GREECE:

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

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CHAPTER 1
Introduction to Greece and its Agricultural Sector

1.1 GEOGRAPHICAL POSITION

Greece is part of the European continent. It is located in the eastern side of the Mediterranean basin, being the southern-most part of the Balkan peninsula. It has an area of 131,944 sq. km., of which 106,777 represent its continental mainland and 25,166 its islandic part. Greece extends from 34°48 'N to 41°45' N degrees geographic latitude, and from 19°22' E to 29°38' E geographic longitude. The country is surrounded from 3 sides by sea (by the Ionian sea in the west and by the Aegean sea in the east and south) and only in the north has terrestrial borders with other states (Albania, the F. Y. R. O. M., Bulgaria and the European part of Turkey). The Ionian sea separates Greece from Italy in the west and the Aegean sea from Turkey in the East. Its versatile coastal line is nearly 15,000 Km. long. Greece has a large number of medium to small size islands. Of them, 76 are of considerable size and inhabited.

1.2 PHYSIOGRAPHY AND CLIMATE

The country is generally characterized as mountainous, having an average elevation of 502 m. above sea level, and presenting more than 40 mountains peaks over 2,000 m. Only 33% of its area is lower than 200 m. in altitude. The remaining 67% is hilly or mountainous. The continental mainland part is crossed from north to south by Pindos, a mountain range which is regarded as the southern branch of the central European Alps. The highest peak in Greece is mount Olympus, 2,917 m. high, renowned from mythical times as the home of Gods.

Its climate belongs to the «Mediterranean» type, being characterized by rains during 3 seasons (autumn, winter and spring), and drought accompanied by high temperatures in the summer. In the continental mainland there is wide variation in microclimates attributed to the pronounced mountainous profile and ranging from the mild Mediterranean type up to the harsh «Central European» climatic type, characterized by extremely low winter temperatures, broad annual temperature range, prolonged winters and a trend for uniform rainfall distribution throughout the year. Representative areas of this climatic type are common in northern Greece. Main factors affecting the climatic

types of Greece are the influence of the Atlantic ocean and the Asiatic continent, the profile of the land and the vicinity and continuous alternation of land and sea. Climatic differences of that scale even between neighboring sites, are encountered in only few parts of the world.

1.3 POPULATION

The population of the country was 10,264,050 inhabitants in 1991. The annual population increase rate over the last 50 years was very low, being 0,5% over the last decade.

1.4 MAIN FARMING SYSTEMS AND CROPS

Agriculture in Greece today is an intensive market oriented competitive sector of the economy, aiming at both the interior and the global market. Exports of farm products were the backbone of the national economy in the past and an important source of foreign exchange. Although the contribution of agriculture to the gross national product and exports has dropped to less than 16% in the last years, certain crops and agricultural products still maintain their leading position as sources of foreign exchange (tobacco, cotton, olives and olive oil, fruits and vegetables) or as essential raw materials for the domestic processing industry (textiles, cigarettes, sugar, wines, juices and soft drinks etc.).

The agricultural area of Greece is 4.01 million Ha, or 40.1 million stremmata (1 stremma = 1.000 m. sq. or 1/10th of a Hectare), as it is shown in the table below:

Land Category	Area in million Ha	Percentage area in%
Agricultural land	4,01	29,7
Ranges	5,21	39,5
Forests	2,98	22,6
Other	0,99	8,2
TOTAL	**13,19**	**100**

The 4,01 million Ha of the agricultural land are allocated to the following crop categories:

Crop category	Area in million Ha	Area %	Irrigated area	Irrigated %
Arable crops	2,33	67,2	0,80	30
Vegetables	0,12	3,3	0,10	8
Grapevines	0,17	4,9	0,02	12
Tree crops	0,90	24,6	0,22	25
Total Cultivated Area	3,52	100	1,14	32
Set Aside 1-5 years	0,49			
Total Agricultural Land	4,01			

Of the agricultural land 1.2 million Ha (32%) is irrigated and about 50% (16% of the overall area of the country) represents lowland plains, that is good agricultural land. Greece has a favourable natural environment for the cultivation of a large number of crop species. The agricultural sector contributes by approximately 16% to the national product, mainly through plant production, which accounts for 70-75% of the whole agricultural production. The per capita farmer's income in 1993 was nearly 70% of the respective income of the civic sector employees.

With few exception, Greece has significant surpluses in almost all major crops The main exportable plant products of the country are olive oil, cotton, tobacco, wine, raisins, fruits and vegetables, which account for about 70% of the value of the plant production of the country and bring significant amounts of foreign currency in the country. In contrast, Greece is very deficient in animal products, especially in bovine meet and milk, wood and wood products (paper etc). The agricultural trade was positive in 1981, but it became strongly negative afterwards, owing to the liberation of imports under the EU regulations and other international agreements, to the higher competition by the introduced products and to the increased demand for foodstuffs to cover the needs of the growing numbers of tourists visiting the country every year.

Certain crops are optimally adapted to the mild climate of the country (olive, grapevine, fruits-trees, oranges, figs, vegetables etc.) or form the basis for its processing industry (tobacco, cotton, sugarbeet, olive, tomato, oranges, fruits,

vegetables etc.). The predominant crop categories and their most representative species appear in the following table:

	Crop category	Area 1000 Ha	Production 1000 tons
A	ARABLE CROPS		
1.	Industrial Crops		
	Cotton	350	975
	Tobacco	80	135
	Sugar Beet	42	2700
2.	Cereals		
	Wheat	1000	3100
	Barley	178	460
	Maize	220	2300
3.	Forage Crops (Trifolium, Grasses etc.)	260	1800
B	VEGETABLES		
	Tomato (Table and Industrial)	44	2100
	Potato	52	1100
	Other (Onion, Watermelon, Brassica, Lettuce, Eggplant)	55	1350
C.	TREE CROPS (in Thousand plants)		
1.	Olives	130.000	
	Table olives		200
	Processed olives		1.480
	Olive oil		300
2.	Citrus fruits (Orange, Lemon etc.)	26.500	1.300
3.	Fruit trees (Peach, Pear, Apple, Apricot, Cherry)	35.000	1.240
4.	Other (Nuts, Fig etc.)	16.500	100
D.	GRAPES	155	
	Must		433
	Table grapes		250
	Raisins		90

The agricultural population of Greece is today estimated to be below 21% of the total. This percentage has dropped from 29% in 1991 to 27% in 1987, then to 23% in 1993 and 21,3% in 1994. The current reduction rate is estimated to 2-2, 6% per year, since almost 90% of the rural youth seek for occupation outside the farming sector. The agricultural population of Greece is however still very high comparatively to the EU standards.

1.5 BRIEF PROFILE OF THE AGRICULTURAL SECTOR

The average family lot size in Greece is only 4-5 Ha. The situation is aggravated by the fact that frequently this small lot consists on average by 3-10 smaller scattered subplots. In comparison to the average plot sizes of 10-50

Ha of many EU countries, only 1,7% of the Greek farming enterprises exceed that lower threshold size for sustainable farming under the EU living standards. The distribution of the agricultural lot sizes in Greece (1987) appear in the table below.

Size category in Ha	Number of Enterprises	Percentage of Enterprises	Area in 1000 Ha	Percentage of Area
0-1	231.600	24,1	1.115.109	2,7
1-3	308.820	32.5	5.649.523	13.8
3-10	333.660	20,4	17.325.934	42,4
10-25	65.300	6,9	9.177.628	22,4
25-50	12.280	1,3	4.086.081	10
50-100	2.960	0,3	1.867.351	4,6
>100	1.040	0.1	1.692.146	4,1
	958.660	100	40.913	100

Farmers' supply with seeds is done by local and international seed production and trading firms and this applies to all varieties registered in the National and EU Catalogues of Plant Varieties. Farmers are allowed to use the seed for 2-3 years (Farmers' Privilege) and they take advantage of this privilege for autogamous plant species. Until 1985 seed production was under state control, but today is a competitive activity undertaken by either state controlled organizations or by cooperatives and private firms, always under the supervision of state authorities. Directly imported seed is also distributed by local or international firms.

As regards the adverse effects of biotic and abiotic factors, damage by pests and diseases is usually small to moderate, while damage by frosts and drought is heavier and more frequent. The climatic change of the last decades has resulted in reduced rainfalls and in increased incidence of hot dry seasons. Drought resistance is now becoming a substantial factor in the breeding programmes of Greece, particularly for cereals, whose production is regularly suffering significant losses by the warm dry north-African wind (Livas).

Greek agriculture is in a critical transitive stage today, facing the adverse effects of the revised common agricultural policy (CAP) of the EU and the new rules governing international agricultural production and trade (GATT agreement). The reduction of the EU support and the lower production and export quotas imposed on certain crucial products for the Greek economy and the increasing international competition are expected to pose major problems in the immediate future. It is believed however that by taking appropriate measures (Farmers Register, Crop Boards to control production levels and avoid unwanted surpluses, crop diversification, cost reduction, improved quality, named traditional products, search for new crops and new markets

etc.) the agricultural production and trade will manage to adapt to the new international frame in the coming 5-10 years. Another promising outlet for the agricultural trade is the largely unexplored Balkan, Eastern European and Russian market, where Greece has competitive advantage mainly due to the immediate proximity and similarity of food preferences in comparison to the distant central European markets where almost 75% of the Greek products (particularly fruits and vegetables) are traded today.

CHAPTER 2
Indigenous Plant Genetic Resources

Taking into account its limited size, Greece is considered among the richest countries in natural vegetation. About 6000 plant species are reported to occur in Greece, of which nearly 800 are endemic. This excessive species diversity has been evolved in the variable ecogeographic niche of the country by natural selection forces, spontaneous seed transfers by migrating birds and animals or periodic introductions of seeds and plants by a multitude of human populations that at times have passed through or settled in the country from prehistoric times. It is believed that the number of the indigenous species is much higher, since the country has never been systematically explored. The genetic resources of Greece are analogous to its rich natural environment and its long agricultural history. Greece is one of the most ancient centres of agriculture along with the countries of Middle East and Western Asia.

2.1 WILD RELATIVES OF CROP PLANTS

Significant categories of indigenous wild and weedy species that are close relatives or ancestors of cultivated plants are Cereals (*Triticum, Aegilops, Hordeum, Haynaldia, Avena, Secale* etc.), Forages *(Trifolium, Medicago, Festuca, Lolium, Phleum* etc), Pulses (*Lens, Vicia, Lupinus* etc.), Vegetables (*Cruciferae, Compositae, Umbelliferae, Liliaceae, Chenopodiaceae*, Grapevine (*Vitis ssp*), Olive (*Olea ssp*) etc.

There is also a multitude of wild species directly used for human nutrition, industrial or other uses and for ornamentation. In that category belong certain wild species used as condiments or as decoctions (*Origanum ssp, Ocimum, Majorana, Capparis, Sideritis, Matricaria*), aromatic plants used for the production of essential oils and perfumes (*Salvia, Mentha, Lavandula* etc) or medicinal plants (*Digitalis, Papaver* etc).

Only a limited part of the broad spectrum of the wild relatives grown in Greece has been collected and conserved in the Greek Gene Bank, which holds

in its facilities 2,800 accessions of wild and weedy species, of which most important are:

SPECIES		SPECIES		SPECIES	
Aegilops caudata	162	*Brassica cretica*	46	*Lupinus spp*	78
Aegilops comosa	185	*Dactylis glomerata*	150	*Medicago spp*	100
Aegilops lorentii	265	*Festuca arundinacea*	32	*Origanum spp*	10
Aegilops ovata	140	*Haynaldia villosa*	118	*Phleum spp*	12
Aegilops spp	79	*Hordeum bulbosum*	54	*Salvia ssp*	38
Aegilops triaristata	153	*Hordeum spontaneum*	85	*Trifolium campestre*	13
Aegilops triuncialis	225	*Lathyrus ssp*	43	*Trifolium cherleri*	13
Agropyrum spp	21	*Lavandula stoechas*	13	*Trifolium hirtum*	21
Allium spp	39	*Lolium perenne*	57	*Trifolium resupinatum*	9
Beta maritima	262	*Lolium spp*	16	*Trifolium spp*	123
Beta nana	28	*Lotus corniculatus*	19	*Vicia sativa*	47

The collection is excellent in certain wild cereal species (i.e. *Aegilops ssp, Haynaldia ssp, Hordeum ssp.*) which are considered as potentially promising donors of genes to cultivated cereals for resistance to drought, diseases etc. On the other hand it is rather poor, comparing to the existing genetic resources in Greece, in wild vegetables, trees, ornamental plants, wild forages and pulses, as well as in medicinal and aromatic plants.

2.2 LANDRACES AND OLD CULTIVARS

The wealth in cultivated germplasm is also analogous to that of the wild. Greece is known as one of the most ancient cradles of agriculture. Main contributing factors to that wealth are its diverse natural environment, the commercial relations with neighbouring or remote lands in the region even from the mythical of early historical times, the early development and explosion of scientific and practical knowledge in botany, agriculture, medicine and the natural sciences in general, and the massive populations movements (and of their seeds) in the region from the Neolithic times till the early part of the century.

The existence of a favourable natural environment for the cultivation of a broad spectrum of species in conjunction with the agriculture of local sufficiency or subsistence that was the rule in the beginning of the century has led to the maintenance under cultivation of a large number of local landraces well adapted to the local conditions and preferences. The category includes both species originated or diversified in Greece (leguminous crops such as *Cicer, Lens, Vicia, Pisum* and *Lupinus*, vegetables such *as Brassica, Lactuca, Cichorium, Beta*, trees such as *Olea, Ficus* etc. and grapes, as well as species introduced in Greece centuries ago but having afterwards evolved and adapted

to the local conditions (many fruit-trees such as *Malus, Pirus, Prunus* etc, Cereals such as *Triticum, Hordeum, Secale* etc, and vegetables such as *Phaseolus, Lycopersicon, Solanum, Capsicum* etc.).

Approx. 4,400 seed samples of local varieties are conserved in the GGB and minor specific ex situ seed or field collections. The main crop species and the respective number of accessions appear in the table below :

SPECIES	Nr.	SPECIES	Nr.	SPECIES	Nr.
Allium cepa	50	*Gossypium hirsutum*	305	*Pisum sativum*	43
Allium porrum	61	*Hordeum vulgare*	99	*Prunus spp*	142
Allium sativum	12	*Lactuca sativa*	38	*Solanum melongena*	16
Aveva sativa	39	*Lathyrus sativus*	15	*Triticum aestivum*	111
Beta vulgaris	443	*Lens culinaris*	99	*Triticum boeoticum*	48
Brassica oleracea	128	*Lycopersicon esculentum*	33	*Triticum durum*	139
Capsicum annuum	31	*Medicago sativa*	16	*Vicia faba*	162
Cicer arietinum	179	*Nicotiana tabaccum*	488	*Vigna unguiculata*	29
Cucurbita maxima	39	*Phaseolus coccineus*	22	*Vitis vinifera*	567
Ervum ervilia	12	*Phaseolus vulgaris*	371	*Zea mays*	294

The collection is particularly strong in germplasm of Cereals (730), Tobacco (488), Cotton (305), Pulses (932), forages, grapevine (567) and Prunus (142) accessions.

2.3 GENETIC EROSION

Most wild species of wide distribution are not facing immediate threat of genetic erosion or extinction (cereals, forages, pulses, aromatic-medicinal plants). There are however certain categories for which the danger is grave and the threat of extinction is a reality. Such species are for example the wild Tulips of Crete (*Tulipa cretica* and *Tulipa saxatilis*) which are grown spontaneously on a limited number of suitable coastal sites, now facing the pressure for tourist development. Similar but less menacing is the threat for wild Beta maritima coastal populations. Among the threatened species are also certain unique aromatic and medicinal plants of the country (*Sideritis ssp.* or 'Greek mountain Tea', *Origanum dictamnus*, the famous "Dictamon" of Crete etc.) due to their excessive overexploitation, putting at risk the limited natural populations.

With the advent of the modern market oriented agriculture Greece has suffered dramatic losses in its cultivated germplasm, which was displaced by the superior modern varieties produced by the local breeding institutes or imported from abroad. The erosion was particularly intense and rapid in

cultivated cereals, where the local populations and varieties cultivated today hardly account for 1-2% of the total allocated acreage. An analogues trend, but with a 15-20 years' delay comparatively to the cereals, is now becoming apparent for the vegetable crops, where in the last years local landraces are rapidly displaced even from backyard gardens.

Traditional varieties are still used in many tree crops (olive, apples, cherry, apricots, pears, nuts) and in the grapevine. However the number of varieties used on a large scale has been substantially reduced.

Main reason for this genetic erosion was the unquestionable superiority of the modern varieties over their traditional counterparts, their suitability for intense farming systems and their conformity to the demands of the market. So, the success of the scientific genetics and breeding had indirectly and unintentionally led to a depletion of the existing global Biodiversity, mainly because even the scientific community had failed to foresee the adverse effects of modern farming and seed production and trade rules on biodiversity and take timely action. It was fortunate that FAO and IBPGR made persistent efforts to raise the scientific at first and political and public awareness shortly afterwards as early as in the 1970s so that today genetic erosion is a major issue, not only for scientific or political circles but even for the simple people.

2.4 GOVERNMENTAL POLICIES TO STOP GENETIC EROSION

Until recently, there was no official encouragement or discouragement of the cultivation of local varieties. Formally, however, with the introduction of the National Catalogue of Plant Varieties, introduced by Law 1564/85 regulating "Production and Trade of propagating material" in Greece, trade of seeds of varieties not registered in the National Catalogue is considered illegal. The law however does not forbid the use of seeds of local varieties by farmers maintaining their own seeds over years, but only seed trade.

Actually the legislation granting Plant Variety Rights intends to protect the interests of both the breeder and the farmer, by securing through relevant controls seeds of high quality, genetic purity and reliable steady performance. In the long run, though, it leads to the extinction of all traditional populations and varieties by making their trade illegal. A new trend is now forming internationally seeking for some legal outlet that would legalize limited local use and trade, under strict control, of traditional varieties to achieve their conservation "On farm" and their continuous adaptive evolution. The Greek Ministry of Agriculture is favouring today a more flexible approach on this issue, in the framework of the protection of the traditional germplasm of the country, and intends to support controlled use of seeds of traditional landraces in relevant international agreements.

Another positive step is the introduction by the Ministry of Agriculture, Directorate of Physical Plannings and Environmental Protection, of a nation-wide programme for the protection of traditional agriculture, in conformity to the respective supporting regulation of EU (2078 /92). This programme it is expected to reverse the trend and contribute to reviving traditional agricultural systems in Greece, reintroduce under-utilized crops and rescue much of the remaining crop diversity in Greece.

2.5 INVOLVEMENT OF FARMERS AND NON GOVERNMENTAL ORGANIZATIONS

There is a general awakening and raising of consciousness not only of the specialized scientific community, but also of the general public, for protection of PGR in the framework of a broader interest for the protection of the environment and Biodiversity. There is a growing interest now in Greece for using local landraces in ecological farming programmes by individual farmers or ecologically sensitive groups, since local germplasm is best suited for low input farming, or for their fine quality and suitability to local traditional preferences and tastes.

GGB has initiated an informal collaboration with certain ecological organizations and provided to them small seed samples on a trial basis, to be multiplied and afterwards assessed for potential reintroduction into cultivation. Certain of these groups are keenly interested to initiate activities on conservation and utilization of seeds of traditional landraces.

CHAPTER 3
National Conservation Activities

Until the end of the 1970s the dramatic depletion of PGR occurring in Greece as a result of the great advances in plant genetics and breeding and the modernization of the agricultural production and trade it was not fully appreciated. National legislation was providing for a generalized protection of the environment and Biodiversity over the Greek territory through the establishment of National Parks, Wetlands and other integrated approaches, and the designation of sites of natural beauty, historical or aesthetic value etc.

Particularly for plant communities, protection was confined to certain areas with rich or rare vegetation where access, plant collection and grazing was restricted or, when necessary, prohibited. Threatened plant species were listed in specific national and international catalogues (Red Data Books) to receive higher priority in the protecting interventions.

Legislation after the 1980s reflects the increasing sensitivity of both the scientific community and of the state authorities in issue of the Conservation and Protection of PGR. The foundation stone for the protection of the domestic PGR was laid down with the introduction of Law 1564/1985 for the "Organization of the production and trade of propagating material of plant species". Article 14 of that law, titled "Conservation and protection of genetic resources" outlines for the first time the basic frame of this protection, defines legal and administrative jurisdictions and task allocations, the area of implementation, the rules of utilization or exploitation, and provides for the necessary funds.

According to this article all indigenous genetic resources, their wild relatives and the biotopes where these species are naturally reproduced constitute invaluable elements of the environment and therefore are protected by the state through the responsible services of the Ministry of Agriculture. The responsibility for the protection of cultivated species and bred animal races belongs exclusively to the Ministry of Agriculture, while for the wild animal and plant relatives and their biotopes where these species live there is common authority of both the Ministry of Agriculture and the Ministry of Environment, Physical Plannings and Public Works.

Article 14 provides mainly for "On farm protection" of the cultivated species and bred animal races and for *in situ* protection of their wild relatives. Also, for the first time there is provision for funding of these protective activities by the Central Fund for Agriculture, Animal Husbandry and Forestry of the

Ministry of Agriculture, supported annually for this purpose by the state Budget. Finally, it provides for the issue of Presidential Decrees designating the protected areas and species, for defining the means for the implementation of the protection, as well as for the issue of ministerial decisions regulating particular topics such as the biogenetic exploitation of these resources, the management of the biotopes and the associated germplasm, the allocation of tasks to particular authorities and services and all other relevant details.

As part of the process to implement art. 14 of law 1564/85, Presidential Decree 80/1990 was issued in 1990, titled "Protection of plant genetic resources of the Country" establishing the "National System of Conservation and Protection of the Genetic Resources of Cultivated Plants", to which they were included:

a) The Greek Gene Bank

b) Field collection - Plantations

c) Zones for protection of wild relative species (*in situ* protection)

d) Zones for protection of traditional farming (On farm protection)

The Greek Gene Bank was designated by this Degree as the coordinating and implementing organ of the National PGR System under the supervision of the competent authorities of the Ministry of Agriculture. GGB coordinates and supervises all activities, keeps updated computerized records of the protected germplasm and introduces new activities to the Directorate of Physical Plannings and Environmental Protection of the Ministry of Agriculture, following relevant proposals by the responsible crop Institutes of the country. As regards the designation of zones for the protection of wild species, the authority is shared between the Ministries of Agriculture and Environment, Physical Plannings and Public Works.

The Central Services of the Ministry of Agriculture having the authority to implement this protection are the Directorates of Physical Plannings and Environmental Protection, of Agricultural Research and of Forests and Forest Environment. From the peripheral services the main responsibility was assigned to the Greek Gene Bank, while limited local responsibility was transferred to the directorates of Agriculture, Forestry and Animal Husbandry of the respective administrative prefectures of the country.

After 1992, when the Greek Gene Bank and the main research institutes of the Ministry of Agriculture have been transferred to the National Agricultural Research Foundation (N. AG. RE. F), a significant share of the authority and

responsibility has to be assigned to this new scientific body, particularly on matters relating to the coordination and carrying out of these activities.

3.1 *IN SITU* CONSERVATION ACTIVITIES

Until now the Joint Decisions by the Ministers of Agriculture and Environment needed to designate zones of *In Situ* protection of wild relative species according to Presidential Decree 80/1990 where conservation of diversity and their natural evolution would be guaranteed, have not been issued. Main reasons for this delay were the numerous legal, administrative, technical and financial problems associated with this endeavour, on the one hand, and the reorganization and reassessment of priorities of the agricultural research on the other.

Fortunately, despite the absence of direct protective measures, a significant part of the Biodiversity of the Greek territory is already protected indirectly within archaeological sites *(Brassica cretica* in the castles of Kythira and Limnos or in the acropolis of Lindos, *Hordeum spontaneum* in Knossos, *Aegilops ssp.* and *Colchicum ssp.* in the acropolis of Aeges etc), in national parks, river estuaries or wetlands. A large sample of the biodiversity of the country is also safely preserved in the region of the Holy Mountain Agion Oros, where nearly 95% of the territory is covered by intact natural ecosystems with high species richness, and a wealth of old traditional varieties still is grown in scattered small agricultural plots.

The Greek Gene Bank has identified through its numerous explorations over the last 15 years certain areas rich in wild genetic resources, and has proposed them for in situ protection. These areas represent only a small sample of the existing ecogeographic and genetic diversity in the Greek territory. When the detailed survey of the country will be completed by relevant work of the GGB, other organizations of the Ministry of Agriculture, Universities, the Ministry of Environment and other public or non-governmental organizations, a much larger number of promising areas will be identified and proposed for protection.

- The foothills near Mesti in Rodopi prefecture of Thraki region *(Triticum boeoticum, Aegilops speltoides* etc.).
- The foothills near Thermopyles in Fthiotis prefecture, central Greece (*Triticum boeoticum, Haynaldia, Aegilops* etc.).
- The area of Kipourio in Grevena prefecture of Makedonia region. (*Triticum boeoticum, Aegilops ssp,* etc.). Certain species found there were unique and reported for the first time to occur in Greece.

- The Aegean islands Limnos, Lesvos, Hios, Samos, Rodos etc. (*Triticum boeoticum, Hordeum spontaneum, Brassica ssp, Aegilops ssp,* wild Legumes, *Beta ssp* etc.).
- The area of Mount Parnon in Arkadia prefecture, region. (wild cereals, vegetables and ornamental - medicinal plants).
- The area of Mani in Lakonia prefecture, in Peloponnisos region. (wild cereals, aromatic and medicinal plants).
- The area of Omalos plateau and Samaria gorge in Crete. (wild vegetables such as *Brassica cretica*, medicinal and aromatic plants such as *Crocus ssp, Sideritis ssp, Origanum dictamnus*, and ornamental plants such as *Tulipa cretica*).
- The area of Mount Aenos in Cefallonia island, Ionian sea. (wild vegetables, cereals, aromatic and ornamental plants *like Beta ssp, Aegilops ssp, Haynaldia ssp.* etc).
- The Gorge of Vikos in Epirus region. (medicinal and aromatic plants).
- The area of lake Prespa in Florina prefecture of Makedonia Region. (wild forage crops and pulses).
- The area of the Monastic State of Agion Oros (Holy Mountain). It is the only area in Greece where nature has been left completely intact through the ages. It is among the richest areas of Greece in biodiversity and genetic resources.
- The area of Mount Olympos. The holy mountain of ancient Greece is extremely rich in biodiversity and in germplasm of certain wild relatives of crop plants (*Beta nana, Secale montanun* etc.) and ornamentals.

As a first approach, taking into account the current situation and limited options, the GGB has proposed the onset of In Situ protection of PGR using initially certain areas already protected through other schemes. Such areas are the national parks, biotopes, archaeological sites etc. A scientific team should make an inventory of the existing genetic resources in these areas and suggest certain measures for monitoring and conserving their populations.

In a second phase certain promising new areas could be designated for protection, after the introduction of specific legislation and administration-monitoring rules and securing the necessary funds.

3.2 ON FARM CONSERVATION ACTIVITIES

The GGB has identified and proposed for protection certain areas where traditional agricultural systems still survive, resisting the pressure of modern times. These areas where a significant number of old local varieties are still grown could be protected through a system of On Farm conservation based on national or international support so that both the endangered local landraces and the associated traditional agricultural systems and landscapes are rescued from the imminent threat of extinction. In these areas the protection of traditional systems and landraces could be further enhanced by combining it with parallel support schemes for ecological agriculture, given the strong affinity of ecological to traditional agriculture.

Of the many places identified, the following merit special protection, having exceptional aesthetic, natural or cultural value and therefore should receive first priority.

- The plateau of Lassithi in Crete island (vegetables, cereals, pulses, aromatic plants).
- The plateau of Englouvi in Lefkas island (wheat, barley, rye, lentil).
- The Aegean islands Limnos, Lesvos, Samos etc. (cereals, vegetables, aromatic plants).
- The Kalavryta area of Ahaia prefecture in Peloponnese region (cereals, pulses are forages).
- The area of the Monastic State of Agion Oros (Holy Mountain). A large number of old Greek landraces are still cultivated and preserved there.

Also, the Ministry of Agriculture has identified a much broader number of sites cultivating traditional varieties through surveys of its central and peripheral services and proposals by various scientific groups, farmers associations, non governmental organizations for environmental protection and ecological farming etc. This work has been used to compile and submit to the EU a proposal for support of the traditional agriculture and maintenance of biodiversity in the framework of the EU Directive 2078/92 that provides for the first time support for such an activity in the European Union countries.

3.3 *EX SITU* COLLECTIONS

The main responsible authority for the implementation of the Ex Situ protection of PGR in the country is the Greek Gene Bank (GGB), assisted in this task by the collaborating crop plant Institutes of the country that now belong to NAGREF.

The GGB, which was set up in 1981, is administratively a department of the Agricultural Research Centre of Makedonia and Thraki (ARCMT). It has national responsibility for the protection of the genetic resources of the country, and regional responsibility for eastern Mediterranean for conservation of the germplasm of the Grapevine, Cotton, Sugarbeet and Tobacco. It maintains almost exclusively local germplasm of cultivated and wild species. Only a small portion comes from abroad (i.e. *Beta Maritima* from other Mediterranean countries, part of the accessions of *Zea* and *Gossypium*).

The material is unique in its majority. Only a limited part is maintained in duplicate collections in other countries, and a rather larger part in duplicate collections within Greece (in respective crop plant institutes) but under short to medium storage conditions (Active or Working collection) or in periodically renewed field plantations.

Taken into account the high diversification of the Greek agriculture, there is particularly increased interest for the germplasm of many crop species (cereals, cotton, forage crops, pulses, grapevine, tobacco) which are important for the national economy and on which the country has long tradition of successful breeding for many decades.

Of special importance is also the field collection of aromatic and medicinal plants at the respective department of the ARCMT, where many endangered species (*Sideritis ssp, Origanum ssp* etc) receive protection.

The germplasm is maintained in the Basic and the Active collections of the GGB in the form of seed. The Clonal germplasm is maintained in field collections (fruit trees, olive, grapevine etc) in the respective institutes of the country (Pomology institute for *Prunus ssp*, Grapevine institute and GGB for *Vitis* germplasm, institute of Subtropical Crops and the Olive for *Olea* germplasm etc).

The germplasm collected until the introduction into effect of the Convention of Biological Diversity (CBD) in 1992 is freely available for scientific purposes to all national research institutes and to research institutions of other countries collaborating with the GGB in the framework of the FAO, IBPGR, ECP/GR or the EU and exchanging germplasm on a mutual bona fide basis.

As regards the availability of the germplasm collected after 1992, it is according to the provisions of the CBD freely accessible but not without any cost. The issue is a matter of national sovereignty, but Greece as a member state of the EU participates in the formulation of a common policy to which national policies ought to be harmonized. The EU member states have proposed free access to plant genetic resources for scientific purposes achieved through multilateral international agreements providing recognition of both Variety Rights and Farmers' Rights and equitable sharing of the benefits.

The germplasm of the GGB is of restricted availability due to the difficulty or inability to regenerate and multiply the usually small initial seed samples collected, particularly of cross-pollinated species, because of the shortage in manpower and funds and the absence of isolation screenhouses to protect its genetic constitution during regeneration. Therefore, only a limited number of samples, for which enough seed exists, is distributed every year to meet the demand of domestic and foreign universities, breeding institutes and gene banks.

From the breeding institutes, germplasm was given for regeneration, evaluation and breeding mainly to the institutes of Forage Crops and Pulses, of Cotton and Industrial Plants and of Cereals. From the Universities, germplasm has been given to the university of Thessaly to initiate an On Farm conservation programme and to establish demonstration and training plots on PGR. A number of seed samples of cereals and vegetables has been given to certain NGO'S active in the protection of the environment and on ecological farming to install demonstration fields and regenerate the material.

A limited number of samples has been send to various countries of the world upon request and, at times, with mutual exchange. The bulk of the samples was requested by the USA, Japan, Australia, England, India, Canada and Spain.

3.4 GERMPLASM COLLECTION

Due to the limited funds available the collecting expeditions are optimally planned to make the most efficient use of the available financial and human resources and the limited time. The preparatory stage includes desk survey (for botanical and agronomic information, information on earlier expeditions etc.), contacts with local agronomists of the area to be explored for information related to the expected seed maturity time of the targeted species, to promising sites of wild relative flora or of traditional farming where landraces could be found etc.

Early collecting expeditions funded by FAO and IBPGR (1981-85) in Greece were targeted on FAO designated priority species. The succeeding expeditions were theoretically multicrop expeditions. However due to their limited duration (5-10 days) and the need to cover large areas in these short periods to complete a rough survey of the country in few years, they had practically to target certain category of species and this category actually was the wild and cultivated Cereals. Therefore GGB houses a good collection of Cereals but it is rather poor in other species of agricultural interest, particularly in Vegetables, fruit trees, aromatic plants and ornamentals.

3.5 SAMPLING METHODOLOGY

Wild species and crop populations were sampled with random sampling methods. However where phenotypic diversity was apparent, a second round followed at which all deviating types were collected with selective sampling that sampled the low frequency genes not represented in the random sample. When practical, 2,000-3,000 seed samples were taken for autogamous and 10,000-12,000 seed samples for allogamous small seeded species. In large seeded species, samples of approx. 1 kg are usually taken.

Normally collection of the targeted species is made from the fields or from remote inaccessible sites (wild species). However the time is not coinciding with seed maturity of many other species, which therefore have to be collected from farmers' stores and local market.

3.6 STORAGE FACILITIES

The base collection (long-term storage) has a capacity of 40 cubic meters and can hold approx. 10,000 samples. Seed is stored in sealed galvanized tin cans or in aluminium foil packages placed on fixed shelves under -18° to -21° C temperature. There is no need to control air humidity in the Base collection due to the air-tight and moist-proof sealed packaging. Under these conditions seed viability of most "Orthodox" species is maintained for more than 20 years.

The active or working collection (short to medium-term storage) has also a capacity of 40 cubic meters and can hold approx. 10,000 samples. Seed is stored in non sealed packaging (ordinary paper or cloth bags) placed on fixed shelves under 0° to +5° C temperature and 30% relative air humidity. Under these conditions seed moisture is maintained at a very low level (5-6%) in equilibrium with the humidity of the surrounding air which is practically dry (25-30% relative humidity), allowing reliable seed conservation for at least 10 years.

Grapevine Clonal plant material is conserved in the field collections of the GGB and the Grapevine Institute of Athens. A field collection of Prunus germplasm is maintained by the Pomology Institute in Naoussa. Greece is rich in medicinal and aromatic plant species, and an excellent herb collection is maintained both in the field and in seed form by the Aromatic and Medicinal Plants Department at ARCMT.

3.7 DOCUMENTATION

The collected germplasm is documented in the initial hand-written Collection Forms kept in separate files, and in the Computerized Data Base of the GGB. At present only collection data have been recorded in that Data Base (Passport data) containing the information related to the initial collection or provided by the germplasm donor in case the germplasm has been given to GGB by another gene bank, crop Institute or Collector.

Characterization and preliminary evaluation data exist for only a small part of the collection (cotton, cereals, grapevine, vegetables, aromatic plants etc), but they have not been entered in the form of characterization or evaluating files in the Data Base mainly due to the lack of specialized personal to undertake this task.

The Data Base of the Gene Bank uses a 486 DX 33 mHz computer with 8 MB central memory and 250 MB hard disk. The software used is DBASE 4. At this stage, data are exchanged only in the form of computer printouts or diskettes. Data are available upon request in the form of DBASE or ASCII or various other file types, since modern packages have simplified data exchange by offering a multitude of file transformation options to practically suit the needs of every user. Information is also available in the form of computer printout, while the Index Seminum compiling all available information on the GGB germplasm is expected to be printed and distributed to all collaborating partners in the coming months.

The GGB participates in networks of information exchange with other gene banks in the framework of collaboration schemes initiated and supported by IBPGR (now IPGRI) and ECP/GR. Thus, it exchanges data with certain gene banks or research institutes which have undertaken the responsibility to act as centralized data bases for Europe or on a global basis, such as the German Gene Bank in Braunschweig acting as a Central Data Bank for Beta germplasm, the Dutch Gene Bank at Wageningen being responsible for the European Brassica land races, the British Gene Bank at Wellesbourne being responsible for Allium and Daucus germplasm etc.

There are no data bases available to enter data related to in situ protection. There is need for the elaboration and approval of international standards which can be subsequently used by all gene banks. Such data banks should contain information related to the geography of the protected area, a register of the species they contain, an assessment of their genetic constitution, stability, possible antagonisms and the threat of genetic erosion etc. It is a complex and difficult task, which however has to be soon undertaken to meet the need and the pressure for implementing, monitoring and documenting in situ protection.

Regarding nomenclature issues, GGB tries to avoid confusion using the classical nomenclature. New names are used when they have received broad recognition.

The data base is duplicated in 2 security copies maintained in another room of the Gene Bank. Large part of the data have also been recorded in other regional or global data bases, active in the documentation of a number of important species.

3.8 EVALUATION AND CHARACTERIZATION

The GGB has characterized a small portion of the conserved germplasm, combining simultaneously seed multiplication or regeneration of small samples, mainly of autogamous species for which there is no need for strict reproductive isolation. Characterization was based on the Descriptor lists issued by FAO/IBPGR or, in species without descriptor list, on personal experience of the researches of the GGB in the characterization of the species and the knowledge of their botany and genetics. Parallel to characterization limited evaluation was carried out on easily identifiable properties but without particular experimental design. Such preliminary evaluation was done for resistance to main pests and diseases and to unfavourable environmental conditions, for yield, earliness, quality etc.

The majority of the accessions of bread and durum wheat, barley, beans, pepper, onions, cabbages, lettuce and eggplant have been already characterized on many characteristics. Cotton Institute has made full characterization of Cotton germplasm. The department of Medicinal and Aromatic Plants of ARCMT has characterized certain important indigenous species of Greece, like the *Origanum ssp* and *Sideritis ssp* (Greek mountain tea). The institute of Forage Crops and Pulses at Larisa has characterized a number of forage and pulse species, Cereal institute has characterized most of the germplasm of soft and durum wheat, barley and maize, Grapevine institute and GGB have characterized the indigenous clones of the grapevine, and Pomology Institute at Naoussa the germplasm of fruit tree crops

conserved there (mainly *Prunus ssp*). Evaluation of germplasm has been undertaken in much lesser extend. The GGB has evaluated part of the Cereal germplasm on a limited number of important parameters (yield, protein content, lodging, resistance to main diseases etc). The department of Aromatic and Medicinal plants of the ARCMT has evaluated *Origanum ssp* and *Sideritis ssp* germplasm for essential oil content, Cotton institute the germplasm of *Gossypium*, the Grapevine Institute of Athens and the GCB the respective Vitis germplasm for earliness, yield and quality. Many other crop specific institutes of the ministry of Agriculture have done limited evaluation on the respective crops (*Olea, Trifoliums, Phaseolus, Vitis* etc) on a limited number of important properties.

Regeneration, characterization and evaluation is carried out in the Gene Bank or other collaborating crop institutes (i.e. Ex Situ) and not in the original sites from where the samples were collected. Despite the problems related to the different behaviour of the accessions comparing to that shown in their natural biotopes and the apparent danger of genetic drift in the Ex Situ regeneration, it is actually the only cost effective and practical approach to this issue.

The results of regeneration and characterization are immediately accessible to all interested scientific bodies, and usually accompany the relevant seed samples send upon request. Part of the resulting data have been presented in meetings or published in scientific magazines. On the other hand GGB asks all the institutes receiving germplasm to return the data produced from the evaluation to help the accumulation of information relevant to that germplasm. However such data never returned to the Gene Bank from any germplasm user.

The evaluation can contribute to the identification of duplicate or multiple accessions of the same variety and to their bulking in one composite sample, limiting the number of conserved accessions and reducing the cost of conservation. It can also lead to the creation of Core collections containing a small number accessions representing the whole spectrum of variation within each species. Core collections are more manageable and can be more thoroughly evaluated that the initial collections. The evaluation thus can reveal whether certain genetic types or certain regions are not adequately represented in the collection and identify areas or germplasm categories for which complementary collections are needed.
It is apparent that the overall evaluation of all existing germplasm on a multitude of useful characteristics is something practically impossible. Therefore the evaluation is limited to certain selected characters each time, according to the interests of each country and the goals of its breeding programmes. Only through this approach the large volumes of existing

accessions can be evaluated at an acceptable cost and with acceptable scientific standards and this probably only by specialized research centres of regional or global status. The respective national research centres can only go in depth in the analysis of certain critical crops for the agricultural economy of their country but not for all crops.

As regards the In situ evaluation, that approach has not been widely implemented due to the high cost of management and scientific monitoring of these populations, it is however recognized as being the most appropriate scientifically intervention. In that direction international collaboration can contribute the necessary know-how and funding.

3.9 REGENERATION OF THE CONSERVED GERMPLASM

Normally germplasm regeneration is carried out at regular intervals according to the estimated seed viability curves of the various conserved species. Theoretically regeneration must take place whenever the seed germination drops to 80-85% that is regarded as the limit at which the deterioration and genetic change in the seeds starts. As a practical rule, regeneration of seeds maintained in the base collection are regenerated every 15 years while those maintained in the Active or Working collection every 7-10 years.

The goal of the regeneration is the production of the required seed quantities to effectively represent the gene constitution of the initial populations. This is rather easily achieved in species with large seed multiplication rate and small seeds, but is largely impractical for large seeded species with low seed multiplication rate. Especially in outbreeding species there are additional problems related to the need for numerous reproductive isolation cases, which the GGB does not possess.

As a practical compromise GGB uses smaller populations ranging from 50-70 plants on autogamous to 150-200 plants on allogamous species. Apart from the above regular regeneration process there is often urgent need to regenerate many small seed samples taken from farmers' stores. Seeds of local varieties collected from that source are in most cases already senescent and in bad phytosanitary condition. Therefore they should be regenerated in the first cultural period after their collection. This is rather easy for the autogamous or cleistogamous species, and very difficult for the allogamous ones. Therefore the viability of many seed samples of that category even under the conditions of storage provided by the Gene Bank is questionable.

Despite the above difficulties, it is however very important to collect and conserve the largest possible part of the existing genetic resources of the country before it is lost for ever by the unprecedented genetic erosion, and to

attempt to mobilize all available scientific and technological forces and any organizations of farmers or other people having interest on genetic resources, through a national or EU programme, or through FAO/IPGRI/ECP-GR programmes and the new frameworks of activity and protection placed by the Convention of Biodiversity or the FAO's Global Plan of Action.

For regeneration, we try to make an optimal compromise according to the available means. However, due to the large number of the conserved species, regeneration cannot be made by the GGB only except for a limited part of the collection. The largest part should be regenerated by the appropriate crop institutes and university faculties that have the necessary scientific and technical capacity. Because of the low hierarchy of GGB and the lack of specific funds allocated to its tasks, it cannot assign today and finance such activities to competent institutes to achieve its goals.

An other alternative currently explored is the distribution of seed samples to farmers groups or other organizations interested for ecological farming, which undertake the obligation to reproduce these seeds while observing the basic rules of reproductive isolation and return a pre-defined seed quantity and the data of the associated general evaluation to the GGB. This option has started recently on a limited scale and on a trial basis and its feasibility and usefulness are assessed.

A substantial part of the pulses germplasm has been regenerated by the institute of Forage Crops and Pulses of Larissa, of Aromatic and Medicinal Plants from the respective department of the ARCMT. Also, Cotton institute has planned regeneration of cotton and industrial plants germplasm for 1995-96.

Usually, priority for regeneration have the small and poor quality samples. In that case, because of their small volume, the initial samples continue to be maintained separately, along with the respective regenerated samples.

CHAPTER 4
In-Country Uses of Plant Genetic Resources

The genetic resources of the country have been used intensively in the past in national breeding programmes, particularly in the period 1925-1970, when the first modern Greek varieties were produced in almost all major crops by selection from local landraces or by crossing these landraces with introduced varieties. After that initial stage breeding has been based on the improved Greek germplasm and on introductions of improved varieties or breeder's material from major international breeding centres.

As regards the germplasm collected by the Gene Bank in the recent years, its use has been rather limited, mainly because its evaluation has been far from adequate to permit identification of promising populations or genes for immediate exploitation in breeding programmes. However today the evaluation has progressed on certain species and a number of populations is currently used in breeding programmes by Cereal Institute (Wheat, Barley, Maize, Rice, Triticale), by Fodder Crops and Pastures Institute *(Phaseolus, Lens, Trifolium, Festuca, Lolium* etc), by the Department of Aromatic and Medical Plants (selection of new clones of *Origanum* and production of promising hybrids in the Greek mountain tea *Sideritis ssp.*), by the Greek Gene Bank (selection of biotypes of *Triticum, Capsicum, Allium* and Lettuce), by the University of Thessaloniki (cytogenetic studies on *Vicia ssp*), by the University of Thessaly (on farm evaluations of selected germplasm for adaptation to low input farming) and by various other users for either demonstration, teaching or research.

Clonal germplasm has been evaluated at the Pomology Institute and has led to the identification of certain promising *Prunus* rootstocks. Also the Mediterranean Agronomic Institute at Chania, Crete and the Floriculture department of the University of Thessaloniki are currently evaluating indigenous ornamental shrubs and wild flowers aiming at their improvement and introduction into cultivation.

Apart from these attempts, the main core of the breeding programmes in Greece is profited by the free access to the germplasm produced by major international research centres and genetic resources centres such as CIMMYT (Wheat and Maize), ICARDA (wheat, pulses), IRRI (Rice), CIAT (potato) etc, granted in the framework of respective scientific collaboration programmes.

There is a growing interest particularly from ecological organizations for the use of old traditional varieties. This trend is expected to lead in the coming years to the creation of new non-governmental organizations devoted to the conservation and use of traditional varieties (heritage seed programmes) and to their eventual use in ecological farming systems. Small seed samples have been entrusted by the GGB to such evolving groups on a trial basis to enable and assess the feasibility of such an approach.

4.1 CROP IMPROVEMENT PROGRAMMES AND SEED DISTRIBUTION

Plant breeding in Greece moved onwards from the phases of improvement of local landraces and varieties and of introductions of improved germplasm from abroad for selection of locally adapted types already from the first part of the century. Over the last decades it is almost exclusively based on crosses of good modern Greek varieties with promising introduced varieties leading to the creation of new varieties combining the advantages of their respective parents. Basic parameters of the breeding programmes are superior yield, adaptation to local conditions, earliness, quality and resistance to adverse biotic (diseases and pests) and abiotic (predominantly drought and frost) factors.

The early breeding programmes in Greece aimed at attaining self-sufficiency of the country on the main foodstuffs and on providing the raw materials for its developing processing industry, which was largely based on agricultural products. This target was met through successful breeding programmes already in the 1960s. After that time breeding had as objective the creation of varieties suited for the international markets to enable increased exports of particular products (tobacco, cotton, vegetables etc) in the deficient EU market.

Greece has long successful tradition in breeding over a number of crops of major importance for its economy (cereals, tobacco, cotton, pulses, forages etc). On the other hand certain traditional sectors of its agricultural economy, such as the cultivation of Olives, Grapes, Figs, Fruit trees, oranges, nuts etc. is almost exclusively based on old traditional local varieties or on selections made on early introductions adapted to the local conditions long time ago. However, due to the fact that breeding, seed production and distribution in Greece were until lately almost exclusively state supported, the whole sector recently run into great difficulties for maintaining their position in the marker, having to compete with the much more flexible and better funded big breeding and seed trading companies of the private sector,

Greece adjusts rapidly its agricultural research to the demands of the market. The majority of the plant breeding institutes have been transferred 4 years

ago to a new scientific body of the ministry of Agriculture, the National Agricultural Research Foundation (NAGREF) operating as a legal entity of the private sector. There is also a growing interest for the establishment of other private seed production and trading companies, and possibly few plant breeding ones.

Seed and Clonal propagating material of Greek varieties are produced in sufficient quantities to meet the demand. The rules of free trade and competition apply all over the country for seed and propagating material of all varieties registered in the National and the European Union Catalogues of Plant Varieties. The Greek varieties have been selected for suitability to the intensive competitive agriculture, but they are also used on a limited scale for family-type farming.

Farmers participate in the seed production cycle at the phase of the production of certified seed under the supervision of state inspection services. There are no majors obstacles to the production and distribution of seeds in Greece, given that its climate is optimal for seed ripening and production of high quality seeds, and the existence of an experienced and well organized network of seed production, controls and trade.

4.2 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES

PGR are not a material suitable for direct commercial exploitation but a potentially useful material, depending on its genetic constitution and its appropriate exploitation by scientific centres having the necessary scientific and technical resources for this purpose. The importance given to their conservation and protection is due to the recognition that global agriculture in the coming years will be based more and more heavily on these resources.

GGB has a short history, therefore the number of apparent direct benefits resulting from the use of the genetic resources it maintains is limited. The first benefits are just now becoming apparent, with the identification and selection of promising material which is used in certain breeding programmes.

The country has been benefited from the establishment of the GGB. This institution has received substantial financial and technical support by FAO from the time of its establishment to purchase or construct seed storage and handling facilities, to explore the Greek territory and collect the indigenous germplasm and to train its staff on PGR in England. Today researchers of the GGB and other plant breeding establishments of the country participate in scientific networks and groups active on the genetic resources of various crops under IPGRI and ECP/GR funding.

One can consider as indirect benefits the access to the genetic resources of other countries enabled through mutually beneficial germplasm exchanges between collaborating gene banks, the participation in international collaboration schemes and the acquirement of expertise through these collaborations and the active involvement of a large number of researches of NAGREF and the Academic institutes on PGR issues, which gradually accumulates technology and capacity for immediate or future successful utilization of the conserved PGR.

The PGR programme of the European Union recently implemented (EU directive 1764/94) and the national PGR programme guarantee that soon these benefits will multiply.

4.3 IMPROVING PGR UTILIZATION

In the current phase the most important asset of PGR work in Greece is their conservation per se. Less important are the immediate benefits from their attempted limited use in breeding or in ecological farming programmes.

Although the country is rich on PGR, it has developed systematic large scale breeding programmes only on certain main crop species of particular importance to its agriculture (cereals, cotton, tobacco, pulses, forages, certain vegetables). There are also certain periodic attempts for breeding a few other species. So, for the main bulk of the conserved species there are no running breeding programmes to be directly benefited. The country has however a good number of experienced breeders and long tradition in breeding to support in the coming years an extensive characterization and evaluation of the conserved germplasm and initiate breeding using promising germplasm thus identified, particularly on vegetable crops that get increasing importance for the country.

The lack of close collaboration between the breeding institutes and the respective university faculties was a limiting factor in the past for progress in this sector. That collaboration would provide an harmonic link between basic research, which enables certain delicate cytogenetic interventions (gene transfer from wild species etc) with the applied research, breeding and seed production Another significant bottleneck was the delays in the acquirement of modern technology that would facilitate the study, evaluation and utilization of PGR. One of the main reasons for this delay was the prolonged reform and the reassessment of goals and priorities of the agricultural research. This reassessment is ending and there is now the time for the final decisions to be made on the number and the directions of the main research institutes of the country, as well as for the necessary infrastructure and the

financial and human resources needed to implement the new policies. Particularly for PGR much is based on the activation of the national programme and, to a lesser extend, on the EU PGR programme, whose contribution is in essence complimentary to the national effort. Only a national programme can focus the necessary attention and care on crops crucial for the national economy and on its natural and cultivated germplasm in general.

Apart from improving the infrastructure it is of similar importance to create a new generation of well trained scientists, both theoretically and technically, which will have the capacity to exploit the new opportunities provided by modern science and technology. Many opportunities for training and scientific exchanges are offered through EU research or training and mobility programmes or by the EU PGR programme and other scientific collaboration schemes at the European or Global level.

CHAPTER 5
National Goals, Policies, Programmes and Legislation

5.1 NATIONAL PROGRAMME

The activities of protection and utilization of PGR in the country are carried out in the framework of a National Programme, which has started in 1981 by the GGB under the auspices of the Directorates of Research, Physical Plannings and Environmental Protection and Seed Production of the Ministry of Agriculture, which were also responsible to provide the necessary funding. After 1991, when the GGB was transferred to the National Agricultural Research Foundation (NAGREF) the programme is carried out under the supervision and funding of that foundation. In this programme participate, under the coordination of the GGB, all the crop institutes of the ministry of agriculture (now also belonging to NAGREF) that are involved in plant breeding. A number of university faculties specialized in relevant research topics are also collaborating.

To date, no particular interest has been expressed by private firms for involvement in these activities. Only recently, due to the engagement of a number of commercial firms in seed production, or more frequently in the trade of seeds and propagating material, a certain interest is being created in that direction. On the other hand there is strong interest by certain non governmental organizations for environmental protection or ecological farming and certain pioneer attempts are taking place for the establishment of some NGO that would play active role for the protection of the traditional varieties (some kind of Heritage seed programme) and for the conservation and distribution of their seed.

The national programme has not received the necessary support to initiate activities throughout the country. Basic reason for this was the low hierarchy of GGB which in addition lacks administrative autonomy and its own budget. In this way its work is limited by the competition of other priority activities of higher ranking administrative and scientific units with which it shares the same insufficient budget. This situation has led to the gradual weakening of the coordinated national effort and left the programme to be supported only by the GGB and few other institutes and researchers heaving an earnest interest for the protection of PGR, encouraged in this direction through the involvement in respective international collaboration

programmes on PGR coordinated by the ECP/GR programme of IBPGR (now IPGRI).

National Coordinator for PGR activities is normally the curator of the GGB and is nominated by the Ministry of Agriculture. The GGB does not have its own separate budget, but it is funded from the general budget of the ARCMT to which it belongs administratively. ARCMT in its turn is funded by NAGREF, a legal entity of the private sector belonging to the Ministry of Agriculture. In this respect the financial situation of the GGB and of the respective national programme is secured.

Germplasm collections are protected by Presidential Decree Nr. 80/1990 "For the Protection of the PGR of the country". The are also indirectly protected through the specific provisions of the International agreement of conventions that the country has signed as i.e. the Convention of Biodiversity, the International Undertaking of FAO and the Programme for the protection of the PGR of the European Union (Directive 2078/92) as well as the respective research programme (Directive 1467/94) of the EU.

In any case, the raising of the status and hierarchy of the GGB and the substantial increase of the allocated funds are critical for its ability to coordinate the actions of other research units and to allocate tasks and funds to the other collaborating organizations of the public and private sector sharing with the GGB the responsibility for this protection. The national programme would serve today for the preservation of a representative sample of the existing biodiversity in Greece to be subsequently used for the improvement of the quality of the agricultural production, for adaptation to the changing demands of the marked and as guarantee for the future of agriculture in Greece.

5.2 TRAINING

The GGB has a scientific staff of 3 researchers trained on PGR Conservation and Utilization at the University of Birmingham in England, at an M.Sc. level. This training has been funded by FAO/IBPGR in the years 1979-1984. The 4th researcher of the GGB has been trained on Plant Genetics and Breeding at the Agronomy department of the University of Thessaloniki, Greece, in 1984.

There is a certain difficulty in providing training to new scientists in that field, since FAO supports a limited number of candidates from each country, while the Greek universities do not provide post graduate studies in this sector. However, they provide training at an M.Sc. level and a number of PhD's in plant Breeding and Genetics. These breeders with an additional

short theoretical and practical training can be successfully employed in the research and protection of the indigenous PGR. This complementary training can be provided by the GGB, or by other collaborating Gene Banks or University faculties in the country or abroad (CIMMYT, ICARDA, CIAT, Birmingham University etc) using short training scholarships of EU, FAO, other international organizations or the Greek government. On the other hand important training centres are the collaborating in the framework of the national programme, research institutes of N. AG. RE. F. and the relevant University faculties.

The Greek Gene Bank has wide experience on explorations and collecting expeditions, on the scientific germplasm sampling, on seed treatment procedures, germplasm characterization, evaluation, documentation and breeding of a substantial number of crops, on legislation, policies etc. In the collaborating university faculties there is invaluable knowledge, in addition to some of the above mentioned activities, in statistics, plant taxonomy, plant protection, teaching and training.

Relevant short training courses can be given to post-graduate students or to holders of M.Sc. or PhD. titles in Botany, Plant Biology, Breeding, Plant Protection etc, from a team of specialists of the GGB, Universities and Institutes, occasionally supported by a number of internationally recognized visiting scientists which will be invited for a series of advanced lectures. Today, the Scientific staff of the GGB participates in short periodic training sessions of both farmers and agronomists, aiming at providing information and training on matters related to PGR protection.

In conclusion, the country has significant scientific potential, which, when properly coordinated, can organize and provide high level of PGR training. In case of gaps, there would be covered by specialists employed in other Gene Banks or research institutes and participating in the courses through EU, FAO or IPGRI funding.

There is no professional discrimination in Greece based on sex differences. On the contrary, an increased interest of women has been observed in the sector of PGR in recent years.

5.3 NATIONAL LEGISLATION

Transfer of PGR is subject to the provisions of Law 1564/85 referring to the "Organization of production and trade of plant propagating material". Due to the peculiarities of the PGRs and their primarily scientific and non commercial value, transfer by the research institutes of the ministry of agriculture and other scientific institutions of small quantities ranging from

50-1000 gr. in relation to seed size, and up to 50 pieces of Clonal reproductive material (cuttings etc) is exempted. Especially the GGB is permitted to import or export germplasm after getting approval by the Ministry of Agriculture (Decision 301374/26-4-94).

Seed transfer within the limits of EU has been further simplified by Directive 97/93 of EU, for the implementation of which in Greece the Presidential Decree 292/1990 has been issued. This directive liberates seed transfer within the EU regardless of the quantity. For the other countries of the world the provisions of Law 1465/85 apply.

As regards phytosanitary control, the small seed samples exchanged by GGB in the EU territory are exempted from the obligation to be accompanied by a phytosanitary certificate, according to the previously mentioned EU directive 97/93. Controls have been further relaxed by directive 94/12, according to which responsibility for phytosanitary control is transferred to the producers of propagating maternal, which were allowed to issue Phytosanitary Passports for the material they produce and trade. The Greek legislation has not been yet harmonized to the EU legislation on this issue, but this is simply a matter of time. For transport of germplasm from or to non EU countries the standard phytosanitary control measures apply according to the national or international legislation in effect.

There is no specific legislation for the transfer of germplasm in vitro. This way of transfer is covered by the general provisions referred to Clonal material, for which there is an allowance for free transfer of limited quantities for scientific purposes.

There are no particular restrictions regarding the use of PGR by the breeding institutes of the country. The responsibility to implement quarantine measures and avoid the introduction of new pathogens in the country belongs to the researchers that use this germplasm, which therefore have the obligation to take every necessary precaution.

Until recently, there were no state incentives provided to the farmers to maintain the traditional varieties. Those varieties that survived to date awe their existence to the interest and care of individual farmers for the agricultural tradition of their villages, and to their high quality and suitability for the local conditions and preferences. The care of the state starts to become apparent for the first time in 1995, through a support programme initiated by the EU with the Regulation 2078/92, that provides support on an acreage basis for the cultivation and use of local varieties in combination with nature friendly practices of cultivation and plant protection.

The production, distribution and trading of the propagating material is regulated by law 1564/65. According to this law the trading of seed or propagating material of a variety is allowed only if this variety has been previously registered in the National or the respective EU Catalogue of plant varieties, reproduced by a responsible maintainer and being monitored by the official organs of the Greek seed propagation and control authority. In this respect, the distribution and trading of reproductive material of traditional varieties is considered illegal. The only outlet enabling the marginal survival of these varieties is that the law is not forbidding the conservation and use of seed of local landraces by the farmers using them, but only their trading. Consequently, although it has discouraged the use of local varieties by excluding them from the commercial channel, and contributed in this way in the loss of precious germplasm, significant proportion of this germplasm has been still preserved to date because the farmers reproduce them for their own use in family size enterprises.

It is assumed that the abolishment of the trade of unimproved seeds was founded on good intentions and had as a goal to secure a certain reward to the breeders of modern varieties, and to protect the interests of the farmers, by supplying them with good quality seeds of high germination and stable genetic composition, securing good yields and quality in a modern competitive market. It is believed that when those views on the protection of breeders' rights had prevailed in the international scene, their destructive consequences on PGR were not foreseen by practically no one. For this reason it is expected that there will be at no substantial loss to the modern breeding to view today the situation from another perspective and open the field for a limited use and trade of local landraces on local markets to be used in protected areas of traditional or ecological agriculture, an approach encouraged by the national and EU policies and the modern views on agriculture and natural environment.

The country has not signed the convention on the Protection of the Rights of the Breeders of Varieties (UPOV) and is not recognising Intellectual Property Rights of Plant varieties. Law 1564 in its article 8 provides for granting such rights but this article has not been in effect since the necessary decrees have not been issued. Regarding this issue, the EU has introduced recently new legislation (Regulation 2100/94) recognising Intellectual Property Rights also for the biotechnologically created varieties (Directives C10/89, C44/93, C101/94) within the EU. Greece has not signed these legal regulations, but it is obliged to do this in due time in the process of the harmonization of legislation within the EU, despite the different views on the matter and the obvious reservations. Consequently, the different views or reservations need to be supported in the framework of the EU to have an effect in the future.

Although the legal protection of IPR is not fully implemented in Greece for plant varieties, the prohibition of the trade of seeds of local varieties that are not registered in the National Catalogue is beginning to hurt traditional farming. Thus, ecological farming groups are unable to supply their members with seeds of local varieties that are optimally adapted to low import agriculture. Those groups find it difficult to find seeds, even of modern varieties, having produced from ecologically managed seed farms.

On the other hand the EU programme 2078/92 that was introduced for the protection of traditional farming and the conservation and rescue of the endangered biodiversity in the EU territory has to be based on a regular production and supply of seeds of traditional varieties which in their majority are not registered in National or EU Catalogues. It is questionable how the necessary seed supply could be achieved in this case. The alternative argument for registering all local varieties to the respective National Catalogues might be applicable for a limited number of good local varieties for which some commercial interest exists, but not for the bulk of these cultivars which are not commercially advantageous. One solution to this problem could possibly be the introduction of a new National Catalogue of Traditional Varieties, for which seed production and distribution would not only be permitted but strongly encouraged.

Greece exchanges germplasm collected until 1992 with international support according to the rules set by FAO and IBPGR which assisted the creation and initial function of the GGB. Similar provisions have been included in the FAO Undertaking on PGR and in the relevant "Code of Conduct of Germplasm Collectors and curators". According to the above arrangements, GGB exchanges germplasm with other gene banks on a mutually beneficial Bona fide basis, sending small seed samples for scientific purposes to requesting institutes or Gene Banks after previous consent of the Ministry of Agriculture and the appropriate research centres of the country.

Under Biodiversity Convention of Rio (1992) this issue is recently being re-examined. At the EU level germplasm exchange is envisaged to be secured through multilateral agreements between the EU and other regional or international associations of countries and not through bilateral agreements that could lead to preferential access of exclusions. The EU is favouring free access to PGR for scientific purposes but recognizes the need for some compensation of the donor countries. It also supports the idea of providing free access to its conserved germplasm to all underdeveloped countries, form which most of this material has been collected in the past.

Greece belongs both to the users as well as (primarily) to the donors of germplasm. Consequently by granting free access to its germplasm it is justified to expect certain benefits, preferably in the form of support to

improve the infrastructure of its national PGR network or of postgraduate training opportunities to create the new generation of PGR specialists needed to further advance protection, evaluation and eventual utilization.

Despite its open collaborative attitude GGB is often unable to satisfy many requests for germplasm, since the seed maintained is of minimal quantity and funding and expertise shortages are not allowing massive regeneration under scientifically acceptable standards to produce sufficient seed quantities for both conservation and distribution.

As regards foreign collecting missions in Greece, they are accepted under the provisions of article 10 of Presidential Decree 80/90. According to this article permission is granted to the applicant, following a positive opinion of the GGB and the responsible crop institutes and scientific bodies of the country, by the Directorate of Protection of the Environment of the Ministry of Agriculture and the respective regional services of the ministry of Agriculture at the counties where the exploration would take place. The foreign collecting missions should be accompanied by a researcher of the GGB or a competent research organization, to facilitate contacts with farmers and local authorities and to keep part of the collected seed and the associated collection data for the Greek Gene Bank.

5.4 OTHER POLICIES

The country is not subsidising production and trade of improved seeds. Only the EU gives certain subsidies aiming at encouraging the use of seed of certain crops which are produced at limited quantities (Indica type rice, Medicago, Vicia etc) in its territory.

The incentives for the provision of agricultural inputs have been reduced or completely abolished under the Common Agricultural Policy of the EU and the enhancement of the free competition at a global scale promoted by the GATT agreement. Those changes however don't seem to have a marked effect on the extent of the use of local varieties. The loss of these varieties is mainly attributed to the unquestionable superiority of the modern scientifically bred varieties in the framework of the intensive competitive farming of our times.

The staff of the GGB or other PGR experts are not currently involved in the planning of major agricultural development projects, to assess and monitor their impact on the conservation and utilization of PGR. The responsibility for such appraisal belongs to the authorities of the central services of the ministry of Agriculture, that uses its own organs for planning and evaluation of major development projects. It is expected however that with the activation of the national programme the GGB and the other organizations responsible

for the protection of national PGR will have a constructive role to that field of authority in the future.

5.5 TRADE, COMMERCIAL AND OTHER INTERNATIONAL AGREEMENTS

Normally commercial and trade agreements are not expected to have major impact on the PGR resources activities. Only when those agreements are accompanied by provisions for bilateral or multilateral scientific and technical collaboration on PGR they give the opportunity for personal contacts, joint research activities and germplasm exchange.

On the other hand, international agreements have significant effect. By being member of the EU, Greece has to follow the EU genetic resources policies, agreed upon by all member states. It also has the privilege to be benefited by the EU funded PGR research or protection programmes. Also, the decisions taken by and the perspectives formed under the leadership of FAO are openly supported by Greece, and the same applies to the principles and policies agreed upon under the Biodiversity Convention. The country has signed all these major agreements and certain other regional or international agreements (IBPGR, IPGRI, ECP/GR Code of Conduct, International Undertaking etc) in good faith and with the certainly of contributing to the progress of agriculture and to its ability to secure food and better environment for the generations to come.

CHAPTER 6
National Programme

6.1 INTERNATIONAL COLLABORATION

Greece has always been closely collaborating at the international level on many important issues related to the protection and conservation nature and biological resources, human nutrition, health, education etc. It has signed all pertinent agreements formulated under the umbrella of the UN.

6.1.1 UNCED

Greece has adopted Agenda 21 and has been active in planning and initiating protection schemes for both the overall biodiversity and its specific part related to PGR.

In the sector of the protection of Biodiversity responsibility is primarily vested in the Ministry of Environment, Physical Plannings and Public Works. Environmental impact studies are essential for all major projects in Greece. Also, a broad network of protected areas is being taken care of or receiving additional support in Greece (Wetlands, river estuaries, sea parks, national parks etc.). Interesting new factors are the newly formed non-governmental groups interested in the environmental protection and nature friendly agriculture, and acting pressure for monitoring industrial, civic and agricultural pollution.

As regards specifically the field of genetic resources, significant progress has been made by the Ministry of Agriculture, which has set up a programme promoting the use of traditional varieties and animal races. This programme is expected to reverse the negative trend of genetic erosion and help in maintaining or even increasing genetic diversity. Strong motivation for use of traditional germplasm is also being created by the demand for this germplasm by ecological farming organizations, given the better adaptation of the traditional varieties to low input farming. The above programmes are credited primarily to the EU which has initiated the relevant legislation and encouraged the initiatives at the national level.

The Convention on Biological Diversity forum and the FAO commission should harmonize their action in the field of Plant Genetic Resources. In a joint action the FAO Commission should preferably undertake the task of protection of PGR and agroecosystems, while Biodiversity Convention

authorities would undertake the responsibilities on broader environmental issues. In this way more efficient use of the limited funds and expertise available would be made by avoiding redundancies, duplication of effort and occasionally conflicting approaches.

6.1.2 UNDP

Greece has been partially supported by the UNDP to train the core of its scientific staff in England on PGR conservation and utilization at its has been collaborating with this programme until it has finally stopped its activity in Greece in 1984.

6.1.3 FAO Global system

Greece has been collaborating with FAO for many years and has been benefited from that collaboration in many respects. Joining the FAO Commission it was therefore a natural consequence of the good level of collaboration and of the sharing of common values in respect to the protection of the genetic heritage as a guarantee for better food supply of the future generations. Although some temporary reassessments and reorganizations had not allowed the country to exploit the new opportunities offered by the adoption of the undertaking and other binding conversions, there are optimistic expectation for the future.

The International Fund is essential part of the Global System and the a basic tool to make wishes and expectations a reality. Greece is primarily a donor of germplasm, and one of the few countries in Europe with rich genetic diversity. Therefore it has a certain justification to expect support in the initial stages of the programme to improve and expand its storage facilities, to train the necessary number of specialists on PGR, to make a number of urgent rescue collections (particularly of vegetable crops germplasm, which are practically uncollected) and to start a large scale regeneration and evaluation of the senescing conserved germplasm. Another sector where international support is expected is the In Situ and On Farm conservation where international expertise and support is needed to initiate such activities within the country. On the other hand Greece is part of the European Union, which as a whole is expected to be probably the major donor to his fund. Therefore it could not be easily classified in the donors or the beneficiaries, but is probably more proximal to the donor's side. Also, most of the above activities are expected to be financed by a national programme, an a EU programme, and as a last resort, by FAO.

6.2 INTERNATIONAL AGRICULTURAL RESEARCH CENTRES

6.2.1 CGIAR

Greece has maintained strong collaboration links with the CGIAR centres for many years. Particularly with IPGRI (former IBPGR) collaboration was optimal and particularly beneficial to the country.

The IBPGR had supported jointly with UNDP and FAO the setting up and initial operation of the Greek Gene Bank, seated at the Agricultural Research Centre of Makedonia and Thraki in Thessaloniki, Greece. It had donated in 1981 an off-roads truck for the collecting missions and a computer unit to start documentation of the germplasm in a computerized data base. It had also funded almost all collecting missions of the GGB in the first 5 years of its operation and the purchase and construction of its seed storage and handling facilities. It has also served as a platform for germplasm introductions and exchange with other countries of the world, and as a forum for scientific collaboration, particularly in Europe, through its regional sub-programme (ECP/GR). Finally it provided the full cost for the training of 3 agronomists of the GGB in the field of Conservation and Utilization of PGR at the University of Birmingham, England, which form today the core of the scientific staff of this institution.

Direct support of IBPGR stopped in 1985, a few years after Greece became full member of the EU. It is now given indirectly by supporting the participation of Greek genetic resources specialists in working groups and collaboration networks funded partially by the contributions of the participating states (ECP/GR programme).

The CGIAR would play a much more important role in the field of PGR in the future, by possibly carrying out massive evaluation and characterization on crops on which they are responsible on behalf of gene banks lacking the necessary facilities and expertise. . They would also be involved in developing methodologies for evaluation, and possibly for modelling In Situ and On Farm conservation approaches, in collaboration with leading university faculties or research institutes.

IPGRI, as successor of the IBPGR, is the most experienced international organization on PGR globally, and much of the today's progress in this field should be credited to the pioneer catalytic action of IBPGR over the last 20 years. Therefore it is expected to play a central role in the Global Plan of Action, possibly being the implementation tool or the scientific body responsible to organize and carry out the activities of the GPA. In any case, it is an umbrella providing international collaboration over broad regions or

globally and over existing regional groups or state associations. Only in very limited cases the national programmes managed to complete the full range of activities stimulated by IBPGR. In most cases national programmes are still slowly evolving, therefore cases of redundant or duplicated efforts are rare. In any case there is no substitute for the international status and umbrella offered by IPGRI and FAO, which motivates good will collaboration between many countries believing in a unifying cause. The IPGRI should continue to provide the forum for international collaboration on a crop basis, to secure better documentation and information exchange and to possibly fund pilot research activities to produce expertise for in situ and on farm conservation and a limited number of expeditions to collect germplasm from unexplored areas currently at risk of genetic erosion.

Greece has been profited significantly over the last decades by its collaboration with the CGIAR centres (particularly by CIMMYT for Cereals, by IRRI for Rice, by Icarda for Cereals and Pulses etc) by receiving promising material or segregating germplasm of various important crops and testing it for local adaptation and eventual use in its breeding programmes, by relevant information and publications and by invitations for periodic short training visits.

6.3 REGIONAL RESEARCH CENTRES

Greece has similar close collaborations with ICARDA, the regional centre of CCIAR situated in the East Mediterranean, for many years, particularly in cereal crops, forages and pulses. The collaboration includes a normal supply of segregating material or finished cultivars of these species, which are send to the collaborating institutes for evaluation and selection, as well as germplasm exchange and short training visits.

6.4 REGIONAL INTERGOVERNMENTAL INITIATIVES

Greece had participated actively in the Mediterranean genetic resources programme (1972-77) and participates also consistently in the ECP/GR programme which succeeded it. Also, it participates in the EU Genetic Resources programme recently put in effect. The international programmes have contributed immensely in the field of PGR in the past, literally initiating activities from the beginning (Mediterranean Programme, ECP/GR) and are expected to achieve now more concrete results on the basis of the infrastructure and scientific expertise thus achieved. In that respect they will contribute significantly to the creation of national programmes and to their proper function by providing a means of comparison of the relative progress

achieved in the various participating countries and creating supportive consensus for countries unable to achieve equal pace at their own means.

As regards the regional centralization, it is best to centralize scientific efforts regionally, by making best use of the available expertise, by supporting mobility of specialists to carry out specific temporary tasks (collection, specific evaluation etc) or by assigning particular tasks to competent regional scientific organizations. Higher levels of regional integration in the form of regional gene banks or regional authorities are probably not foreseen for the immediate future.

6.5 BILATERAL INTERGOVERNMENTAL INITIATIVES

GGB and other institutes had recently good collaboration with gene banks and other research institutes on the region in the framework of broader bilateral scientific and technical collaboration projects (Bulgaria, Yugoslavia, Spain). However this collaboration has been limited primarily to scientific visits and not actual research or development work. There are still good scientific relations maintained and it is hoped that they could advance further when our national programmes or the EU programme are fully operative, or when favourable conditions are developed by the Global Plan of Action or the Biodiversity convention. Bilateral collaboration with the neighbouring countries is expected to be greatly enhanced in the near future.

CHAPTER 7
National Needs and Opportunities

Greece is active in systematic genetic resources activities for only 14 years, therefore in comparison to states active in the field from even the beginning of the century it has to take many steps to reach the high standards needed to match its wealth and uniqueness in genetic resources. These needs are related to the creation or improvement of the infrastructure, to staff training, complementary rescue collections etc. All these needs are expected to be met primarily by a National Genetic Resources programme, the respective EU Genetic Resources programme or competitive research programmes, possibly and indirectly by EU programmes supporting traditional or ecological farming practices and protection of biodiversity, and probably only marginally by the Global Plan of Action (particularly for staff training, scientific exchanges, in situ protection pilot projects, rescue collections). The main needs are reported below:

- Support to expand or improve seed storage facilities.
- Upgrading seed handling and laboratory facilities (Cytology, Biochemistry, Embryo culture).
- Urgent expeditions to rescue the extremely endangered germplasm of Vegetables, fruit trees, under-utilized crops, aromatic and ornamental plants. Particularly for vegetable landraces it is estimated that unless immediate rescue action is taken in the coming 2-5 years it would be irreversibly lost for ever, together with the associated knowledge of traditional farming and seed production. The new generation of farmers has not acquired the knowledge of producing and maintaining seed, and therefore is totally dependent on the market, that is on the modern varieties for seed supply. This knowledge inherited through the ages is being lost along with the last generation of farmers that kept it to date. International support in funds and experienced collectors may be essential. Germplasm collections rank low in EU or IPGRI programmes but are extremely important for Greece.
- Training of a new generation of experts to broaden the spectrum of activities and gradually take over the responsibility of the PGR tasks. International support is indispensable in the form of scholarships, training visits etc.
- Technical support to initiate in Situ and on Farm conservation activities in Greece. This may be provided through respective pioneer activities in

selected areas of Greece with the guidance and assistance of major international scientific and technical bodies (IBPGR, CGIAR Centres, specialized universities and institutes etc.) jointly with local scientific teams.

There is optimism that these goals will be to a large extend achieved soon, through the national genetic resources programme, other new interest groups now activated, EU programmes or international collaboration schemes. The new promising changes include.

- The new international agreements and conventions directly involving states in such protective activities.
- The recently introduced EU genetic Resources programme (1467/94) and the programme supporting Traditional Farming and maintenance of Biodiversity (2078/92).
- The expected reactivation and full expansion of the national Genetic Resources programme, mobilising all available scientific and technical potential of the country to contribute in this direction.
- The increased public awareness and the creation of new non governmental organizations interested in the protection of the traditional farming and the use of traditional landraces in conjunction with ecological farming. These NGOs are most of the time more active and more flexible than respective state organizations in achieving these goals.

CHAPTER 8
Proposals for the Global Plan of Action

8.1 PROPOSALS OF NATIONAL INTEREST

The following elements represent national priorities for which international support would be appreciated, in addition to the efforts made through a national programme:

- Urgent collecting expeditions to rescue the threatened germplasm of various crop categories, primarily vegetables, which have not been collected up to now and, following the current trends, will be lost almost completely in the coming years. Support would include both funding and expertise.
- Support for training a new generation of PGR specialist, preferably in advanced international specialized centres universities, CGIAR centres etc., or in locally arranged training courses.
- Assistance to initiate pilot projects on In Situ and On Farm Conservation on already identified areas rich in biodiversity.
- Support of massive regeneration activities to make the germplasm available for distribution pollination (isolation cages, insect pollinator rearing facilities etc.).
- Support to upgrade seed storage and handling facilities and to create the basic laboratory structure for a gene bank (Cytology, Biotechnology, Tissue culture for embryo rescue etc.).
- Support of in Situ and Farm conservation activities on a limited number of ecogeographically representative sites rich in plant genetic resources already identified.

8.2 PRIORITIES AT THE INTERNATIONAL LEVEL

Priorities on an International scale are referred both to the technical level and to the legislative - political level.

a) Technical level

- Direct support to developing countries with important PGR to establish the infrastructure to collect and conserve their genetic resources, as a token of recognition and compensation of farmers' rights.
- Direct support to the same countries to train the scientific staff needed to conserve and exploit these genetic resources for the benefit of both the donor countries and the international agriculture.
- On Farm protection, primarily focused on selected areas rich in biodiversity to provide substantial income support on those marginal areas of non-competitive agriculture where these species still survive and not indiscriminately over entire countries, even to rich competitive farming areas (EU specific project provides generalized support and is not focused on really promising areas meriting protection).

b) Legislative-political level

- Effort to legalize the use and local trade of traditional landraces, particularly in designated areas of traditional or ecological farming encouraged by modern legislation (EU2078/92), possibly in the form of Traditional Variety Rights granted on a limited scale in such areas. In that case the adverse effect of Plant Variety Rights, granted not only in favour of the breeders - which was legitimate and right - but also against the traditional germplasm (which is both unethical and wrong approach), are minimized and both ways of thinking on this issue are comfortably and beneficially compromized.
- Effort to find an optimum solution in the issue of recognising Plant Patent Rights, especially for biotechnologically modified plant varieties. Granting such rights to support pioneer work in that direction and advance breeding should not be done against the rights of the conventional breeders, but with parallel consideration of their rights. Granting such rights should be done with extreme care and following assessment of environmental impact.

Greece has not introduced legislation on Intellectual Property Rights for plant varieties or for Genetically modified organisms. It favours the right of the farmers to maintain their own seed over a limited number of years (Farmers Privilege) and the right of Breeders to use named varieties produced by other breeders as raw material for their own breeding programmes (Breeders Exemption). However the EU has already recognized PVR and IPR for the above categories and Greece may be in need to harmonize its policy with the agreed policy of the EU countries, or try to introduce with other EU countries new legal approaches to these issues.