastwards as Anti-Taurus the Eastern arm continues southwards as Amanus range which runs

close to the gulf of Iskenderun until it reaches the Syrian frontier at Akra Dag. Much of the plateau of central Anatolia lies between 800 and 1,000 m, although various mountains rise much higher.

In the centre, the plateau fails gradually to the treeless depression containing the large salt lake. The East Anatolia is higher and much more mountainous, the level of plateau itself reaching over 1,700 m in the further east part. From this plateau rise the particularly high Vulkan Mountains, over 300 m. In the further east 5,172 m high Agri Mountain the highest mountain of Turkey.

South East Anatolia, in its topography, stands somewhat apart from East Anatolia. Though often strictly to the plains between Dicle (Tigris) and Firat (Euprathes). This plateau is considerably lower and flatter, failing gently from 800 m in the North, to about 400 m near the Syrian border. It consist of rolling hills and vast plains, the wide basaltic hump of Karaca Dag (1919 m) providing the major relief.

Thrace (Tracia) is topographically very heterogeneous. Istranca mountains that borders Black sea is a low continuation of the northern range of Anatolia and is composed largely skhists. Most of the area of this region is occupied by undulating plains drained by Ergene river. On the northwest side of the Marmara Sea is the low sandstone range of Tekir Mountains which continues southwards into Gelibolu peninsula.

1.2 CLIMATE

In contrast to the rest of turkey, the most striking climatic feature of North Anatolia is the heavy rainfall, which particularly in the North-east, continues all the year around. The coastal climate is mild. Throughout north west of this region there is sufficient summer drought near the coast west of cape Sinop cold winds bring lower winter temperatures. Although precipitation in the area is often believed to increase with altitude.

West and South Anatolia have typical Mediterranean climate near the coast- mild, wet winters, and long, hot, add summers with almost constant drought from May to September. Although summer precipitation is negligible, humidity is not so low as it is on the Central Plateau. Rainfall in the Mediterranean belt of Turkey, however, varies considerably from one year to another, throughout much of the area snow lies in winter above 1,000 m. Temperatures tend to be higher in South Anatolia than west, where in South West of Marmara Sea the Mediterranean climate is modified by the lower temperatures and higher rainfall of North Anatolia.

In the Inner Anatolia precipitation occurs predominantly in winter and spring, the climate of Inner Anatolia resembles that of Mediterranean climate of West and South Anatolia. In most areas, precipitation is less and much of it fails as snow. Winter temperature are very much lover, particularly in the highlands of East Anatolia, where nearly the whole area in under snow from November to March or April. In summer temperatures soar during the day and drop suddenly at night. A striking feature of climate, is the very low summer humidity much lower than in the Mediterranean region-and correspondingly high saturation deficit.

The plateau tends to be very windy and suffers devastating hail storms. Precipitation is even more erratic than in Mediterranean belt; in some years spring rains are so light, while in a favorable year almost daily thunderstorms continue throughout May or even into June. On the lower, outer plateau of South East Anatolia temperatures are higher than in the rest of Inner Anatolia.

1.3 POPULATION

The population growth rate is high in Turkey. The present population of Turkey is 60 million (59,577,000, in 1993). Economically active population of Turkey is 25,598,000 and 45.6% (11,676,000) of this figure is accounted as agricultural population.

1.4 AGRICULTURE

The total amount of arable land is about 27.6 million hectares (35%) of the land of Turkey. The main farming systems are dry and irrigated farming. Irrigable land is 12.5 million hectares arable land. Since the water derivation is not possible through the basins, the only 8.5 million hectares of land can be irrigated economically.

The total irrigated area is about 4.5 million hectares.

Land use of Turkey is given in Table 1.

*Table 1 Land Use of Turkey (1992)**

Land	Land in hectares	Percentage (%)
Forest		
Area sown	20.119.000	42
Fallow land	18.811.000	40
Fruit orchards	5.089.000	11
	3.012.000	6
. Vineyards	576.000	
. Fruit orchards	1.565.000	
. Olive orchards	871.000	
Vegetable gardens	663.000	1

*Agricultural Structure and Production, 1992. State Institute of Statistics.

Total 18,532,038 hectares are sown and 18,282,499 hectares are harvested for field crops. The total field crop production of Turkey is 55,501,308 tons. The detail statistics are given in Table 2.

*Table 2 Field Crop Statistics (1992)**

Crops	Area Sown		Production	
	Hectares	Percentage	Tons	Percentage
Cereals	13,933,945	75	29,071,250	52
Pulses	2,083,918	11	1,822,470	3
Industrial crops	1,445,417	8	16,094,506	29
Oil seed crops	771,458	4	2,061,082	4
Tuber crops	297,300	2	6,452,000	12

* Agricultural Structure and Production, 1992. State Institute of Statistics.

The total number of fruit trees is 54,594,800 (475 ,217,000 is bearing and 70,731,000 is non bearing) and the total fruit production is 10 981 700 tons of Turkey. The detailed statistics of fruits are shown in Table 3.

*Table 3 Fruits Statistics (1992)**

Fruits		Number of Trees		Production	
	Bearing	Non Bearing	Total	Tons	Percentage
Pome fruits	46,672,000	10,509,000	57,181,000	2,616,000	25
Stone fruits	119,455,000	14,641,000	134,096,000	1,965,700	18
Citrus	22,595,000	3,159,000	25,754,000	1,674,000	15
Nuts	271,314,000	40,041,000	311,355,000	801,000	7
Grape like fruits	15,181,000	2,381,000	17,562,000	3,925,000	36

* Agricultural Structure and Production, 1992. State Institute of Statistics.

The vegetables grown in 662,571 hectares land and the total vegetable production is accounted as 17,467,970 tones. The detailed figures are given in Table 4 for vegetable production.

*Table 4 Vegetable Production (1992)**

Vegetables	Tons	Production Percentage
Leafy or edible vegetables	1,419,638	8
Leguminous vegetables	583,132	3
Fruit bearing vegetables	14,844,000	85
Root, bulb and tuberous vegetables	531,630	3
Other vegetables	69,520	1

* Agricultural Structure and Production, 1992. State Institute of Statistics.

The fodder crops production is given in Table 5.

*Table 5 Fodder Crops Statistics (1992)**

Crops	Area - Hectares		Production - Tons			
	Sown	Harvested	Grain	Silaje Maize	Green	Dried
Maize	525,000	524,434	-	134,952	-	-
Cow vetches	260,000	257,144	-	-	298,255	326,857
Wild vetches	10,000	10,516	-	-	130	2,940
Alfa Alfa	195,543	194,410	1,817	-	1,658,646	122,650
Sainfoin	83,860	83,791	2,219	-	262,025	288,992

* Agricultural Structure and Production, 1992. State Institute of Statistics.

89,345 hectares area are reserved for tea production for 215,388 tea growers. The total tea production is 724,383 tons (production of green leaves).

1.5 FOREST

Since 1945 almost all the forest in Turkey have belonged to the state in accordance with the principal Forest Act of 1937, No. 3116 as amended in the Forest Act Amendments of 1945, 1950 and 1956. A very small proportion is privately owned (22,066 hectares). Approximately 20% of the land base of Turkey (20 million hectares) is covered with forest, which contains a rich array of plant communities which is especially rich in a diversity of forest ecosystems. The forest have a wide range of values including: watershed management, traditional wood products (lumber, wood, fiber, resin and fuel wood), fruit and nut food sources (e.g. wood crop species of walnut, chestnut, pistachio, pear, apple, olive, pine nut, etc.), medicinal plant product and ornamental plants.

Of equal importance is the function of various forest ecosystems to provide habits for wild relatives and land races of non-woody plants of agricultural value. Forest management strategies are still timber production oriented and do not incorporate the value of forests from more comprehensive perspective as genetic resources reservoirs.

As a result of geographical position, ecological variation of Turkey, the forests show great variation in their type. Eight major forest areas can be distinguished according to their dominant species and their geographical distribution. So there is great variety of forest ranging from cone-bearing, needle-leaf evergreen forest to forest with deciduous trees belonging to the mild climatic zones. There are also gallery type of forest along rivers in central and Eastern Anatolia. The constitutions of forests are either single-species (pure stands) both for evergreen and deciduous trees or mixed-form forests (mixed stands).

Approximately 11 million hectares of forest areas are now classified as unproductive forest and the mature forested area is decreasing due to various factors: such mainly as land opening for agricultural use, uncontrolled grazing, forest fire. Under this circumstances, forest policy has the following objectives: to protect the forest, to manage the forest in order to raise productivity, to improve the forest lands by afforestation and reafforestation.

Since protection of forest depends mostly upon the improvement of social and economic situation of the forest communities living in the forest. The Ministry of Forestry (MOF) provides the possibilities to help the forest villagers to improve their social and economic conditions. MOF works on to develop the forest industry on one land and a large scaled reafforestation program on the other to increase the forest areas of Turkey.

1.6 SEED SUPPLY SYSTEM

Ministry of Agriculture has responsibility for the seed supply of major crops to the farmers communities. The legal regulation. of seed registration, quality control and certification has been promulgated by the Act of 308. Variety Registration and Certification Centre of MARA is responsible for the registration of the developed or improved variety by the public or private research institutions. Those institutions, after the registration of their varieties in according to Act 308, are responsible to produce elite and basic seeds of their varieties. The certified seeds are produced by State Farms or private sector to supply the seed to the farmers. Some of the private seed companies have licenses for research.

Agriculture keeps its importance in national economy, since Turkey is still and agricultural country due to its economical structure. Therefore, increasing the income *per capita* is closely related to increasing the agricultural income.

The area, production and yield of the important crops are given below.

Table 6 Area, Production and yield of some crops (1993)

Crops	Area Harvested (ha)	Production (tons)	Yield (kg/ha)
Wheat	9,600,000	21,016,000	21,189
Barley	3,440,000	7,500,000	2,152
Maize	550,000	2,500,000	4,545
Chik pea	820,000	740,000	902
Lentil	713,000	725,000	1,017
Sugar beet	400,331	15,126,116	38,174
Seed Cotton	554,000	1,390,000	2,507
Cotton seed	823,000	58,000	550
Tobacco	327,000	327,000	999
Sunflower	597,000	815,000	1,365
Potatoes	192,000	4,650,000	24,219

*FAO Yearbook, Production, 1993.

The total crop production indices is indicated as 132.24 in FAO Yearbook production, 1993.

1.7 EXPORT - IMPORT

Some cereals (wheat and barley), pulses (chickpea and lentil), and some fruits are important with their a great potential to export. The export and import figures are given below.

Table 7 Export and import of agricultural commodities (1992)*

Commodities	Import Quantity (tons)	Export Quantity (tons)
Wheat	93,981	3,804,502
Barley	37,399	827,240
Chick pea	-	267,819
Lentil	434	128,045
Opium seed	-	6,866
Tobacco	20,936	76,454
Orange	6,737	40,474
Mandarin	-	94,119
Grape-fruit	143	23,185
Lemon	138	143,587
Hazelnut	40	133,910
Raisin	642	111,845
Dry fig	-	27,028
Pistachio	70	1,037
Apple	27,007	40,878
Peaches	-	11,339
Sunflower	112,552	1,735

* Agricultural Structure and Production, 1992. State Institute of Statistics.

CHAPTER 2
Indigenous Plant Genetic Resources

Turkey is one of significant and unique country in the world from the stand point of plant genetic resources and plant diversity. Two of the Vavilov's Centre of Origin (i.e., Near Eastern and Mediterranean Centres) extend into Turkey. This, of course, indicates that Turkey is the one of the centre of origin and/or Centre of diversity of several crop plants and many plant species. Turkey is endowed with a rich diversity of family, genera and species of plants (163 family, 1,225 genera, 9,000 species). 3,000 plant taxa are endemic to the area out of 9,000 species.

These rich plant genetic resources have provide the raw material for much of temperate world agriculture. Primitive land races, wild crop relatives and other wild plant species from Turkey continue to provide new sources of important traits to improve agricultural production and introduce new source efficient world worldwide.

Turkey has very rich and interesting flora with its existing diversity. The potential and the reasons for this richness determined as follows:

1. It is a meeting place of three phytogeographical regions.
2. Many genera have their Centre of Origin and Centre of Diversity.
3. Species endemism is very high.
4. Anatolia forms a bridge between Europe and Asia, and has apparently served as a migration route for the penetration of other elements.

2.1 PHYTOGEOGRAPHY

Turkey is the meeting place of three phytogeographical regions: Euro-Siberian, Mediterranean and lrano-Turanian.

Euro-Siberian territory extends along the most of North Anatolia and in a narrower strip along the black Sea coast of Thrace. In Anatolia the whole of the Euro-Siberian belt is best referred to the Euxine province. Most of the Euxine province below the tree line is covered with forest, or by shrub where the forest has been destroyed. In the lower parts is mainly deciduous, often associated with evergreen

shrubs, but in the higher parts conifers increase or even predominant. In eastern part many species occur that do not extend further west. The alpine flora is closely connected with that of Caucasus, and shows little floristic connection with the rest Turkey. The western part of the Euxine province shows a progressive decrease in the Euxine species concentrated in North East Anatolia, and at the same time an infiltration of species centered in Balkans or central Europe. The alpine flora of this part shows many links with the lrano-Turanian region and even with Oreo-Mediterranean flora of Turkey. of Euxine vegetation occur further south-on Kaz Dagi (of North West Aegean Region) and Murat Dagi (at the middle of transitional Aegean Region); some Euro-Siberian species reach the Anti-Taurus and many more the Amanus Mountains; others penetrate as far south as the Lebanon. The mesophytic vegetation are predominant in Euro-Siberian region. Deciduous forest are the usual climax in the middle and lower regions.

Mediterranean region, very natural region, is adapted in its narrow sense to cover all areas bordering the Mediterranean. It reaches its eastern limits in the Anti-Taurus, Amanus. In Turkey all the Mediterranean vegetation belongs to Mediterranean province. A large number of geophytes, throphytes and suffrutescent chamaephytes is characteristic of this region, although sclerophyll vegetation dominates the landscape. In Thrace the Mediterranean territory is small, being confined to the southern part. In Anatolia it covers most of West and South Anatolia and extends as a series of enclaves along much of Black Sea coast. In West Anatolia the transition between the Mediterranean, Euro-Siberian and lrano-Turanian regions is gradual, but in South Anatolia relatively abrupt. Although West and South Anatolia share many leading species, there are considerable floristic differences; these are most noticeable at higher altitudes and in regard to endemism, which is considerably higher in Taurus than it is in the West. In South Anatolia, the flora of the Amanus differs markedly from that of the drier Central Taurus and Anti-Taurus. Machie, dominated by evergreen shrubs, covers much of the Mediterranean territory of Turkey below 1,000-1,200 m. On deeper soils, or where there has been less interference with the natural climax, forest prevail. In many places the macchie has been degraded and replaced by phrygana.

lrano Turanian Region is by far largest of the Three region in Turkey, and apart from a few enclouves, is confined to Central and East Anatolia. Although so large and rich in herbaceous and suffruticose species, it is far less well understood than the other phytogeographical regions, largely due to the difficulties of identification in several genera which play an important part in its vegetation. In broad sense the lrano-Turanian region extends from Inner Anatolia southwards to Palestine and eastwards to Mongolia. Inner Anatolia belongs to the lrano-Turanian subregion, which has two separate provinces. Many of the genera so characteristic of this region, have their main Centres of development in the lrano-Turanian part of Anatolia. Expect at high altitudes, the lrano-Turanian Region in Turkey divides into two major vegetational areas: l) a wide peripheral area of deciduous scrub and even park-like forest represents an originally forested area; 2) inner areas of tree-

less, true steppe, of which the largest is the central Anatolian Except, centered on Tuz Gölü but extending, with some interruptions, as for as to the Northern and Southern transitional region. Most of East Anatolia is occupied by scrub or even park-like forest often dominated by junipers and deciduous oaks.

2.2 CENTRE OF ORIGIN AND CENTRE OF DIVERSITY

There is no disagreement among the plant scientists on the including Anatolia in the two Centres of Diversity and Centre of Origin, The Near Eastern Centre and The Mediterranean Centre Which overlap at Anatolia. The poieoetnobotanical finding shed the light on the origins and development of plant domestication and confirmed the centre of origin based on the plant exploration studies. The early sites for finds of domesticated plants are Catathoyuk, Can Hasan, Aceramic Hacilar and Late Neolitic Hacilar, Mersin and Cayonu dating to about 7000-5000 B.C.

Turkey is one of the centre of origin of some cultivated plants like *Linum*, *Allium spp.*, *Hordeum*, *Secale*, *Triticum*, *Avena*, *Cicer*, *Lens*, *Pisum*, *Vitis*, *Amygdalus*, *Prunus spp.*, *Beta* etc.

The potential of plant diversity of Turkey was determined and recognized by the well known plant explorers who worked in Turkey and found the most richest diversity of some cultivated plants, their wild and weed relatives and other wild plant species, than elsewhere.

Turkey is described as microcentres for *Amygdalus spp.*, *Cucumis melo*, *C.sativus*, *Cucurbita mosnata*, *C.pepo. Lens culinaris*, *Lupinus spp.*, *Malus spp.*, *Medicago Pista sativa*, other annual *Medicago spp.*, *Onobrychis viciifolia*, *Phaseolus vulgaris*, *Pistachio spp.*, *Prunus spp.*, *Pyrus spp.*, *Trifolium spp.*, *Vicia faba*, *Vitis vinifera* and *Zea mays*.

2.3 ENDEMISM

Turkey's wealth in plants is apparent in the fact. that 3,000 out of the 9,000 plant species are endemic to the area.

Endemics are scattered throughout the country, but are almost absent from Trace. The largest number of endemics occurs in the lrano-Turanian Region and the Mediterranean region. Many genera well developed in Anatolia (like *Alyssum*,

Asyneuma, *Alkanna*, *Rhamnus*, *Salvia*, *Sideritis*, *Verbascum*) contain closely related endemics that replace one another in different areas. The floristic links between the Mediterranean and lrano-Turanian regions are much closer than between the flora of either of these regions and the Euro-Siberian region. Many genera are well represented in both and have endemics in each region. A rather large number of endemics, however, is apparently confined to areas where adjacent regions meet or integrate- a feature which deserves further study.
The endemics show definite areas of concentration throughout the country, predominating in the mountainous parts of South and South East Anatolia. The highest concentration is in the Central Taurus, followed by the west Taurus and the Mountains around Erzincan of East Anatolia; Anatolian endemics are numerous, Diagonal however throughout the Anatolian Diagonal; South East Anatolia, North West Anatolia (Kastamonu-Çankiri belt), ant the Amonus. The distributions of the endemics to the regions are: lrano-Turanian (1,181), Mediterranean (1,946), Euro-Siberian (256). The distribution area of 1,689 taxa has not been determined. The categories of the endemics of Turkey in according to IUCN Red Data Book are: Extinct (8), Endangered (46), Vulnerable (183), Rare (1,701), Indeterminate (49), Insufficiently Known (282), Out of Danger (5), Not threaten (798). Within the framework of National Plant Genetic Resources Research Project The Conservation of Endemic Species of Turkey has been programmed and conducted since 1992. The detailed information about Turkey's endemics will be resulted and of this programme.

The genus with rich endemism are *Astragalus* (229 species), *Verbascum* (175 species), *Centaurea* (107 species). The genus represented with low number of species but high proportion of endemism are: *Alkanna*, *Sideritis*, *Acantholimon*, *Paronychia*, *Gypsophila*. All *Ebenus* species found in Turkey are endemic.

2.4 FOREST GENETIC RESOURCES

In this chapter mostly trees are assumed as forest genetic resources. Other species grown in forest areas considered as other wild species since those taxa utilized in agriculture as ornamental, medicinal and aromatic purposes and some wild relative of fruits.

The forest of Turkey exhibits rich diversity of woody species.

The forest area in Turkey is found on the mountains bordering the Black Sea, Marmara, the Aegean and Mediterranean, and is located an altitude belt of sea level to 2,000 meters. Central and Eastern parts of the country are much less heavily forested. Small concentrations of needle leaf forests (*P. nigra* and *P. sylvestris*)

are found in some protected localities of Central Anatolia. In both regions, however, most common forest tree species are *Quercus.*

Some forest tree species occur in enclaves outside of their common distribution areas. *Fagus orientalis* is most striking example which grows in the forest on Amanos Mountain in Eastern Mediterranean, and on some mountains in Adana Area. Similarly *P. brutia* and *P. pinea* which are typical of Mediterranean coastal one, constitute bouquets of forests in some coastal part and valleys of Black Sea Region. Some trees and bushes such as *Platanus orientalis* and *Punica granatum*, grow in river valleys in Black sea region where they find a suitable environment, and in valleys in the Eastern Anatolia.

The most frequently occurring evergreen forest consist of *Pinus brutia*, and *P. nigra ssp. Pallasiana*, which are found mostly in the Mediterranean *coastal* belt. Other needle-leaf forest trees are *P. sylvestris* and *Abies nordmanniana* (in North Anatolia), *A. cilicica* (in South Anatolia on the Taurus mountain range), *Cedrus libani* (Tourus), and *Picea orientalis* (North East Anatolia), either in single-or mixed stand.

The most commonly occurring deciduous forest trees are *Fagus orientalis* (in North and West Anatolia) and various *Quercus* species which are wide spread. These trees are more often found in pure stand, but may also be seen in mixed formations. Eighteen species of this genus grow naturally in Turkey, two of which (*Q. aucheri* and *Q. vulcanica*) are native to the area. Other common trees, mostly in pure stand, are *Castanea, Acer*, *Fraxinus*, *Tilia*, *Sorbus*, *Carpinus*, *Alnus*, *Salix* and *Populus*.

Of great interest among forest trees is liquidambar tree (*Liquidambar orientalis*) which is retict of the tertiary period. This species is concentrated in the humid valleys of South Western Turkey where water table is close to surface. The diffusion of this species is very limited.

Phoenix teophrastii (date) has recently been discovered growing in the cost of Datça Peninsula, the Southwestern corner of Anatolia.

Central and eastern part of Turkey are not heavily forested. Small concentrations of needle leaf forest (*Pinus nigra* and *P. sylvestris*) are found in some protected areas of Central Anatolia. In both regions, however, the most common forest trees are *Quercus* species.

Turkey is also remarkable for the presence of woody Rosaceae group. The *Amygdalus*, *Crataegus*, *Prunus*, and *Pyrus* genera of this Family are well represented by various species, some of which native to the country and distributed in the forest areas.

Eight major forest areas with their dominant species and their ecological distribution are identified.

1. Euxine-Colchis, *Fagus Abies* forest area.
2. Mediterranean-Aegean forest area.
3. Mediterranean-South Anatolian forest area.
4. South Anatolian *Cedrus-Abies* mountain forest area.
5. Submediterranean *Pinus nigra* forest area.
6. Boreal *Picea orientalis - Abies nordmandiana - Pinus silvestris* forest area.
7. East Anatolia *Quercus-Juniperus* forest area.
8. *Liquidambar orientalis* forest area.

1. Euxine-Colchis, *Fagus-Abies* Forest area

extend along most of North Anatolia and the Black Sea Coast of Trace (Istranca Mountains). On the slopes exposed to the Black sea, dominantly mesophytic deciduous forest is formed in a belt from see level up to 1,200 m. The main species are beach (*Fagus orientalis*) often associated with several species of deciduous oak (*Quercus dischorochensis*, *Q.pedunculiflora*, *Q.hartwissiana*, *Q.conferta*), hornbeam (*Carpinus betulus*), Chestnut (*Castanes vesca*), maples (*Acer trautvetteri*, *A.planatoides*, *A.campestre*), alder (*Alnus glutinosa*, *A.barbata-only* in North East Anatolia), *Tilia rubra* and *T.tomentosa* (only in North West Anatolia). The following species may be considered characteristic for this belt: *Rhodendron ponticum*, *R.flavum*, *Prunus laurocerasus*, *Vaccinium aretos taphylos*, *Daphne pontice*, *Hedera colchica*, *Corylus avellana*, *Epimedium pubigerum*, *II ex cotehica*, *Frangula alnus*, *Helleborus orientalis*, *Lathyrus aureus*, *Staphylea pinnata*, *Trachystemen orientale*.

2. Mediterranean-Aegean forest

Mainly consist of *Pinus brutia*, *P.pinea* and *Quercus aegilops* occuring as pure or mixed stand at lower altitudes (between 400-700 m.). At higher altitudes. their places are taken by *Pinus nigra* forest. *Pinus pinea* usually refers not to grow far inland. *Quercus aegilops*, which has a larger distribution area in Turkey than in other countries, appears as loose stands in all areas. Below 400 m along the coast and in depressions, maquis covers large areas. The influence of the sea penetrates deeply inland and makes it possible for maquis to spread widely. The leading woody species of the maguis include *Arbutus andrachne*, *Calycotome villosa*, *Cistus creticus*, *C.salviifolius* , *Cotinus coggygnia*, *Juniperus oxycedrus*, *Erica verticillata*, *E.arborea*, *Laurus nobilis*, *Olea europeae var. oleaster*, *Phillyrea latifolius*, *Pistachia lentiscus*, *P.terebinthus*, *Q.coccifera* (often a dominant species) and *Styrax officinalis*. In many places it is very obvious that the coniferous forest has been degraded by the influence of man and replaced by maquis.

3. Mediterrranean-South Anatolian Forest Area

Pinus brutia is the main forest tree species up to 1,300 m at the Southern slopes of Taurus Mountains. Along the coast and up to 600-800 m maquis is dominant. *P. brutia* occasionally is seen in maquis, but after the maquis belt some deciduous trees and shrubs such as *Quercus infectoria ssp. boissieri, Cercis siliquastrum* and *fraxinus ornus ssp. Cilicica* associate with this pine species. It occurs in large pure stand above 1,000 m Above 1,300 m it replace with *Cedrus libani*.

4. South Anatolian *Cedrus-Abies* Mountain Forest Area

Larfe stands of *Cedrus libani* occur mostly from 1,300-2,000 m and even up to 2,200 m. Its distribution extend from Western Taurus to eastern Taurus. Besides its general distribution area, there are two local cedar forest in Turkey: One at on Sultandagi (on the Western border of Central Anatolia and Aegean Region) and the other at Erbaa in çatalan (On the Northern border of Central Anatolia and North Anatolia). The later is very interesting from the phytogeographical point of view. In its distribution area it forms pure or mixed stands with *Abies cilicica*, *Juniperus foetidissima* and *J.excelsa*, *Acer monspessulanum*, *A.hyrcanum*, *Fraxinus oxycarpa*. From the ecological point of view, *Cedrus libani* and *Abies cilicica* prefer south-West and West slopes exposed to the rain bearing winds. Climbing over the ridges of the Taurus and moving inland, *Cedrus libani* and *Abies cilicica* disappear and are replaced by *Pinus nigra*.

5. Submediterranean-*Pinus nigra* forest Area

Pinus nigra var. *caramanica*, The Taurus pine, is indigenous only in Anatolia, Trace Cyprus and Crimea. It forms pure or mixed natural forest over large areas in the West, north, and south Anatolia; but in general these forests are found on the southern slopes of the mountains in north Anatolia, Whereas they occur on the northern slopes of the Taurus mountains in South Anatolia, facing inland and advance towards the steppe region, forming mixed stands with deciduous oak (*Quercus pubescens*) and Juniperus species (*J.oxycedrus*, *J.foetidissima*), *Pyrus eleagnifolius*, *Cistus laurifolius*, Further inland, *Pinus nigra* dissappears and only wild pear (*Pyrus eleagnifolius*), *Quercus pubescens*, some *Juniperus species* and *Paliurus aculeatus* occur as the last remeant of forest before the steppe begins.

6. Boreal *Picea-Abies-Pinus silvestris* Forest Area

Picea orientalis is one of the important trees in Turkey. It is distributed throughout the greater part of the Caucasus and Northeast Anatolia. In Turkey alone it forms about 200,000 hectares of pure mixed natural forest. At high altitudes it sometimes forms pure stands over a considerable area; on the other hand, it is often accompanied by beech (*Fagus orientalis*), fir (*Abies nordmanniana*), pine (*Pinus silvestris*). The highest limit for oriental spruce forests is in northeast Turkey, at 2,400 m in the Yalnizçam mountains. It ranges from the sea level, in some places to 1,800-2,400 m in many districts but reaches its optimum development above 1,200

m. The rarity of *Picea orientalis* in the lowlands of the area may be more connected with the influence of biotic factors then with climatic and edaphic factors. However, its general distribution is determined mainly by climatic factors. Where the climate is markedly dry, *Picea orientalis* diminishes. Its growth is restricted by deficient rainfall and low atmospheric humidity. The ground flora in the spruce forest is usually poor and consist largely of mosses, lichens, and liverworts. But where there is sufficient light and space, the ground is occupied by *Rhododendron* and *Vaccinium*.

7. East Anatolia-*Quercus-Juniperus* forest Area

Most of the East Anatolia is covered by scrub often dominated by Juniper and deciduous oaks. These remain from the old forests which suffered much destruction by man. Leading species include *Juniperus excelsa*, *Quercus infectoria* ssp. *boissieri, Q.Iibani, Q.brantii, Q.pubescens, Acer monspessulanum* ssp. *cinerascens*, *Pistachia eurycarpa*, *P.khinjuk*, *Sorbus persica* etc. *Populus tremula* and *Betula eurycarpa* can be found in small groups or stands at high altitudes.

8. *Liquidambar orientalis* Forest Area

occurs in South West Anatolia in Mu§ia Province. Very recently some new areas were discovered in West Anatolia in Aydin (near çine), in Burdur and Antalya Provinces. It covers the flood plain and is often associated with *Alnus orientalis*. *Platanus orientalis Ulmus* spp., *Smilax excelsa*, *Periploca graea*, *Vitis vinifera*. Apart from its general distribution, It is recorded as growing by Asi River near the south coast of Hatay Province. Many herbaceous species grow under this forest such as *Alisma plantago*, *Phragmites communis*, *hysimachia vulgaris*, *Glycyrrhiza glabra* etc. The total area of *Liquidambar* forest is about 6,000 hectares.

Endemics of forest tree species are scattered throughout Turkey, but are concentrated in several areas of phytogeographical regions.

There are two native fir species in Turkey, the Cilican Fir (*Abies cilicica*) and caucasian Fir (*Abies nordmanniana*), both of which are widely distributed. However, these species have unique subspecies that are endemic in Turkey. Because of their unique growth forms and their ability to survive in difficult environments these subspecies are a valuable genetic resources for future breeding programs. *A. cilicica* ssp. isaurica is found in South Anatolia, around Antalya and Konya-Bozkir, and Uludag Fir (*Abies nordmandiana ssp. bornmuelleriana*) grows in North (around Samsun) and Mount Uludag and the Kazdagi Mountain Fir (*Abies nordmandiana ssp. equitrojani*) which grows on the Kazdagi Mountain.

In the North Anatolia (Euro-Sibirian Region, Euxine province) most of the endemic forest species such as *Picea orientalis* concentrated in eastern part of this region. In the west part of this region the leading species are *Fagus orientalis* and *Acer cappadocium*.

In West Anatolia endemics are comparatively few. The remarkable relict tree, *Liquidambar orientalis* is confined to South West Anatolia. *Juniperus phoenices* is present near the coast.

South Anatolia is the arae of *Abies cilicica*, Cedrus libani and *Alnus orientalis*. Themost northern Mediterranean source of Cedar of Lebanon (*Cedrus libani*) occur in this region.
Some geographic sources of trees are endangered or have already been destroyed from over use. Such is the case with oriental Spruce (*Picea orientalis* which is abundant at the higher elevations but now infrequent at lower elevations.

2.5 OTHER WILD SPECIES AND WILD RELATIVES OF CROP PLANTS

2.5.1 Wild Genetic Resources

The three phytogeographical region have different vegetational aspect and some of the species may be considered characteristics of those region.

In the Euro-Siberian Region the following species may be considered characteristic for much of Euxine province below the tree line: *Corylus spp.*, *Dapne pontica*, *Hedera colchico*, *Hypericum androsaemum*, *Mespilus germeniaca*, *Smilax excelsa*, *Sorbus torminalis*, *Argyrolobium calycinum Astrantia Moxima*, *Calamintha grandiflora*, *Cardimine bulbifera*, *Circaea lutetiana*, *Epimedium pubigerum*, *Euphorbia amygdaloides*, *Galium odoratum*, *Helleborus orientalis*, *Lethyrus aureus*, *Pyrola spp.*, *Ranunculus brutius*, *salvia spp.*, *Trachystemon orientale*, *Valeriana alliariifolia*.

In the Mediterranean Region the leading woody species include *Arbutus andrachne, Calycotome villosa, Carpinus betulus, Celtis auatralis, Ceratonia siliqua, Cistus spp., Cotinus coggyria, Daphne sericoo, Erica verticillata, Fontanesia phillyreoides* (South Anatolia), *Laurus nobilis, Myrtus communis, Olea europaea var. oleaster, Phillyrea media, Pistachio spp., Rhomnus palaestinus, Quercus spp., Smilax aspera* and *Styrax officinalis.* In the Phrygana formation the leading species are: *Cistus spp., Lavandula stoechas, Poterium spinosum, Thymbra spicata.* In the dried river beds or in the stream sides the followings are characteristic: *Alnus orientalis* (South and South West Anatolia), *Nerium oleander* and *smilax excelsa. Quercus infectoria ssp. boissieri* is often a leading plant in the scrub belt. The leading species in the intermediate territory between Mediterranean and lrano-Turanian Region are: *Pistachio atlantica* and several woody rosaceae including *Pyrus elaeagrifolia*, *Prunus micro corpa* and *Amygdolus orientalis* Above the tree line (at

ca. 1,700 m in Taurus) the spiny species are dominated with various cushion communities: *Astragalus*, *Acantholimon*, *Onobrychis cornuta*.

Many of the genera so characteristic of the lrano-Turanian Region further east such as: *Acantholimon*, *Acanthophyllum*, *Calligonum*, *Coussinia, Ferula*, *Eromostoachys*, etc. *Achillea*, *Santolinoideae*, *Aethionema*, *Alyssum* sect. *Gamosepolum*, lsatis sect. *lsatis*, *Salvia* sect. *Eusphace* has their main centre in lrano-Turanian part of Anatolia. In the treeless steppe of Central Anatolia *Artemisia fragans* is often leading species.
The characteristic species of this part are: *Achillea santolina*, *Euphorbia tinctoria*, *Globularia orientalis*, *lsatis glauca*, *Linum hirsitum* ssp. *Anatolicum*, *Moltkia aurea*, *Noaea mucronata*, *Peganum harmala*, *Phlomis armeniaca*, *Poa bulbosa*, *Teucrium orientale* and several *Stipa* and spiny *Astragalus*. Other species endemic to the area are *Consolida stenocarpa* and *Delphinium venulosum*. Around Tuz Lake many *Chenopodiaceae* species are the leading species with several the distinctive endemics in genera which are not usually associated with halophytic habitats. In the steppe of East Anatolia *Artemisra fragans* is leading species together with *A.orientalis*, *A.araratica*. In Mountain of East Anatolia *Bromus tomentcllus* is wide spread; spiny cushion plants increase with altitude, mainly *Astragalus subgenus Tragacantha*, *Acantholimon* spp. and *Onobrychis*. In South East Anatolia the characteristic species are: *Consolida tomentosa* ssp. *Oligantha*, *Eryngium noeanum*, *Hypericum laeve*, *Papaver stylatum*, *Phlomis kurdica*, *Salvia spinosa*.

The categories of non-endemic, taxa and taxa important different purposes such as forage plants, ornamental plant, medicinal and aromatic plants in according to IUCN Red Data Book are: Extinct (4), Endangered (60), Vulnerable (205), Rare (1,310), Indeterminate (78), Insufficiently Known (362). Indigenous plant species are under threat of various factors, Most commonly by forest clearances for form land, heavy grazing, various developmental activities like urbanization industrialization etc. But the various attempts are being made for the protection of natural resources by different ministries.

The natural flora are used for different purposed by local communities for long time. Recently some of the economically important wild plants are used in agricultural research program, to introduce new species to growers. Some economically and socially important plant genera of Turkish flora are given below:

Plants to be used as ornamental: *Allium, Anemone, Arum, Centaurea, Chonodoxa, Colchicum, Crocus, Cyclomen , Delphinium, Dianthus, Eranthis, Fritillaria, Galanthus, Gladiolus, Gypsophilla, Helleborus, Hyocinthus, Iris, Leucojum, Lilium, Muscari, Narcissus, Nectaroscordum, Ornithogalum, Paeonia, Pancratium, Rosa, Scilla, Silene, Sternbergia, Tulipa, Viola*.

Plants to be used as medicinal and aromatic: *Achillea, Aconitum, Alkanna, Allium, Althea, Amygdalus, Angelica, Artemisia, Asparagus, Asperula, Brassica, Carum,*

Colchicum, Convallaria, Crateagus, Delphinium, Digitalis, Ephedra, Equisetum, Ferula, Ferulago, Fragaria, Galanthus, Gentiana, Glycirrhiza, Gypsophilla, Helycrysum, Helleborus, Hyocyamus, Lamium, Leucoium, Linum, Liquidambar, Lycopodium, Malva, Marrubium, Matricaria, Melilotus, Mentha, Nigella, Orchidaceae, Origanum, Paeonia, Papaver, Pimpinella, Prangos, Primula, Quercus, Rhamnus, Rosa, Rubia, Ruscus, Salvia, Saponaria, Scolymus, Sidenritis, Symphytum, Tanacetum, Teucrium, Thymbra, Thymus, Trigonella, Ulmaria, Vaccinium, Valeriana, Veratrum, Verbascum, Viola, Zizyphus.

2.5.2 The Wild Relatives

Two main ecogeographic race of wild einkom, *Triticum boeoticum*, is found in Turkey. White relatively small and usually one-seeded race is characteristics of cooler Western Anatolia. A race with large and two seeded spikelets is found in warmer, summer dry areas of Southern Anatolia. However, in Anatolia intermediates between these two extremes are also occur, often forming mixed diverse populations the wild emmer wheat (*T.dicoccoides*) is almost always found mixed with *T.boeoticum*, and it is more restricted in its distribution and its ecology. The goat grass, *Aegilops* spp. have large distribution and considerable diversity accumulated in Anatolia. The twenty wild Triticum species, including *aegilops* has been recorded for Turkey.

The wild ancestor of cultivated barley, *Hordeum spontaneum*, shows a wider distribution in Turkey. It occupies both primary and secondary habitat in South Anatolia, while it is rare in West Anatolia. Generally wild barley does not tolerate extreme cold; it is only occasionally found above 1500 m. Morphologically, *H.spontaneum* is quite variable and several distinct forms can be distinguished. Other wild species of barleys are *H.bulbosum*, *H.marinum* and *H.murinum* are also have diversity.

Other wild Cereals, *Avena* spp. and *Secale* spp. are also frequently dominant species in Turkey.

Five wild species of lentil, *Lens orientalis, L.nigricans, L.ervoides, L.montbretii, L.odemensis* occur in Turkey. The wild and weedy forms of Pisum are found in Turkey where the primary (Near East) and secondary (Mediterranean) center of diversity of pea overlap. The primary progenitor of pea, *P.humile* is found in south East and East Anatolia, But *P.elatius* predominantly found in South Coast, Aegean Belt and Black Sea coast.

Some of Cicer species indigenous to Turkey may have played a role in its ancestry, particularly *C.pinnatifidum, C.echinospermum* and *C.bijugum*. A wild annual species *C.reticulotum* wild progenitor of chickpea described from Turkey. The twelve annual or perennial wild *Cicer* species occur in Turkey.

The flora of Turkey is very rich in wild medicinal, aromatic and ornamental plants, most of which indicated above. Within the ornamental plants the great numbers of bulbous tuberous plants, woody and herbaceous perennials, biennials and annuals are found in Turkish flora. The rate of endemic is also high within this plant group. Most of the ornamental species are found in wild habitat among deciduous shrubs and under deciduous trees or scattered among bushes, rocks. The diversity of ornamental plant species are related to diverse topography and climate of Turkey. Medicinal and aromatic plants almost have same situation in Turkey.

The number of vegetable has their origin in Anatolia. The wild relative of *Brassica's B.cretica* is found in South Anatolia (in South Aegean and Mediterranean Belt). Wild *Raphanus raphanistrum* has also distribution in the West and South coastal part. Wild celery, *Apium graveolens*; wild beet *B.maritima* and other *Beta spp.*, wild carrots, *Daucus spp.*; wild rockets *Eruca spp.* wild lettuce, *Lactuca spp.*; wild mustard, *Sinapis spp.* are some of the wild vegetables commonly used as vegetable or salad plants. Many other wild plant species are used as salad and vegetable plants, but still are not utilized in development.

The indigenous fruit trees are also found in Turkey. Those woody plants are valuable genetic resources as food crops. Because their resistance to insect, *disease* and their natural ability to an array of sites, such species as chestnut (*Castanea sative*), olive (*Olea europea*) and walnut (*Juglans regia*) are some valuable fruit genetic resources. Wild relatives of apple (*malus* spp.) pear (*Pyrus* spp.) and plum (*Prunus* spp.) are also found in Turkey. The wild *pistachios; P.terebinthus*, *P.lentiscus*; wild hazel nuts *Corylus spp.*; wild plums *Prunus spinosa*, *P.divericata*; wild cornell cherry *Cornus sanguinea*, wild pears *Pyrus elaegrifolia* and other *Pyrus* species; wild almonds *Amygdalus spp.* are some of wild relatives of fruit trees found in Turkey. Seweel and sour cherries are also indigenous, various wild types are found especially in North Turkey. Most of those wild relatives are fruit trees are utilized as rootstock. There are also wild relatives of other fruits like wild strawberry, *Fragaria* spp.; wild blackberries *Rubus spp.*

The wild relatives of forage grasses and legumes are commonly occur in Turkey. The natural pastures and meadows show high genetic diversity. This caused to ecological populations of forages, which are superior to the current use can be released as commercial cultivars with a minimum of further selection and breeding. But most of them threatened with genetic erosion mainly due to over grazing.

Centuries of overgrazing have changed the original distribution of mainly wild legumes and cereals. Today, wild progenitors of some food legumes, such as chickpea (*Cicer reticulatum*) are almost exclusively confined to steep rocky slopes where grazing pressure is not as severe.

2.5.3 Landraces and Old Cultivars

Landraces are found in the areas where crop species first arose through domestication. Turkey also lies within the broad region of domestication of crops. Therefore, there are highly variable domesticated crops as well as landraces with unique characteristics in Turkey. But Adaption of new crop cultivars, nitrogenous fertilizer, and increasing commercialization in agriculture have reduced the area of local crop production, in Turkey. While high yielding modem cultivars predominate, the local landraces are still cultivated in some of the regions. For instance modem wheat is concentrated on irrigated and valley bottom land in West Anatolia, but farmers often grew both modern and local bread and durum wheat cultivars for their home use. The diploid einkorn, *Triticum monococcum*, and the tetraploid emmer wheat, *T.dicoccum* are grown by some farmers in North West and Eastern Anatolia respectively. The two-row barley land races, *H.distichum*, and six-row barley and races, *H.vulgare* are also grown in Turkey. The cultivation of oat and rye landraces are now rare in Anatolia.

Most of the landraces of legumes maintain a high level of genetic heterogeneity, very frequently more than wild populations. The lentil landraces are still widely grown by farmers. The forms of those landraces are very diverse as macrosperma (Large seeded), microsperma (small seeded) and intermediates for both red and green lentils. Landraces of field and garden pea (*Pisum arvense* and *P.sativum*), faba bean (*Vicia faba*) are still grown. Chickpea (*Cicer arietinum*) and bean (*Phaseolus vulgaris*) remarkable landraces of Turkey. Different forms of chickpea landraces are found. Small seeded forms grown mainly in South East and Central Anatolia, whereas large seeded types exist in transitional and West Anatolia. Beans are cultivated all over Turkey for dry and vegetable use. Because of better adaptation of bean into the various climatic regions, the most important variation observed in fruiting characters, in pod and seed size with a remarkable range of testa color.

Most of the vegetables have micro gene centres in Turkey. Number of vegetables has their origin in Anatolia. As a result of the natural adaptation to different ecogeographical regions. and the artificial selection by farmers the vegetable landraces have considerable variation exhibited from are locality to another. The traditional agricultural system used in the backyard gardens to grow vegetables, especially in remote areas of Turkey, have been important in bringing together some species that have subsequently hybridized they have been able to increase the variation. Turkey is one of the possible centre of origin for Beet (Beta). Different races for different use are found. The diverse forms and landraces of vegetable, table and fodder beets have been grown and used locally for generations in Anatolia.

The industrial crops have mostly same situation in Turkey with other plant group face. Flax, *Linum usitatissimum*, was domesticated about the same time as emmer wheat and barley in mountains of Near East. The fiber (flax) and oil (linseed) type

of *Linum* landraces found with various in length and branching in habitus. Along Black Sea Coast of Turkey prostrate multistemmod types are cultivated since ancient times. *Papaver somniferum* has also different form of landraces with different capsules, flower and seed colors. Although Turkey is not centre of origin of tobacco, sunflower, and corn but those crops have also diverse landraces which are adapted to different ecological conditions.

The various local types of fruits are found in Turkey. Almond trees may differ widely in vigor, yield, nut and kernel quality, and flowering time. The cultivation of plums is very ancient and widespread. Sweet cherry has also grown for centuries throughout Turkey. The spontaneous seedlings are occasionally allowed to develop into bearing trees, especially of apricot; almond and cherry plum (*P.ceracifera*), which increase the rate of existing diversity.

Four factors effect the farmers, even modem farmers, to keep their landraces or traditional crops.

1. Fragmentation of land holdings allows farmers to manage several fields and to keep local landraces.
2. Marginal agronomic conditions, especially steep slopes and heterogenous soils of mountain agriculture, make local landraces competitive with improved cultivars, at least in part of the farming system.
3. Economic isolation creates market imperfections and lessens the competitive advantages of improved cultivars.
4. Cultural identity and preference for diversity lead farmers to keep local landraces.

CHAPTER 3
National Conservation Activities

The plant genetic resources activities were started by the establishment of Crop Research and Introduction Centre (CRIC) in lzmir (recent name of the institute is Aegean Agricultural Research Institute, AARI). The UN/FAO and Turkish Government Agreed to set up CRIC by the UN Special Fund to assemble and study on plant genetic resources in Turkey. An agreement signed between Turkish Government and UNSF/FAO in 1963 and Terminated in 1973. The institute continued its functions after the termination of UNSF/FAO/TUR-8 protect, in all respect. The centre, before the establishment of National Plant Genetic Resources Research Project participated the regional project in SW Asia supported by the Swedish International Development Agency (TF/REM/5-SWE) and by IBPGR (TF/REM/031). Because of the importance of Turkey for plant genetic resources, the plant genetic resources activities reorganized in 1976 within the framework of National Plant Genetic Resources Research Project (NPGRRP). AARI has then become National Project Coordination Institute.

The Objective of NPGRRP is the exploration, collection, conservation (both *ex situ* and *in situ*), and evaluation of existing plant genetic resources and plant diversity of Turkey for today and future.

Turkey is one of the pioneering country started to maintain the genetic resources. Although Turkey has considerable experiences on *ex situ* conservation (both in field and seed genebanks). *In situ* conservation of wild crop relatives has not been practiced until 1994.

3.1 *IN SITU* CONSERVATION

The recent applications of *in situ* conservation project within the framework of GEF aims to maintain the wild crop genetic resources in their natural habitats at existing state owned lands. This project is the first of its kind in the *in situ* world to project both woody and non-woody. crop relatives from an integrated multispecies and multisites approach. This will be done through conducting ecogeographical surveys and inventories to provide basis for establishment of *in situ*. Gene Management Zones (GMZs) in selected pilot areas that are rich in target wild crop relatives. The highest priorities have been given to globally significant non-woody

crop species which are in the first gene pool of wheat, barley, chickpea and lentils as well as important woody species such as chestnut, plums, and selected forest species. The project will initiate and develop a mechanism to foster the on going National Plant Genetic Resources Research Project for identifying, designating and managing the areas specifically for *in situ* conservation of nationally and globally significant wild crop relatives which are originated in Turkey. The project also aims to make *in situ* conservation integrated with existing *ex situ* conservation program of Turkey.

The project will use complementary strengths of Ministry of Agriculture and Rural Affairs (MARA) with experience in genetic resources activities especially in *ex situ* conservation, Ministry of Forestry (MOF) which has experience in land management, Ministry of Environment (MOE) which has a strategic out look on resource management. MARA and MOF are the implementing Ministries.

The lead institute of MARA is Aegean Agricultural Research Institute AARI will coordinate activities of MARA for *in situ* conservation project and collaborate with Field Crop Central Research Institute (FCCRI), Ankara; Southeast Anatolian Research Institute (SEARI), Diyarbakir and Cukurova Research Institute (CRI), Adana.

The pilot areas are selected and described as: The Kaz Dag Area of Northwestern Aegean Region, Ceylanpinar of Southeastern Turkey, Amanus (Nur) Mountains at Southern Anatolia (on the Southern part of Anatolian Diagonal).

The project has been designated around the following five components: a) Site survey and inventories; b) Designation of GMZS; c) Data management; d) Development of a National Plan for in situ conservation; e) Provide the institutional strengthening within and between MARA, MOF and MOE. The project has been started in 1993 with training of project staff of MARA, MOF and MOE. The survey activities have been started to conduct in three designated areas, in 1994.

The project will seek to identify and establish in *situ* conservation areas in Turkey, for the projection of genetic resources and wild relatives of major crops and forest tree species that originated in Turkey. It is prepared to provide sustainable *in situ* conservation of genetic resources of cereals, horticultural and ornamental crops, medicinal plants and forest trees. It will also provide to develop and implement a National strategy for *in situ* conservation, and to test and develop a new approach for the conservation of genetic diversity of wild crop species which has not been tried on a large scale anywhere in the world. The land races are not a major focus of this project. Because the *in situ* conservation of land races found very complex on biological, social and policy issues. But during the implementation end of this project the institutional capacity of Turkey will give the opportunities to provide a National Strategy for *in situ* (on farm) conservation of land races.

Research is essential part of this project, therefore the research on genetic diversity and conservation biology will be conducted at the stages of *in situ* conservation project.

3.2 *EX SITU* COLLECTIONS

Ex situ conservation activities has been undertaken since 1964. It is still on process within the framework of National Plant Genetic Resources Research Project.

The collection by sampling the maximum variation and determination of the interspecific, agroecological and phytogeographical distribution of plant species are the first step of the project. Data of farmer survey and expedition are compiled and priorities to locations and plant species are considered, to eliminate the duplicate efforts, during planning the collection missions. The missions each year programmed to collect the existing plant genetic resources for eight plant groups (cereals, forages, food legumes, vegetables, industrial crops, ornamental, medicinal and aromatic plants, fruit and grapes) and endemic plant species. The collections in each plant group consist of landraces, wild relatives and other wild plant species are considered in the plant group. The endemics are collected specifically, separately from the plant groups.

The *ex situ* conservation is implemented both for national and vegetative collections which are preserved in seed genebank and field genebanks respectively.

The National seed genebank was established in 1972 in Izmir to preserve the collected genetic resources material since 1964. Those of the previous material has kept in the cold rooms of cheese factory, and was moved to the genebank in 1972. At the moment, all *ex situ* activities of National project are financed by Turkish Government. Its importance has been very well understood by the Government.

The national collection contain the landraces and wild relatives (both for seed and vegetative collections), other wild species which are especially economically important (medicinal, aromatic, ornamentals etc.) and endemic plant species. There are also a few South West Asian collection, and a small proportion of world wheat and barley collection.

The main users of the material are the plant breeders and researchers both from Turkey and abroad.

The collecting activities are planned by given the priority to the region and/or plant species under threat or to the plant species interested by other national programmes. Especially the fruit types and medicinal aromatic plants are collected

by the needs of national programs. Most the collection kept in the genebanks are the representative of the existing variation of populations found in their growing site or where they are collected. Therefore the random sampling techniques are used. At the beginning of the collection missions the coarse grid collection was made, but latest collections were made fine-grid in remote areas. Especially the species specific collection missions are very comprehensive.

3.2.1 Storage Facilities

The facilities of lzmir Gene Bank (at AARI) for seed collection have been designed for the needs of long-term and medium-term storage for both base and active collections, respectively. Cold rooms work at minus 18°C for long-term and 0°C for medium term storage. There are also facilities for temporary storage, with rooms working at 4°C.

The collections are kept always in the same conditions safely. Humidity is not controlled in the cold rooms. The seeds are dried to 5-6 % moisture content and kept in the sealed can containers for base and active collections. For temporary storage the aluminum laminated foils are used. All the conditions in the gene bank comply with internationally recommended standards.

To keep those standard, the project need financial support from FAO or IPGRI, especially providing the can containers and aluminum laminated foil bags, and one automatic power generator for some what electricity problem.

For the safe duplicates of the base collection another storage facilities available in Ankara (at Field Crop Research Institute). This facilities consist of deep-freezer to keep the material in aluminum laminated foil bags.

When the material received by the genebank immediately processed for storage after drying. A room type drying facilities exist. The viability are tested for all the material and stored. The storage capacity of the genebanks is not on the verge. Because the new cold rooms has been accommodated to be worked in minus 18°C and 0°C.

There are some research activities on the *in vitro* storage techniques of some vegetatively propagated plant species.

The vegetatively propagated material, mainly fruit genetic resources are kept in field genebanks at 13 institute (including AARI). At AARI the vegetative garlic collection, some medicinal and aromatic plants and vegetatively propagated ornamentals are also kept as field collection. Maintenance of the vegetative material in the field gene banks is very expensive work. So the financial support is needed.

3.2.2 Documentation

Documentation is one of the main function of the NPGRRP for both *ex situ* and *in situ* activities.

The passport data for *ex situ* conservation is recorded on standard formats for each accessions in one site. The storage information, including regeneration data, is recorded in storage format for each accession separately. But evaluation formats are differs from genus/species of the crops. A computerized data base is available by using the DBASE. It is a uniform data base with information gathered from standard formats.

For in situ conservation program a data base will be built for complex array of information that will be acquired in survey and inventory and management of GMZS. Since in situ conservation program is complementary to ex situ conservation, the two database will be linked and complementary to each other. For survey and inventory information A Site Data Collection Form and instruction for information recorded on that form have been prepared. These data will be efficiently managed for success of the project. The Geographic information System (GIS) will be used to evaluate the quantitative and spatial data gathered especially from survey and inventory activities.

The information is available to user of the NPGRRP in computer printout and/or 3" diskette, on request.

Within the frame work of IPGRI-ECP/GR there is a networking to exchange data in computer forms.

The original information on the standard formats gathered from genetic resources activities are achieved in Central Documentation Unit of Plant Genetic Resources Department of AARI. The computerized data base of those information is back up in the institute. The information from joint activities with foreign Institutions are duplicated at the contributed institutes. Also information related the crop species of ECP/GR is duplicated at the designated ECP/GR Data Base Centre.

3.2.3 Evaluation and Characterization

NPGRRP makes a clear distinction between the processes of characterization and evaluation of genetic resources material holding at the genebanks (seed and field genebanks).

The characterization activities are coordinated by NPGRRP and carried out within the framework of NPGRRP. The plant groups (cereals, food legumes, forage crops, vegetables, industrial crops, fruit and grape, medicinal and aromatic plants,

ornamental plants groups) teams are responsible for this task. The evaluation programs of plant groups are conducted in cooperation with the National Plant Breeding Programs. The IBPGR/IPGRI descriptors are used with some modifications.

The characterization and evaluation activities are started recent years for seed propagated plants, while characterization and evaluation of fruit collection are conducted parallel to other research and breeding programme. So high in proportion when the evaluation completed, same of the varieties resulted from the selection of the fruit genetic resources collections.

The data resulting from evaluation carried out by users of the samples are return if the evaluation and/or characterization work cooperatively planned by NPGRRP. The annual report of the characterization/evaluation project are also achieved the results.

If the material distributed from genebanks the feed back information is requested to provide when the research completed on the material.

For the effective and intensive use of genetic resources collections by the breeding programs, NPGRRP usually cooperate with those programme on evaluation/characterization to introduce those valuable material to the breeders.

The characterization, especially evaluation works are cost-effective so the international collaboration on crop based evaluation could help to shore knowledge on the germplasm and cost.

The full on going characterization programs are on Wild *Beta spp.*, *Dianthus spp.* wild *Sideritis spp.*, wild *origanum spp.*, *Cicer arientinum* land races, *Nicotiana tarbacum* land races, *Triticum* landraces, wild *triticum* and *Aegilops spp.*, and some fruit species.

Research is essential part of *in situ* conservation project. The genetic diversity and morphological diversity of the population of target species in study site will be evaluated.

3.2.4 Regeneration

The regeneration of plant genetic resources collections is undertaken when the viability has dropped below 80 %. The multiplication of the accessions are carried out when the quantity of the accessions is decreased in a certain level. The multiplication or regeneration sites are chosen, wherever possible, according to similarity of ecology to those of the sites from which the accessions were originally collected. So various institutes and some breeders are involved in regeneration and multiplication of material. To avoid the contamination (gene flow) the

breeding system and reproductive biology of the species are taken into account during the multiplication/regeneration of accessions. Therefore, for many case the isolation is needed for, outcrossing material since the institutes involved have limited number of lands, facilities (e.g. controlled conditions, isolation cabinets, etc.), labor the multiplication/regeneration of the accessions takes time and very coat-affective. The multiplication is needed mostly for the wild mainly for the old material from the beginning of genetic resources programs in 1960s, since they were not stored in proper storage conditions.

One of the difficulty on regeneration/multiplication of wild species with no information or reproductive biology. Since there is very unique species in Turkish Flora on which there is no specific work of their reproductive biology and dormancy mechanism. For the dormancy and germination methods and *in vitro* multiplication techniques of some wild species some research are carried out by AARI. During multiplication and regeneration programs some of the characteristics of accessions are observed.

The regeneration records are kept in storage database.

Some wild species to rich a certain size/amount have been regenerated more then twice. The original and regenerated seeds are stored separately in the genebank.

3.3 CONSERVATION OF FOREST GENETIC RESOURCES

3.3.1 *In situ* Conservation of Forest Genetic Resources

Turkey has long established National Parks Program. The protection of some unique forest ecosystem under a Nature Conservation Area Program was initiated in 1987, establishing 23 conservation areas totaling 55,492 hectares. These areas protect and maintain a collection of unique flora and woody plant species which represent rare tree species or forest types, but also include important ecosystems. Although these areas are protected, they are not managed for wild crop relatives or biodiversity conservation in the modem sense and the current management system may not, in fact, maintain the complete natural vegetation cover since a degree of disturbance, i.e. grazing, may occur. Some smaller biogenetic reserve areas were created as early as 1955 and 42,000 hectares have been selected as natural seed stands in 314 locations, representing 25 forest tree species. In addition 894 hectares, protecting 11 species in 12 locations, have been established as gene conservation areas. These later efforts provide a modest degree of protection for a unified number of seed sources for production forestry, but need to be expanded and need to incorporate in situ strategies for wild relatives.

Within the frame work of Turkish In situ conservation of Genetic Diversity Project which is a Global Environment Facility (GEF) project, some forest tree species will be conserved id a selected site (Kaz Daglari), and in situ Gene Management Zones (GMZS) will be established for targeted tree species. This project is aimed to protect both non-woody and woody crop relatives from an integrated multi species approach. The project implementation responsibility is shored between Ministry of Agriculture for woody and non-woody crop relatives, Ministry of Forestry Some forest trees and Ministry of Environment for extension and publicity.

3.3.2 *Ex Situ* Conservation of Forest Genetic Resources

In the forest sector some 300 tons of seeds of various forest species collected yearly and approximately 200 tons are used for production purposes with 75 tons stored for future use. Currently there are also 944 hectares of seed orchards and clone banks of 24 species established in 149 locations. Presently, natural regeneration of the forest tree species remains the preferred method of regeneration and to date approximately 100,000 hectares have been regenerated. Yet, not all woody species can be rapidly reestablished following harvesting and some problems still exist with firs, spruce and to some extend with beech. It is apparent that natural regeneration done can not be entirely depended upon.

CHAPTER 4
In-Country Uses of Plant Genetic Resources

4.1 USE OF PGR COLLECTIONS

Most frequently used plant species are *Triticum, Hordeum*, *Vicia* spp. (Mostly *Vicia sativa*), *Sesamum, Helianthus*, *Phaseolus*, *Cicer, Cucurbita, Hibiscus, Lactuca, Pappaver* etc. The fruits and vegetable genetic resources are commonly and most frequently used by national fruit, and vegetable programs. Food legumes and oil seed crop programs are also frequent users of the material. Last 3 years figures are given in Table 8.

Table 8 Plant species supplied from gene bank in last 3 years, 1992-1994.

Plant	N°. of Accessions
Sesame	110
Nicotiana	220
Cicer	351
Triticum+Aegilops	130
Hordeum	76
Zea mays	132
Hebianthus	43
Cucurbits	46
Hibiscus	36
Linum	10

Since some of the national programs cooperate with NPGRRP on collection of related genetic resources they also frequent user of the genetic resources collected by themselves. National Fruit Research Programs, National Vegetable Research Programs, National Medicinal and Aromatic Plants, Program, National Forage Research Program, Oil Seed Crops Research Program are the collaborative and frequent users of Turkish genetic resources.

For example there are some of the varieties released from National genetic resources collection by using them in National Crop improvementprogram: 7 forage species, 21 pomegranate, 24 plums, 8 plum root stocks, 3 quincy, 13 sour cherry,

1 Anise registered by AARI, 1 sesame registered by MARI (Mediterranean Agricultural Research Institute).

4.2 CROP IMPROVEMENT PROGRAMMES AND SEED DISTRIBUTION

In Turkey there are 19 National Project Working on Crop improvement.

National Research Projects:

- Rice Research Project
- Potato Research Project
- Tobacco Research Project
- Cotton Research Project
- Cereal Research Project
- Food legumes Research Project
- Forage Crops Research Project
- Fruit Research Project
- Citrus Research Project
- Olive Research Project
- Pistachio Research Project
- Hazelnut Research Project
- Fig Research Project
- Vegetable Research Project
- Sunflower Research Project
- Maize Research Project
- Ornamental Plants Research Project
- Medicinal and Aromatic Plants Research Project
- Grape Research Project

The main functions of some National Research Projects are to improve local varieties. While others mostly are functional to adapt imported germplasm to local needs.

The objectives of most breeding program are improving the new varieties with:

- high yielding
- resistant to stress factors
- resistant to disease/pest

The ultimate objectives of these projects differs from are to another. Mostly focused on to increase production increasing export opportunities for the requirement. of importing countries.

The amount and quality of scientific plant breeding programmes being undertaken in Turkey is adequate to meet national needs and goals. But some of the recent bio-technological research would be adapted to undertake some basic research which can support further breeding program.

The plant breeding activities are primarily conducted by government funded programmes but some private companies and multinational companies have some breeding activities.

By the Agricultural Extension and Applied Research Project the in-country crop improvement products and made available to farmers easily and quickly. Cooperative activities of scientist/breeder both from research institutes and Universities, extension service and farmers help to exchange information, products and improve the research programmes in according to the farmers requirement.

The improved varieties introduced to farmers with on-farm trials by breeder and demonstrations by extension experts. The information exchange between farmers, extension services and scientist/breeder is undertaken by monthly meetings.

4.3 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES AND IMPROVING PGR UTILIZATION

National Plant Genetic Resources Research Project concentrated its efforts for collection and conservation of plant species either under threat or required by the National Crop Research Projects. In both cases the direct and indirect benefits are derived from these efforts. The improved varieties released from National Plant genetic resources collection are the direct benefit of the countries agricultural sector.

As stated previously characterization and evaluation program of National plant genetic resources is being carried out with the collaboration of National crop research projects. Therefore the respective crop scientists (breeder/agronomist,

pathologist) get opportunity to evaluate and identify the accessions for their utilization in crop improvement programmes. The achievement of NPGRRP is to assemble maximum crop genetic resources variability from different agroecological regions of Turkey. The utilization of plant genetic resources could be further enhanced if those material fully evaluated and utilized by research scientists.

CHAPTER 5
National Goals, Policies, Programmes and Legislation

5.1 NATIONAL PROGRAMME

The Aegean Agricultural Research Institute (AARI) is National Coordination Centre for National Plant Genetic Resources Research Project (NPGRRP). AARI has national responsibility on coordination and undertaken collection, conservation, characterization/evaluation, multiplication/regeneration and documentation of plant genetic resources of Turkey. Within the framework of NPGRRP, The plant genetic resources activities are being carried out with collaboration various research institute of Ministry of Agriculture and Rural Affairs (MARA), and Universities. The ex situ conservation activities of National program is a government funded program. But the in situ activities are GEF-funded programme and undertaken with collaboration of MARA, MOF and MOE. The NGOs and universities are also involved in part of public awareness and preparation of National Plan. At present no farmers organization is undertaking plant genetic resources conservation activity in Turkey.

The National Coordinator (Head of PGR Dept. of AARI) coordinates all plant genetic resources activities on National bases on behalf of AARI. The Herbarium of AARI is very rich in herbarium specimens of genetic resources. The documentation, introduction of exotic genetic resources and distribution of National collections are the central activities undertaken by National Coordination Centre. The annual programmes and the budget prepared by the national coordinator in according to the requirement of collaborative institutes and research projects. There are 27 projects of NPGRRP.

Annual programs of those projects are discussed and agreed in annual meeting of PGR working Group. The working Group as a kind of managing board of the project, meets once a year, upon call of General Directorate of Agricultural Research of MARA. The annual programmes, budgets are approved by the Ministry of Agriculture and Rural Affairs. The PGR programme has its budget line.

The National plant genetic resources collections protected by legislation.The Regulation on Collection Conservation and Utilization of Plant Genetic Resources are published in the Official Gazette on 15 August 1992. The responsibilities of

related institutions, including institutes of MARA, universities or the institutes of other ministries works on related aspects of PGR.

5.2 TRAINING

Since the national program a collaborative program therefore the all related skills are available. The *ex situ* part of program has adequately staffed with trained personnel. But need training of junior staff member of the project.

None of the universities offers relevant courses on PGR. So on the advanced level of training the international technical/financial assistance needed to train the project staff in abroad. AARI gives seminars and courses both for international and national level. The international courses are organized jointly with the international institutions. The financial/technical assistance would be needed for such courses.

There is no differences between men and women on the working any of the subject in Turkey. Therefore men and women equally involved in all aspects of PGR including training programmes at all levels.

The policy-makers in Turkey understand the importance of plant genetic resources. For public awareness some of the programmes, articles are prepared in the communication media.

5.3 NATIONAL LEGISLATION

The International rules and regulations are accepted by the Quarantine Office. The Quarantine regulation requires the import permit for introducing the germplasm material. The material should be accompanied by phytosanitary certificate and all the necessary indications or statements determined in the import permit. AARI is only responsible institute to introduce the research material (germplasm) from abroad and export research material to abroad from national collection. Therefore AARI has close cooperation with the Quarantine Service (Provincial Quarantine Director, lzmir). Quarantine laws allow the international transfer of *in vitro*, seed and vegetative parts of plant in according to the international Quarantine regulation.

Government does not provide incentives to farmers for the conservation of traditional varieties. The Act. No. 308 on Seed Registration and Certification governs the sale and distribution of seeds. The certified seeds are distributed to farmers. The Regulations Variety Protection and Breeders right on the Registered Varieties are published in Official Gazette on 28 September 1994 as amendment of Act. 308.

The plant genetic resources exchange has been regulated by PGR Regulation published in Official Gazette (15 August, 1992). With some exception material available to scientist for scientific research. But feed-back information is required. The foreign collection missions are also regulated in the same regulation.

The foreign collecting missions should be organized jointly with NPGRRP with a project and approved by Turkish Authorities. The material should be divided between the parties.

5.4 OTHER POLICIES AND INTERNATIONAL AGREEMENT

The PGR staff/experts are not directly involved in planning of major agricultural development project. But since NPGRRP cooperate with other national program and their staff works for NPGRRP the indirect involvement is exist.

A Red Data Book was published in 1989 indicating the level of endangerment faced in plant species of Turkey according to IUCN classification.

Turkey is a signatory of Bern Convention. Therefore Turkey has added approximately seventy plant species which need protection, and necessary measures are being taken for their protection.

Turkey is also signatory of RAMSAR, Bio Diversity Conventions.

Turkey has been signed CITES. The purpose of this convention is protecting the endangered plant species which are subject to commercial trading, and to bring under control their export and import.Turkey has imposed restrictions on the removal from natural habitat of certain bulb plants, plants with rhizome roots and tubers (geophytes). More importantly, efforts are being made to restrict their sales abroad since 1980s.

CHAPTER 6
International Collaboration

Turkey is collaborating various international organizations on various aspect of PGR since 1960s.

6.1 UNITED NATIONS INITIATIVE

Turkey is a signatory of Biodiversity Convention Since June 1992. Turkey is adapted agenda 21 to implement Chapter 14 G, Conservation and Sustainable utilization of plant genetic resources for food and sustainable agriculture, Turkey become member of a Consortium establish by the effort of ICARDA and IPGRI in WANA Region to Conserve the biological diversity for Sustainable Agriculture in Fertile Crescent. To implement Chapter 15, conservation. of Biological Diversity, A project (GEF Project) has under study to conserve the genetic diversity in Turkey. It is dealing with *in situ* conservation of wild relatives of crops and some forest trees.

Turkey is also member of FAO commission on Plant Genetic Resources and signed the International Undertaking. At the moment Turkey has not gained any direct and objective benefits. But, of course joining to such commission, is indirectly effective on the policy makers clarify the importance of the conservation of plant genetic resources. Turkey believe the importance of the creation of International fund to help the progress on plant genetic resources activities of developing countries especially in the centre of diversities.

Turkey is willing to have strong collaboration with FAO on programme level in the future.

6.2 INTERNATIONAL AGRICULTURAL RESEARCH CENTRES

Turkey is collaborating with many of the International Agricultural Centres and IPGRI on various aspect of PGR. With CIP, CIMMYT, ICARDA there are agreements signed. These are mainly on the provision of enhanced material exchange within the country users and on the various research program including exchange of PGR material and joint research on PGR especially with ICARDA. Some joint expedition on the collection of food legumes and wheat realized, and joint collection and evaluation genetic diversity of wild food legumes (Cicer and Lens) and wild wheat (*Triticum* and *Aegilops*) have been planed, with ICARDA.

Turkey also member of ECP/GR and WANANET of IPGRI.

Previously Turkish staff have received training from IPGRI and ICARDA. Those were mainly short course. And also some international regional course were organized Jointly with ICARDA and IPGRI on conservation of PGR.

The new and strong support in plant genetic resources Turkey would like to receive from CGIAR. On the financial support of evaluation programme, training (especially audiovisual training on genetic diversity determination, GIS etc.) and to provide same new model of equipment's and goods to improve the genebank facilities.

ICARDA and CIMMYT has their office in Turkey.

IPGRI for next decade should pay more emphasis on the development and' establishment or improvement the national programs in the regional countries with coordination of the countries that have developed and comprehensive PGR programme. Additionally IPGRI should create the joint programme within the region, and also should give more emphasis helping the countries on the establishment or improvement of *in situ* programmes, not only for consulting but also finding the donors to Support and training for such programmes in the countries.

6.3 BILATERAL INITIATIVES

Turkey has some bilateral agreement with some of some countries on agricultural research.

CHAPTER 7
National Needs And Opportunities

Those are the future plans and needs.

- *In situ* conservation of wild relatives of crop:
  - Inventories in pilot areas for target species and associated wild species.
  - Determination of genetic diversity of target species in selected sites.
  - Designation of GMZs.
  - Preparation of National Plant for conservation of wild relatives of crops.
- *In situ* conservation of Crops (On-farm conservation):
  - Targeting the species.
  - Socio-economic studies on the conservation of crops.
  - Determination of genetic diversity of target species.
  - Conservation biology research on target species.
  - Designation of *in situ* conservation site.
  - Preparation of the regulation for sustainable *in situ* conservation of crop.
- Evaluation of PGR:
  - Cereals
  - Forages
  - Vegetables
  - Industrial crops
  - Food legumes
  - Medicinal and aromatic Plants
  - Ornamentals
- Collection of medicinal and aromatic plants, ornamentals endemics, wild relatives of vegetables, industrial plants, forages, and fruits.
- The biochemical evaluation of genetic Diversity studies (Isozyme, DNA analysis).

- Further evaluation of major crops to:
  - Stress factors
  - Resistant to disease and pest
  - Technological evaluation
- Establishment of National clonal repositories at different agro-ecological region of the country.
- The training of the junior staff of the NPGRRP, in different disciplines of PGR for the implementation and improvement of future programmes with the new technologies applicable to PGR.
  - Renewal of the equipments and facilities with new model and technology
  - Automatic power generator, Green houses
  - New conservation containers (Cans)
  - Research on cryopreservation.

PHITOGEOGRAPHICAL REGIONS OF TURKEY