CZECH REPUBLIC:

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

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Note by FAO

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CHAPTER 1
Characteristics of the Czech Republic, its Agricultural and Forestry Sectors

1.1 GENERAL INFORMATION

The Czech Republic is one of two successors to the former Czechoslovakia, which was divided into two parts by parliamentary act on January 1, 1993. The political system of the Czech Republic is a parliamentary democracy, headed by the president. The Czech Republic includes three historical regions: Bohemia, Moravia and Silesia.

The Czech Republic is situated in Central Europe. Its territory is located between latitude 48°33′ N and 51°03′ N and longitude 12°05′ E and 18°51E. The neighbouring country to the West is Germany (length of the border 810 km), the Polish border in the North has length of 762 km, the Austrian border in the South has 466 km. The shortest is eastern border with Slovak republic (272 km). Total area is 78 800 km^2. There are hilly regions along the northern, western and south-western border and highlands in the central part of the country. Lowlands are situated in the north and north-east around the rivers Ohøe and Labe, as well as around the rivers Morava and Dyje in central and southern Moravia in the south-east of the country. Structure of the land area is given bellow:

Total land area	**7,886,417**	**ha**
Agricultural land	4,283,010	ha
Arable land	3,175,204	ha
Forest soil	2,629,075	ha
Building area	127,409	ha
Population	**10,326,000**	
Density of population	131	p/km^2

The country has a mild European climate. However, there can still be large variations from year to year, ranging from maritimal to continental climates. Due to these specific conditions, locally adapted cultivars of agricultural crops usually have better yield stability, and most registered cultivars of major crops are of domestic origin.

Long-term climatic means in selected localities are given below:

Meteorological stations (located in different parts of the country)	**Mean temperature (0°C)**	**Precipitation (mm)**
Mariánské Lázně (west part)	9.7	491
Havlíčkův Brod (central part)	6.6	690
Brno (south-east)	8.8	531
Opava (north-east)	7.9	626

The population of the Czech Republic is 10.30 mil. persons (mid-year 1992); population density is 131 persons per km^2. Natural increase per population is very low (0.01%), life expectancy is 68.5 years in males and 76.1 years in females. Nutrition obviously has a strong impact on mean life expectancy, as suggested by the structure of food consumption per capita (data from the year 1991):

Meat	95.5	kg
Hog fat and bacon	7.6	kg
Plants´ fats and oils	12.4	kg
Milk	95.8	l
Butter	8.2	kg
Wheat flou	86.5	kg
Eggs	343.0	pcs
Sugar	44.7	kg
Vegetables	76.3	kg
Fruits	63.4	kg
Potatoes	85.0	kg

Extensive industrial development during the last 40 years and an especially enormous increase in energy demand (based on the use of low quality brown coal) has led to serious damage of environment in several parts of the country. Most polluted areas in the northern Bohemia, where large power plants have been built, show the signs of strong damage to wild flora as well as agricultural crops, and especially forests. Negative effects on local population have also been found.

The following specific emission levels of main pollutants (in tons per km^2) have been estimated:

Solid emissions	7.5
Sulphur dioxide	22.5
Nitrogen oxides	9.2
Carbon monoxide	14.0
Hydrocarbons	2.9

1.2 AGRICULTURE IN THE CZECH REPUBLIC

The Czech Republic is an industrial country, despite the fact that extensive investments are needed to modernize most industrial technologies. The gross domestic product of the country was 771.3 billion Czech Crowns (Kč) (approximately 28 billion USD) in 1992. In the same period the gross agricultural output was 85.0 billion Kč (11 % of the gross domestic product), contribution of crop production was 35.7 bill. Kč, animal production contributed by 49.3 bill. Kč. Average employment in agriculture was 341 thousand of persons; that is, 6.9% of average employment in the national economy - and this number is decreasing (estimatrrion of the year 1994 - 5.1%).

There are 4,283 million ha of agricultural land, which is 53.9% of the total land area (7,886 million ha). Arable land amounts to 3,175 million ha, meadows 603 thousand ha and pasture land 258 th. ha. Non-agricultural land amounts to 3,603 million ha, from which 2,629 million ha are forests and 55 th. ha are ponds.

The traditional system of family farms, which represented Czech agriculture in the past was changed after the year 1948 when the communists came to power, especially during the 1950s. Farmers had to join cooperative farms, and other agricultural land was owned by state farms. Continuously most of land was concentrated in large cooperative farms and state farms, which usually measured several thousand ha. After the revolution in 1989, the land and other properties were restituted to the original owners.

Nevertheless, most agricultural land is still used by large scale farms and newly founded agricultural companies. Family farms use only 16% of agricultural land; the mean size of farms is 27 ha; and for 58% of farmers, farming is their only source of income (data from the year 1993). In the same period the mean size of transformed cooperative farms was 1 800 ha, and state farms 2,800 ha. These large farms usually have skilled, highly-qualified management and use large-scale technologies (in some cases on a high technological level, but often there is need for investment in newer, more advanced technology).

Ownership and size of farms in Czech agriculture (1992)

	Number	000 ha	%	size (ha)
		Acreage		Average
Cooperative farms after transformation	1,679	12,279	53.2	1,357
New private enterprises which have arisen fromstate farms	946	566	13.2	599
Private (family) farms	52,003	780	18.2	15
Private sector - total	54,628	3,652	84.6	67
Private sector not including farms with acreage less than 1 ha	26,770	3,610	84.3	135
Others (state farms not yet privatised, training farms, etc.)		667	15.4	

Inputs into agriculture and consequently also yields of agricultural crops decreased significantly after the application of liberal economical policies in 1991. This resulted also in changes of areas of particular crops. For example, the area of fodder crops dropped from 32.7% to 28.5%. There was also a significant decrease in the area in legumes, potatoes and sugar beet. On the other hand, the area of oil crops increased from 2.7% to 8% and in technical crops from 6.0% to 8.0%. Yields of most crops have decreased, as well. Long term yield of wheat (4.7 t/ha) dropped to only 4.1 t/ha in 1992. Also in other crops the yields have decreased - by 8.4 t/ha in sugar beet, 2.9 t/ha in potatoes, etc. The main reason is the decrease in the use of fertilizers by 75.8% (86 kg of N, P, K per ha) when compared to the year 1985.

Average inputs of nutrients since 1960

in kg/ha	1960	1980	1989	1991	1993
N	22.0	99.4	98.5	56.6	43.7
P	22.0	73.0	63.5	16.7	11.6
K	26.5	91.6	55.9	13.6	8.9
N, P, K	70.5	264.0	217.9	86.9	64.2

Plant production can be characterised by the crop structure shown in the Appendix 1.

The most important crops are cereals, especially winter wheat (24.5% of arable land), spring barley (14.7%) and winter barley (5.9%). Rye (2.5%) and oat (2.5%) belong to traditional cereals, as well. Among legumes, peas (2.0%) are most common. Potatoes (2.5%) belong to basic foodstuffs, as well as the traditional

crop, sugar beet (2.9%). Among oil crops rape (6.1%) is most important, but lately also sunflower and poppy are becoming popular. Maize for silage (8.7%) is basic fodder stuff, especially for dairy cattle; other important fodder crops are red clover (4.5%) and alfalfa (4.7%). Meadows grow on 14.2% of agricultural land, but they are often extensive, as well as pasture land (6.2% of agricultural land).

In animal production, cattle, pigs and poultry are most important. Changes in the structure of animal species are shown below (in thousands of animals).

	1960	1980	1989	1992	1993
Cattle-total of which cows	3,030 1,411	3,499 1,317	3,506 1,236	2,512 932	2,161 830
Pigsl of which cows	3,553 368	5,106 430	4,790 324	4,599 324	4,071 246
Sheep	181	308	430	254	196
Horses	200	24	27	19	18
Poultry (of which egg) laying hens	19,236 17,388	31,472 14,926	31,981 15,438	28,220 13,385	24,974 12,556

In general, the reduction in numbers of cattle and other husbandry animals was mainly due to a decrease in the market for animal products.

1.3 FORESTRY IN THE CZECH REPUBLIC

The Czech Republic is one of the countries where, due to comparatively high population density and growing economic potential, the countryside has been devastated dramatically and the biosphere is threatened as a whole. The impact of anthropogenous activity, mainly air pollution, is clearly visible in the forest areas, which represent one third of the country's territory.

Forested area	2,637,000	ha
Share of forest land	33.3	%
Forest soil per capita	0.26	ha
Average standing volume	218	m^3 u.b.
Total current increment	17,047,160	m^3 u.b.
Current increment per ha	6.6	m^3/ha

Productive forests occupy nearly 96% of the forest area (1,489,300 ha). There are 61,800 ha of protected forests and 1,031,900 ha of special purpose forests.

Efforts to increase production led to the establishment of site-unsuitable monocultures and disruption of the genetic quality of stands. Norway spruce is the dominant species, covering 55% of forested land.

Huge forest regions have been devastated by air pollution; only 41% of forests do not show evidence of damage. Mainly the northern mountain regions are heavily damaged (45-60,000 ha of forests have been destroyed). Even the damaged forests represent an important element of biological sources and contribute to the protection of natural environmental values.

More than 1.3 million hectares of forest area is owned by the "Forests of the Czech Republic", a new legal entity established in 1992. It holds a significant part of the former State Forest property. The new organization has 26 Regional Forest Districts and 96 Forest Administrations.

A structural approach to forestry is very important at the present time because communal and private forest holdings have been reestabilished within former boundaries, but they are now framed in completely different social, technical and economic conditions. Underestimation of these consequences in the course of the transformation process could impoverish the forestry sector and increase demand on the state budget.

Despite problems with pollutants, forestation has continually been increasing since the beginning of this century. Problems exist due to pests (*Lymantria* and *Ips genera*), diseases (*tracheomycotic fungi*) and, especially in the last seven years, droughts.

CHAPTER 2
Indigenous Plant Genetic Resources

2.1 FOREST GENETIC RESOURCES

Humans have made a decisive impact on forest soil from the beginning of settlement. In this time, forest tree species diversity has decreased for Reforestation edicts from the second half of the 18th century were the very beginning of significant changes in species composition of natural forests due to the fact that mainly coniferous species were recommended for cultivation.

This means that in our republic the original population of main forest tree species have been preserved only in some localities, often **only in the remains of natural stands**, and mostly in the oldest forests. Their value as a potential base for the source of reproductive material is considered in the Government Conception of the Environment Creation and Preservation (1985).

Nevertheless, forest tree species, mainly coniferous, have been damaged to a catastrophic extent. Gene-sources in some localities and regions are damaged and liquidated, industrial pollution being the main cause. Also of importance is the negative impact of drought and other abiotic agents, multiplied by the destructive effect of insect pests and parasitic fungi. Some incorrect silvicultural measures and abundant deer populations are also important causes of forest damage.

The gene pool of the following important forest tree species is endangered: **European silver fir, elm sp.**, **regional Norway spruce populations** and in some regions **oak**, **beech**, **maple** and **small-leaved lime**. Concerning the aim of preservation of the whole genetic spectrum, not only partial populations and important single trees are subjects of our interest. Also populations from marginal and extreme localities have to be preserved, even if they are not important from the economic point of view. Such populations and single trees can provide genes important for breeding (adaptability, resistance). Provenance research is important from the viewpoint of the choice of suitable provenances, their transfer and subsequent rayonization.

The Nature Preserves are of great importance for the revitalization and regeneration of natural or semi-natural, and thus more stable, forest communities. Improving collaboration between employees and experts on Nature Protection and representatives of Forest of the CR has resulted, among other things in the refusal of fundamentalist demands preventing any intervention in National Protected Regions. Some valuable elements of the protected zones could hardly be preserved without minimal management interference. Seed collecting and replanting of self seedlings can be used in other stands, often under the special management regime, as so-called gene bases (see below).

2.2 WILD SPECIES AND WILD RELATIVES OF CROP PLANTS

The Czech Republic does not belong to the Vavilov primary centres of origin of cultivated plants, but nevertheless several crops originated in European territory (fruit trees, hop, *Ribes, Rubus, Medicago, Lactuca, Brassica*). Wild ancestors and related species of cultivated crops belong to this valuable gene pool, which could and should be collected in the territory of the Czech Republic (see App. 2). There is a wide range of grasses, leguminous fodder crops and other dicots available in rich meadows in relatively clean and preserved regions of the Czech Republic. They can be collected in several border mountain regions and in thermophytic regions, especially in the Czech and Moravian Karsts. Most of these promising areas for collecting are in protected regions and national parks. These regions can be also good sources of various aromatic and medicinal plants. However, many traditional medicinal and aromatic plants are still grown in gardens, especially in remote villages, in the mountains.

There is a great pool of fruit woody plants in the Czech Republic. Their direct ancestors, wild apples, pears, cherries, plums, hazel nuts, *Rubus, Ribes*, and *Vaccinium* grow widely in the Czech Republic. Old landraces which have escaped from cultivation hybridize with them, and this introgressed material is now scattered in the natural vegetation or accompanies human settlements.

Several wild ancestors of leaf vegetables like *Cichorium*, *Lactuca*, or root vegetables like *Daucus, Pastinaca, Petroselinum*, grow in meadows or as weeds in the country. The wild species of *Allium* are generally distributed in various ecological habitats.

Vitis sylvestris is rare in the Czech Republic, but may be found in river forests in thermophytic regions. *Vitis riparia* occupies similar habitats, but is more frequent. *Humulus lupulus* is an unwanted vine on bushes when it is near hop plantations.

Triticeae grasses are represented by several perennial species. Except for weedy *Elytrigia repens*, it is also rare, but may be found *Hordelymus europaeus* in woodlands often together with *Elymus caninus*. *Thinopyrum intermedium* is a grass frequently found in thermophytic regions. From annual or biennial species, synanthropic barleys are often found (*H. murinum*, *H. leporinum*). *Avena fatua* is a serious weed of cereals. Rarely is it possible to see *Hordeum jubatum*, *Aegilops cylindrica* and *Secale sylvestre*.

There are regions which have been seriously disturbed and polluted, but there are still regions which are relatively clean and preserved which can be easily used for collecting. These regions cover several border mountains (Šumava, Novohradské hory, Krkonoše, Orlické hory, Jeseníky, Beskydy, Bílé Karpaty), basins of South Bohemia and Moravia, Czech and Moravian Karsts, Žd'árské vrchy and Pálava. Many of these listed regions are in Protected Landscape Regions or National Parks, where it is possible to easily cooperate with local authorities and where it is possible to get help such as maps, floristic literature and consultation.

A survey of the wild relatives and ancestors of economic plants which are still available in the territory of the Czech Republic is given in Appendix 4. There are altogether 249 such species, 39 of them protected species (among these 23 ornamental species and 11 aromatic and medicinal species). The largest groups of wild relatives and ancestors belong to aromatic and medicinal plants (93 species), grasses (36 species), ornamental plants (32 species), fruit woody plants (24 species) and fodder plants species (22%). Only several such species can be found in vegetables (13) and few in cereals (9), food legumes (6), oil plants (4), industrial plants (4), alternative cereals (4) and grape vine (2).

Many endangered wild relatives belong to endangered species in the Czech Republic, as well. They are protected by law, often within protected areas (See Chapter 3). Several collecting missions have been organised, aimed at some of the above-mentioned species (esp. grasses, fodder legumes, fruit trees and vegetables). Collecting of local wild relatives and landraces will continue as one of the priorities of the "National Programme on Plant Genetic Resource Conservation and Utilisation".

The main causes of genetic erosion of wild relatives are expanding industry as well as pollution of the environment. Agricultural practices can contribute to losses of diversity, as well.

Most of aromatic and medicinal plants have not been developed commercially, as well as some grasses and fodder plants. Valuable genetic diversity could be found especially in grasses and fruit trees, and to a lesser extent in fodder legumes and vegetables.

We believe that governmental programmes could secure wild relatives of agricultural crops. To fulfil this aim, more effective collaboration between the Ministry of Agriculture and the Ministry of Environment is needed.

Wild relatives have been effectively used especially in the breeding of grasses and fodder legumes. Many cultivars of grasses, bred in the Research Station for Grasses in Rožnov, originated in ecotypes collected in the mountains near the station. Similarly, several cultivars of fodder leguminous crops originated in ecotypes collected in Moravia near the Research Institute of Fodder Plants in Troubsko near Brno (*Coronilla, Lotus*).

2.3 LANDRACES (FARMERS´ VARIETIES) AND OLD CULTIVARS

Under present legislation only released cultivars may be grown in the Czech Republic, as in the former Czechoslovakia. Released cultivars are regularly included in PGR collections and form part of the indigenous plant genetic resources. Only few of the old cultivars are still registered (see App. 3). To these old cultivars belong fruit trees, vegetables and field crops which are less important (faba bean „Chlumecký“ - registered since 1928). Registered cultivars are listed in the „List of registered cultivars“ and a short characterisation of a new cultivar is given in this list in the year of registration.

When a cultivar is restricted, it is maintained only in the PGR collection. Grown cultivars of major crops change relatively quickly (e.g. cereals) and new releases represent one of the sources of the collection's enlargement. Information about PGR collections is available directly from the national documentation system of the PGR or from published catalogues and surveys.

Traditional cultivars are maintained first of all for their use in breeding or research. Some traditional fruit trees are still grown for their particular properties like special taste or aroma. Fruit landraces and old cultivars are very

seldom planted and disappear when old gardens, small country roads and solitary trees in the landscape are cut down. During the last 5 years, some of these landraces were collected by the Research Institute for Fruits, Holovousy.

Maintenance of landraces and traditional varieties as well as wild relatives is encouraged through the „National Programme...".Governmental policy takes in to account the importance of the traditional varieties as a source of valuable characteristics and properties for future use in breeding. The second goal of the utilisation of traditional crops is based in recent afford to diversify the spectrum of cultivated crops (for non-food, e.g. industrial, purposes as well as for human health and nutrition).

A new project for collecting and conservation of the widest genetic diversity of wild fodder plants, wild relatives of cultivated crops and threatened landraces of fruits and other crops in the territory of the Czech Republic was prepared in the Gene Bank of Prague, with the cooperation of the Research Institute for Fodder Plants of Troubsko and Zubří and the Research Institute for Fruits, Holovousy. Within the framework of this project several collecting missions have bean performed, and others are planned for the next two years.

At present, domestic wild relatives represent 2.2% and domestic landraces 12.2% of the whole number of indigenous germplasm. The status of domestic materials in particular crops is shown in App. 4. A relatively high percentage of landraces can be found in local genetic resources of wheat, tomato, *Allium* sp., fruit trees and maize. Valuable landraces were maintained in hop and flax collections.

Landraces played an important role in the history of breeding in the territory of the Czech Republic. Especially in the first half of the century, many local cultivars were bred using hybridization of local landraces with productive foreign cultivars. Many crop cultivars were also directly selected from these landraces. Presently, landraces are rarely grown (e.g. fruit trees or vegetables), mostly by local hobby-gardeners. However, lately there has been an increasing interest in local landraces.

Collecting and maintenance of wild relatives and landraces are the objectives of the „National Programme..." as well as the project „Gathering, Collection, and Conservation of Wild Genetic Resources and Landraces in the Czech Republic" supported by the Grant Agency of the Czech Republic. There is also another research project of the Czech Academy of Sciences and the Ministry of Environment aimed at wild flora, which contributes to the protection and maintenance of wild relatives of agricultural crops.

CHAPTER 3
National Conservation Activities

Biodiversity of the Czech landscape has been endangered in last forty years, when changes in agriculture and industrial pollution (especially acid rain) occurred. The process of collectivisation had negative effect on biodiversity, when large fields (often more than 50 ha) became common. Also, drainage of fields and meadows, frequently and not always sensibly used, often led to negative changes in agroecosystems. Extensive use of pesticides, herbicides and fertilisers also contributed to these changes. At the present time 278 animal species and 507 plant species are included in the list of endangered species in the Czech Republic.

3.1 *IN SITU* CONSERVATION OF PLANT GENETIC RESOURCES

Conservation *in situ* is presently not used in genetic resources of agricultural plants. It is used exclusively in forest resources and in conservation of wild species of plants. Protected areas and botanical gardens represent the main institutions dealing with *in situ* conservation of wild plants species. The legal status of these institutions was declared by order of the Ministry of Environment of the Czech Republic in 1992 (Sbírka zákonůč. 395/1992).

Protected areas are classified into six groups, according to the main tasks, level of protection, extent of protected area etc.:

National parks	3	111,120	ha
Protected landscape areas	24	1,042,356	ha
National nature reserves	124	26,882	ha
National natural landmarks	100	4,801	ha
Nature reserves	450	16,491	ha
Natural landmarks	866	25,752	ha

National nature reserves and national natural landmarks have an especially important role in *in situ* conservation. Altogether there are 1,540 protected areas in the Czech Republic. In many cases, protected areas have been established to maintain endangered plant species in ecosystems.

Taking into account the risks of loss, three levels of danger are characterised:

Critically endangered species	267
Strongly endangered species	143
Endangered species	97

All cultivated species and their wild relatives which are in danger of genetic erosion are mentioned in the National List of Protected Species.

Most protected areas are managed by skilled specialists, who participate in the projects (programmes) on biodiversity protection and conservation of endangered wild species.

Recently the research project „Active Help to Endangered Species of Selected Animals and Plants" has been prepared by the Czech Institute for Nature Protection. The aim of the project is protection of biodiversity for a global strategy of sustainable development. Research of populations of protected species and their conservation will be carried out in the framework of this project. Another research project has been prepared by the Czech Academy of Science and its Institute of Botany. These projects are mostly aimed at the study and conservation of particular plant species and ecosystems. Cooperation has been discussed between research projects on wild plants and those on genetic resources of agricultural crops. Mutual cooperation in the collection of local resources has been agreed. The collectors will provide samples of wild relatives of agricultural crops to the agricultural institutes which deal with relevant crops.

Some of the 70 botanic gardens in the Czech Republic are also active in *in situ* conservation. The Advisory Committee for Botanical Gardens, and the skilled specialists who are members of this committee, provide methodical coordination to botanical gardens. However, the professional level and size of botanic gardens are rather different, depending on the institutions to which they belong (cities, universities, schools, research institutes), their mandate and sources of funds. The botanic gardens belonging to the Institute of Botany of the Czech Academy of Science, to universities, and to research institutes can be considered as most important. On the contrary, only few botanic gardens in schools have more than local importance.

Cooperation has not been developed between institutions dealing with genetic resources of agricultural crops and botanic gardens. It mostly depends on the personal contacts of specialists. The Gene Bank in the Research Institute for Crop Production in Prague has offered to help with long term storage of seed samples, if there is need for such conservation in some botanic gardens. Up to

now only the Institute of Botany, Prùhonice has used this service of the gene bank. Creation of more productive contacts between institutes dealing with crop genetic resources and botanic gardens is one of the tasks in plant genetic resources conservation in the Czech Republic.

There is no official programme of „On farm“ conservation, concerning major crops such as cereals, legumes, root crops, fodder crops, oil crops, etc. Actual landraces are no longer grown; all growing areas are sown by modern advanced varieties. Commercially produced seed is used. A similar situation is in the commercial growing of vegetables and fruit trees. In these two groups of crops, however, some hobby gardeners can still maintain old, locally-bred cultivars or landraces. Several missions have collected such materials from hobby gardeners and have gathered valuable materials. We plan to continue such contact with small gardeners and to extend their cooperation in conservation activities to research institutes or to universities.

3.2 *EX SITU* COLLECTIONS OF PLANT GENETIC RESOURCES

Ex situ conservation and utilisation of plant genetic resources have a long tradition in Bohemia and Moravia. Several research and breeding stations and botanic gardens were already gathering PGR and working with them at the beginning of this century. Collections of a wider species spectrum were gathered in the Husbandry Botanic Research Station in Tábor (established in 1880 and closed in 1919). Also, the Chemical and Physiological Research Station in Jeneč near Prague (established in 1898) tested various species and varieties. In 1920 the station was transferred to Uhříněves at the National Research Institute of Agriculture, Prague. This institute took over the collections of the Husbandry Botanic Station in Tábor. In 1948 it was transferred to Doksany, and in 1952 to the Research Institute of Crop Production in Prague-Ruzyně. At that time, the collections contained 2847 varieties of cereals, legumes, oil and fodder crops.

The Moravian Land Agricultural Research Institutes in Brno, established in 1919, have assembled collections of local landraces. In the period 1951-1954, these collections were transferred to newly established institutions. Most of the accessions were transferred to the Research Institute of Cereals in Kroměříž, to the Research Institute of Fodder Crops in Troubsko, and to the Grassland Research Station in Rožnov.

A number of local landraces and bred varieties of Czech origin, from the beginning of this century, have been preserved in collections of the above-mentioned institutes. Old varieties of vine and fruit trees from the same period have also been preserved in repositories or plantations of research institutes.

The original 6,000 varieties gathered in 1951 in the Czech and Slovak collections were rapidly extended, particularly in the 1950s and the 1960s. There were 42,500 accessions in the Czechoslovak collections in 1992, when the country divided into the Czech and the Slovak Republics.

Considerable working capacity was directed to the maintenance of these collections. Vegetatively propagated species have been maintained by the institutes holding relevant collections. Seed-propagated species were regularly regenerated according to the results of germination tests. In the seventies, and particularly in the eighties, air-conditioned storage of seed samples in freezing boxes and later in cooling chambers was installed in some institutes holding collections. The gene bank in the Research Institute of Crop Production in Prague has assured the long-term storage of seed samples for all institutes since 1988.

The gene bank is under the auspices of Ministry of Agriculture of the Czech Republic from which it is fully financed. The National Information System of Plant Genetic Resources (EVIGEZ) was developed during the seventies and eighties in RICP, Prague.

Before the Second World War, genetic resources activities were not united under one organizational structure - rather, the individual institutes acted on their own. Since 1954, the overall methodological coordination has been provided by the RICP Prague. Presently there are 11 institutions working on plant genetic resources of cultivated plants (App. 7). Two of these institutions are state-owned research institutes (RICP Prague, RIOG Průhonice), one university (Mendels University of Agriculture and Forestry, Brno, Faculty of Horticulture, Lednice) and eight private research institutes. All seed-propagated collections are stored in active collections (selected valuable materials also in the base collection) in the gene bank in RICP, Prague. All collections of vegetatively propagated species are maintained by the institutes holding these collections.

A survey of Czech collections listed by species is given in Appendix 6. In spite of the fact that most local landraces and old cultivars have been saved in collections, the indigenous materials form only a smaller part of the collections (16%, among which 12,2% are landraces). However, indigenous genetic resources are considered the most important part of the collections, which preferably should be evaluated and maintained as our unique contribution to the world gene-pools of agricultural crops.

Appendix 5 show that the largest collections have been gathered in cereals (16,056 samples) and vegetables (7,668 samples). Altogether 42,792 accessions of plant genetic resources have been gathered in Czech collections as of 1.1. 1995.

Ex situ conservation of plant genetic resources has become an important part of the „National Programme on Plant Genetic Resources Conservation and Utilisation", which was launched by the Czech Ministry of Agriculture of the Czech Republic in 1994. All institutions holding collections are involved in this project.

Methodical coordination of the „National Programme..." is provided by the Czech Board of Plant Genetic Resources. The board is composed of collection curators, workers of the gene bank, breeders, representatives of universities and other specialists in plant genetic resources.

The institutes holding collections are responsible for the maintenance and increase of the collections (in cooperation with the gene bank), documentation, evaluation and regeneration of genetic resources. In vegetatively propagated species the institutes are in the position of the gene bank and they are responsible for long-term conservation of plant genetic resources (usually in field collections; in potatoes this method is combined with *in vitro* maintenance). Some institutes dealing with seed propagated species have facilities for medium term seed storage and they can also store working collections or safe duplications of collections. Attention is devoted to the gathering of resources of Czech origin (including local collecting missions), their evaluation, documentation and conservation.

The gene bank, as well as all institutions holding collections, cooperate with users, mainly private breeders and researchers. The annual amount of samples of plant genetic resources which have been provided to users in previous years is estimated to be 1,400 - 1,800 (almost half of it distributed abroad). Annual introductions of plant genetic resources are usually slightly higher (800-1,200 accessions) than exports. Local and foreign breeding companies (newly bred cultivars) as well as cooperating gene banks are the main sources of new germplasm. A limited number of accessions originate from local collecting missions which have been performed lately. Collecting missions are directed mainly to ward endangered localities and species, and also to the areas with valuable diversity (protected areas). Grasses, fodder legumes, medicinal plants, fruit trees and a few vegetables are the main objects of interest.

The structure of collections corresponds roughly to the crop structure in plant production in the Czech Republic. New advanced cultivars and special resources (experimental lines, etc.) are most interesting for users.

Breeders´ interests are taken in to account by an increase of collections (resources of particular characters) as well as by their evaluation.

We do not consider any accessions in the Czech collections to be abundant (excluding duplicates). In previous years we have discussed the value of local newly-bred lines which were evaluated in State Variety Testing Trials but not released (often lines close to newly released local cultivars). As a result, a decision has been accepted to maintain in collections only those lines in which specific valuable characteristics can be identified.

All expenses of *ex situ* conservation of plant genetic resources in the Czech Republic are covered by the State (the Ministry of Agriculture of the Czech Republic) in the framework of the „National Programme on Plant Genetic Resources Conservation and Utilisation“. This is a long-term project with a stable budget.

Based on the fact that all activities are financed by the government, plant genetic resources are considered to be state-owned. This is important to guarantee free availability of plant GR. Nevertheless this fact is not confirmed in Czech legal regulations.

3.3 STORAGE FACILITIES

The Czech Gene Bank in RICP, Prague - Ruzyně is responsible for long-term storage of all seed-propagated collections of economic plant GR in the Czech Republic. This storage facility began operating in 1988 and is assigned exclusively for this purpose. Total storage capacity of the long-term store is 100,000 seed samples. It consists of 5 cooled chambers, two of them (with capacity of 55 thousand samples) are cooled to +2°C. Three others, operating at - 15°C to - 20°C have capacity of 45 thousand accessions. They can be used for storage of the base collections. This capacity is fully sufficient for the needs of the Czech Republic in the next few decades. Presently, part of the capacity is rented; that is used commercially. Services of the gene bank are fully financed by the Ministry of Agriculture of the Czech Republic. The gene bank is responsible for the coordination of the „National Programme...“.

The process of sample preparation and storage conditions follow international recommendations. Principle rules of work of the gene bank as well as standards required for seeds and storage technologies are summarised in the Handbook of the Czech Gene Bank. It serves the needs especially of collection curators

and users. Seed samples entering the gene bank are checked for their purity, germination and health status. Collection holders must submit samples with requested parameters. If the seeds conform to the standard parameters, they are dried to 4% - 8% of moisture content (according to the species) and placed into sealed glass jars (370 ml or 210 ml respectively, according to the seed size). The jars are stored in moving shelves in cooled chambers. Usually the processing of received samples can start immediately after they are received. When it is necessary to store them before processing they are placed into the pre-drying room. In general, seed drying is considered very effective and relatively cheap processing. It is carried out under temperatures below 25°C, to maintain a high seed viability.

The active collections of most species are stored at +2°C. All base collections and the active collections of species with rapid loss of viability (some vegetables, flowers, medicinal and aromatic plants) are stored at -15°C. All indigenous genetic resources and selected foreign materials (with high potential value) are stored in duplication in the base collection under -20°C.

Currently the system of safe duplication of selected materials in base collections is being prepared in cooperation with the Slovak Republic (RICP Piešt'any). The project on safe duplications in the years 1994 - 1995 is supported by FAO. Regeneration and safe duplication of selected valuable materials between the Czech Republic and the Slovak Republic will help to fill the gaps which occurred in germplasm collections of both countries when Czechoslovakia divided.

Seed viability is monitored periodically (in 5-year periods) the seed stocks will be monitored automatically by the documentation system EVIGEZ. Received data are compared with initial data which have been included in the EVIGEZ information system. Most of institutes holding collections have storage conditions for working collections, but they differ from collection to collection.

After the division of Czechoslovakia, mutual exchange of PGR between Czech and Slovak gene banks was agreed. At present the preparation phase is taking place. Multiplied samples are stored in doubled amount for future transmission to the Slovak gene bank.

When the seed viability and/or seed stock falls below acceptable limits, the gene bank organises the regeneration of such samples in cooperation with the institution responsible for the corresponding collection.

The storage capacity of the gene bank is 100,000 seed samples. Currently, the collections of seed propagated genetic resources in the Czech Republic amount 32,000, leaving two-thirds of the gene bank's capacity unfilled. Spare capacity is rented, for example, to the State Variety Testing Institute for storage of seed samples of released cultivars (identification and originality). Also seed samples from Slovak collections are stored until the operation of the Slovak gene bank in RICP Piešt'any.

We intend to increase the parameters for medium-term storage in the active collection (to keep samples under temperature below 0°C) in the national gene bank. For safe operation of the cooling system a spare source of electricity has been installed, which would supply the gene bank within 5 minutes after any interruption of electric current.

Vegetatively propagated species are first of all maintained in a form of field collections. Only the collection of potatoes stored as microtubers or tissue culture samples represents an exception with in this group of PGR. Institutions holding vegetatively propagated PGR such as potatoes, fruit trees, hop, vine, some vegetables and ornamental woody plants are supported in their conservation and evaluation activities through the „National Programme ...“. Expenses of conservation are fully covered by this project.

Some problems concerning ownership of land for maintenance of vegetatively propagated PGR have occurred, but have been solved by legislation. Fields and PGR field collections are protected and new owners are expected to save these materials for a long time (in all cases they have rented the land to institutions dealing with collections of PGR). Such a trend is necessary to keep collections for the future.

3.4 DOCUMENTATION

The Czech documentation system of PGR works under software FoxPro 2.5 for DOS. A special user programme EVIGEZ for central documentation of PGR is used. The EVIGEZ information system was established in 1984 and its name is an abbreviation of the Czech term for documentation of plant genetic resources (**EVI**dence **GE**netických **Z**droů). EVIGEZ was designed for the documentation of cultivated plants and their relatives. The user programme has been continually developed and progressively upgraded according to the demands of the gene and users. EVIGEZ is used in both Czech and Slovak (formerly Czechoslovak) PGR central documentations.

It is estimated that about 90% of PGR are documented in the passport section of the database. Base information on PGR is described by 33 descriptors, which are common for all crops. The main passport database contains basic information on PGR (origin, breeding characteristics, taxonomy, availability, etc.). Information about wild species received from collecting missions is stored in Pascol table and supplementary information is available in the table Notes. The passport section consists of 43,119 records at present. Part of them, cca 3,000, are duplicated (in case when collections of one crop are held in two different places).

The description section of EVIGEZ evaluation consists of 5,030 records. Up to 110 descriptions are involved in evaluating morphological, biological and yield characteristics. The descriptors are different for various crops according to the relevant Descriptor list. Manifestation of each trait is expressed in a scale 1-9. National descriptor lists for 20 crops have been published in Czech or Slovak, English and Russian.

The third part of the EVIGEZ system maintains information about gene bank storage. The documentation system contains information on characteristics of stored seed samples and their storage codes. This part of EVIGEZ involves management data of 15,000 accessions in 18,000 glass jars. The active collection represents a large proportion of stored seeds (85%).

Programme EVIGEZ is user friendly and in the Czech language, so users do not need to be very experienced to use it. Input of new data is very simple and the programme satisfies users wishes for variable kinds of output. The programme does not allow input of duplicate accession numbers and watches minimum seed supply in a jar.

The documentation system EVIGEZ was originally designed for information about cultivated plants, but is flexible enough for input of information about wild species. Wild relatives of cultivated plants are included as well.

Lists of PGR in collections have been published in catalogue form, formerly Index Seminum (until 1986). The newest one, Catalogue of Cereals in Czech and Slovak Collections, was published in 1993 as volume I. At present volume II. of this catalogue is being completed, which surveys other crop collections.

Data are exchanged in print form or on floppy disks. Curators of collections are responsible for the quality and contents of data. There are intensive contacts between curators of crop collections and the documentation centre in the gene bank in RICP Praha. Records are updated once or twice a year and the data are corrected continually. Though passport data are received regularly,

evaluation data for the description section of EVIGEZ are not obtained very often. Thus, the description data for only eight crops are available at present.

EVIGEZ data have been duplicated several times and backups are stored on computer tape as well as floppy disks. A backup is made after each change in a data file and the backup set is saved in the building of gene bank and in the house of documentation officer as well. The gene bank building is secured by an alarm system.

The Gene bank RICP Prague was entrusted to share responsibility for the Wheat European Database, for the part of non-EU countries in the framework of IPGRI and ECP/GR collaboration. Intensive exchange of data with other gene banks will start in this year.

Both passport and evaluation data are freely available to users - as computer print-outs (dialogue system) or in published catalogues. We believe that advanced documentation has a positive influence on the value and use of plant genetic resources; however, we do not have direct data to support this opinion.

We have no experience with documentation on plant genetic resources maintained *in situ*.

General information on Czech collections, information on specific donors, pedigree and presence of major genes was compiled and published in the following publications:

Rogalewicz, L. et al: Catalogue of Czechoslovak Genetic Resources of Cultivated Plants Maintained in Czechoslovak Collections. VÚRV Praha, 1989, genetické zdroje 42, 94 pp.
Škorpík, M. et al: Catalogue of Wheat Varieties with Evaluation of Important Characters. VÚRV Praha, 1991, 107 pp.
Martynov, S. P.: Genealogies and Gene Alleles Identified in 31,000 Cultivars and Lines of Wheat. Praha, 1992, 1311 pp.
Holubec, V., Faberová, I. (Editors): Catalogue of Genetic Resources of Cereals in Czech and Slovak Collections, VÚRV Praha, 1993, 356 pp.

3.5 EVALUATION AND CHARACTERIZATION OF PLANT GENETIC RESOURCES

Evaluation of PGR, first of all cereals and potatoes, has long-term tradition in the Czech Republic (in former Czechoslovakia). Some methods of characterisation, mostly morphological descriptions, were formerly included in the process of evaluation; now characterization and evaluation are included in one system. In general, characterization is considered the first (preliminary) step of evaluation.

Each collection holder, in addition to their other obligations, is responsible for evaluation of the collection. National lists of descriptors for particular genera are used for these purposes. They have been published for 20 crops and were prepared based on such international sources as IBPGR (IPGRI) descriptor lists, UPOV Guidelines for the Conduct of Tests for Distinctness, Homogeneity and Stability and former COMECON countries' descriptor lists. The evaluated characteristics can be divided into some main categories - morphological, phenological, stress resistance or tolerance (diseases, pests, frost, etc.), yield elements, quality of products (nutritional aspects). The results of evaluation represent a source of evaluation data for the documentation system EVIGEZ.

Evaluation takes place in approximately 60% of PGR in the Czech Republic but only a small part of the data has been transferred into the documentation system (5,030 items; that is 11.8% of accessions in Czech collections).

Because the gene bank in RICP Prague has the responsibility for evaluation of some collections (winter and spring wheat, winter barley, triticale, buckwheat, millet, Amaranthus and sunflower), only these collections have been evaluated at the gene bank locality (approximately 30%). Other collections have been evaluated at the locality of collection holders under conditions suitable for particular crops. Only PGR coming from the institution of the collection holder has been evaluated in the locality of origin.

In most collections the systems of evaluation have been discussed with breeders and the results of evaluation are available for all users. Most evaluation data is published in periodical scientific journals or in the Plant Genetic Resources Annual Report published by Nitra Agricultural University, in the Slovak Republic. Very narrow contacts with breeders can be formed in such workplaces where PGR evaluation and breeding take place simultaneously.

Involving farmers in the process of PGR evaluation seems to be difficult because of recent changes in Czech agriculture. Farm cooperatives and state farms have until now been in the process of privatisation and productivity reduction. New farmers have not yet settled their farming systems and most of attention is given to these problems. Some contacts have been launched with farms producing bio-products, like PRO-BIO association.

Evaluation data (results of evaluation) could be one of the criteria for the preparation of „core collections". We have started to use the evaluation data for screening collections and formation of „subcollections" of character or property donors (e.g. resistance or quality donors).

Collection holders have their own systems of evaluation based on the „General methodology" and specified in methodologies for particular crops. Usually, neither gene bank nor collection curators receive data from PGR users because they use them directly in breeding programmes. In some joint experiments (e.g. for yield potential evaluation) the gene bank cooperates with users and receives results back as supplementary information for the documentation system, but this is not a precondition for providing PGR samples. On the other hand, if requested, the collection curator provides the accession user with evaluation data.

The process of evaluation is divided into two main steps:

- Characterisation and the base evaluation phase are sources of data for the description database. Expenditures of this phase are covered by funds from the „National Programme on Conservation and Utilisation of Plant Genetic Resources".
- Special evaluation of characters and properties (extensive field trials and laboratory tests) is important for effective utilisation of PGR in breeding and research. Expenditures of this evaluation should be covered by grants, applied research projects or other available funds.

As mentioned above, „subcollections" can be used as a rationalization measure in the system of PGR evaluation. In the case of released cultivars, data from literature can be gathered and used as an information source for the better utilisation of the collections. In the case of wild relatives, only special testing for selected characters, important from the breeder's point of view, should be carried out.

International cooperation could be very effective in the field of PGR characterisation. However, the evaluation in specific conditions of the country (climate, soil) can hardly be replaced by using results from abroad. On the

other hand identification of major genes, and evaluation of characters with low G x E interactions can be effectively organised in international networks e.g. ECP/GR programme. We are very interested in this type of collaboration.

It is difficult to specify expenditures for PGR evaluation in general. According to our experience, the base evaluation of one accession in field trials (e.g. cereals, legumes, oilseed crops) costs 300 - 500 Kč (11 - 18.5 USD) for one plot per year. But the same expenditures for fruit trees are more than twice as high. These costs depend on the level of salaries and prices of materials, which are still relatively low in the Czech Republic.

We consider the fingerprinting of valuable materials in a gene bank very important for the successful regeneration and evaluation of PGR. Therefore, our gene bank seeks funds for the necessary equipment. We would appreciate international collaboration in this field, including characterisation of accessions.

Evaluation of genetic resources maintained *in situ* is not developed.

3.6 REGENERATION OF PLANT GENETIC RESOURCES

The gene bank arranges the regeneration of seed samples when their viability or seed stock falls below acceptable limits. As a minimal stock in outbreeding species 4,000 seeds are stored (with exception of a few large-seed species). Critical limits of viability are declared for each species maintained in the gene bank (Čuriová et al.; The Manual of Czechoslovak Gene Bank, RICP Praha). Regeneration is carried out in cooperation with a collection curator and the institution responsible for the corresponding collection. Sufficient amounts of the seed samples are sent to collection curators for regeneration.

The collection curator is fully responsible for the quality of the regeneration, isolation of the sample if necessary, quality of harvest, seed purity and seed health. The collection curators return multiplied seeds to the gene bank. Regeneration of all collections is carried out by skilled specialists (researchers), who are supervised by the coordinator of the „National Programme...“. Also, all costs, materials and facilities for regeneration are fully covered by this Programme. Principles and methods of regeneration for particular species (groups of species) are described in „Methodologies“ for particular collections. In principle, only such an amount of revitalization should be carried out, which would assure a high level of vitality of the samples (size of population, isolation, etc.).

Full details on regeneration history are not included in data which are routinely distributed to users with seed samples. However, such information will be available in the gene bank and may be sent on request.

All collections are included in this regeneration system on the basis of agreements between the gene bank and the institutes holding collections in the framework of the „National Programme of Conservation and Utilisation of PGR".

The Czech National Gene Bank began its activity five years ago; viability monitoring began in 1995 and still continues (first viability tests after 5 years' storage).

Generally, only fresh seeds should be used for storage of new accessions. This condition is included in agreements between the gene bank and collection holders, and is valid for the transfer of accessions from working collections to the active and base collections. Thus, only fresh seeds can be included in seed collections (active and base) stored in the gene bank.

3.7 CONSERVATION ACTIVITIES OF FOREST TREE SPECIES GENE - POOL

The basic presumption of the regeneration of forest communities in heavily damaged, mainly mountain regions is, besides lowering of pollution load, mainly preservation and reproduction of endangered genetic resources of natural forest tree populations. The ecologically unsound system of management focused mainly on conifer species, resulting in many artificially deforested areas which can only be reforested with difficult. Within the framework of the State Programme on Environment Protection there are different projects prepared in many regions (e.g. in Protected zones), aimed at the gradual regeneration of forest ecosystems, characterized by species composition, provenance and spacing as "semi-natural forests" or nature closer stands. The fact that in many cases the positions and statements of nature protection authorities and forestry institutions are converging, is considered very positive. Such an approach results in concrete local or regional agreements on cooperation (e.g. SCHKO Jizerské hory and Forests of the Czech Republic - Agreement on cooperation in gene resources preservation and their use in forest regeneration; Forests of the Czech Republic and ČÚOP - NPR Kralický Sněžík).

The principles of sustainable development in all forests are applied through special management and use of the forests in such a manner and to such an extent that its stability, biodiversity, production and regeneration capacity can fulfil all the useful roles of the forest. It is adopted as one of the basic continuous strategic targets of the Czech forest policy. Relevant long-term particular targets are presented in Chapter 5.

Current results of provenance research give us information on the geographical variability of qualitative and quantitative characteristics and reactions of various populations to different locality conditions. These results have been used in forestry practice since 1988, taking into account the use of different provenances. The seed collection regions were consequently defined and certified, and seed transfer was declared among individual regions.

The use of the certified reproductive material of local origin is the basic precondition for seed rayonization and transfer. Transfer of seeds, seedlings and transplants to other forest regions can be realized in the frame of the same seed zone and vegetative forest degree (admissible tolerance is +/- one degree). At present seed zones are stated for Norway spruce, Scots pine and European larch (presently). Transfer of other tree species is limited only by vegetative forest degree.

The conception of forest resources preservation in existing institutions is coordinated by the state forests (LČR - Forests of the Czech Republic) and is based on standard approaches, long term experience and research results. Due to a limited budget, the conception cannot be implemented on an optimal scale. Nevertheless, it is the base which should be used in preparation of legal acts focused on preservation and improvement of forest resources. Besides preferred natural regeneration, there are other measurements for genetic resources of forest tree species protection and reproduction which have already been realized both in practical forest management and research programmes:

Basic measures

Seed collection, certified stands
Gene bases

supporting measures

Seed orchards, clonal archives
Seed stands
Mother stands
Selected trees
Forest seed bank

Certified stands

The positive trend in the increase of broadleaved trees' share has been preserved also in the last year (+5.4%). The central database, based on data of former state forest documents is being updated. It is supposed that in forest management plans starting from the year 1995, only forest stands of particular owners should be included in the certified stands for seed collecting.

The proposal on the new „Phenotype Stand Classification" has been discussed in close cooperation with forest owners (Forest Management Planning Institute ÚHÚL - and forest administration bodies).

Certified stands	(ha)	area	(%)
total	**145,298.19**		**100.0**
category A	14,825.52		10.2
category B	130,472.52		89.8
coniferous tree species	126,135.09		86.8
broadleaved - tree species	19,163.10		13.2
Norway spruce	103,777.10		71.4
Scots pine	16,333.67		11.2
European larch	3,526.24		2.4
European beech	12,338.66		8.5
Oak genus	5,360.80		3.7

Gene bases

Currently there are 275 gene bases of the total area 124,863.51 ha (about 5% of forested area in the Czech Republic). A total of 135 gene bases (66,889.36 ha) have been recognized in the framework of forest categorization; the rest is in drafting stage and will be discussed and agreed upon gradually during the development of the new management plans. There are certain problems with gene bases which must be solved in forests restituted to their original owners.

Seed orchards

Working from its own knowledge, the FGMRI, Jíloviště - Strnady prepares projects on the establishment of seed orchards. The institute collaborates in the search for suitable regions, the control of the regions' status, and management of the database and central inventory. The total area of the seed orchards in the Czech Republic is 326.7 ha.

Seed orchards

Coniferous	ha
European larch	99.06
Scots pine	117.26
Douglas fir	5.35
Norway spruce	66.64
European silver fir	4.24
Weymouth pine	1.05
Stone pine	7.45
Total	**301.05**

Broadleaved	ha
European beech	12.66
Oaks	4.15
Ulmus	6.73
Carpathian birch	0.78
Alder	1.33
Total	**25.66**

Seed stands

These so-called seed stands represent, in total, 3,808.85 ha. From this area nearly 75% of seed donors have been planted; 25% of them originate in natural regeneration and about 0.1% are the result of vegetative regeneration. After an evaluation of inventory results, the future system of establishing such stands will be discussed, including legislation measures.

Tree species	area (ha)
Norway spruce	2,337.70
European silver fir	4.42
Grand fir	2.25
Douglas fir	0.79
Scots pine	612.65
European larch	399.46
Coniferous	**3,365.27**
English oak	84.17
Pubescent oak	183.91
Durmast oak	7.05
European beech	168.45
Broadleaved	**443.58**
Total	**3,808.85**

Selected trees

There are 7,727 selected trees documented in the central database; only 1,232 of them, (that is, 16%) are broadleaved trees.
The last inventory of selected trees was made in 1979. Therefore experts on forest resources in the Czech Republic are preparing the revision of the present status, using available prepared materials to reflect the current situation. Such an inventory, together with education and legislative measures should also be implemented in stands of other owners.

Number of selected trees by individual tree species

Norway Spruce	3,059
European Silver Fir	112
Grand Fir	21
Scots Pine	1,427
Swiss Mountain Pine32	32
Douglas Fir	399
Weymouth Pine	33
European Larch	1,411
Western Red Cedar	1
Pubescent Oak	97
English Oak	80
Durmast Oak	20
European Beech	343
Small-leaved Lime	139
European Ash	46
Sycamor Maple	76
Black Alder	101
European Birch	144
Carpathian Birch	6
Wych Elm	49
Mazzard	131

Seed bank

Originally, the forestry seed bank was only used as a seed material source for breeding programmes (since 1985). Nevertheless, it can also be a tool of preservation of chosen populations of forest tree species. The aim is the long-term storage of seeds which will not be sown in the period before emissions are reduced. The selection of suitable species is carried out by experts in forest resources. Their activities cover the whole area of the Czech Republic, which has been divided into 8 regions. Before storage seeds are controlled and treated. Seeds are stored in a vacuum in plastic containers and kept at a temperature below -25°C to -35°C. It is expected that storage will be provided for 30 to

40 years, and control analyzes will be performed every 5 years. The total capacity of the seed bank is about 15 tons of seeds. A representative amount of seeds from the partial populations will be stored; their number should represent important regional populations.

Up to now the forest seed bank is used to store the seeds of economically important species. We have had good experiences mainly with spruce, larch and pine. In the future the present forest seed bank should serve as gene bank as well.

The following measures are recommended:

- Foundation of forest preserves and protected regions,
- Reproductive plantings (foundation of new seed stands),
- Clonal archives, mother plantation of ortets.

CHAPTER 4
In-Country Uses of Plant Genetic Resources

4.1 USE OF PLANT GENETIC RESOURCES COLLECTIONS

The frequency of plant genetic resources utilization (evaluated by the number of samples sent to users) corresponds to both extent of breeding and importance of a crop in local agriculture. Even though we can only provide exact data for the year 1994, the following crop resources can be specified as most frequently utilized (in decreasing order): wheat, barley, peas, fodder legumes (alfalfa, clover), flax, rape, potatoes, some fruit trees (apple, pear). The main in-country users are private breeding companies (more than 20), private crop-specialised research and breeding institutes (9), agricultural universities (3) and individual breeders. In our estimations, about 1,500 to 2,000 samples of plant genetic resources are distributed annually, about 60% of this amount within the country. Because of a lack of data we are not able to specify the number of scientists and/or breeders using the genetic resources.

Also not precisely known is the proportion of resources from local collections to all utilised plant genetic resources (or introduced resources). Our rough estimation is that it is approximately 50% of annually utilised germplasm (that is 1,000 - 1,300 samples).

Most of the species maintained in the gene bank are not (or are rarely) distributed. It could be assessed that almost all distributed samples belong to about 30 - 40% of the species maintained in the gene bank. The main external sources of germplasm for users are breeding companies (direct exchange of latest materials by breeders), gene banks and research institutes. Most of the materials are introduced by the gene bank and institutes holding collections. However, most valuable materials for breeders are often obtained by mutual exchange.

Our estimation is that about 60% of the species maintained in the gene bank (collections) were not utilised in in-country projects during the last 3 years. Due to structural changes in Czech agriculture there is growing interest in broadening the spectra of crops as well as the genetic base of grown cultivars. Therefore, we expect that additional new species will be used in the future, as

well. The utilisation of PGR is strongly influenced by the amount of information available about the accessions. To stimulate PGR utilisation the Czech Gene Bank has published a catalogue of passport data of cereals GR. It also regularly sends results of evaluations to breeders and cooperates with them by evaluation.

Only registered cultivars of agricultural crops are grown in the Czech Republic by seed producers. There exists a market for seeds, where farmers can select most appropriate cultivars.

4.2 CROP IMPROVEMENT PROGRAMMES AND SEED DISTRIBUTION

Almost all plant breeding is assured by private breeding companies. However, these companies can obtain governmental support for breeding programmes (up to 60% of direct expenses of breeding). Most programmes are aimed at breeding high-yielding, well-adapted cultivars, with high quality product, good resistance, tolerance to main stresses and effective response to growing conditions. Advanced local and foreign cultivars are usually used as initial materials in breeding; in some programmes wild relatives and absolete cultivars are utilised, as well. The increase of quality of products and diversity of production systems are the ultimate objectives of breeding programmes (high effectiveness of production - that is, high yield and effective utilization of inputs - is considered essential). The amount and quality of local breeding is adequate to meet national needs. It is probable that some local breeding companies will not be able to survive in strong competition on the market. On the other hand, there are few companies which are successful on the international seed-market. Foreign companies cover a significant part of the market (esp. in hybrid cultivars). Seed is mostly imported.

Information on registered cultivars is annually provided to all users by the State Institute for Control and Testing in Agriculture. This institute also started preparation of the Lists of Recommended Cultivars (based on series of field trials) which provide more detailed information for farmers. In major crops, local cultivars are grown in prevailing areas and certified seed is regularly used by most farmers.

4.3 USE OF FOREST GENETIC RESOURCES

Concerning the use of forest resources the Forestry and Game Management Research Institute (FGMRI) has a specific role. There is a department assigned by the Ministry of Agriculture of the Czech Republic to deal with certification and inventory of reproductive sources. Selection, certifying, inventory and control of reproductive sources are ensured in the framework of this permanent activity. Also important are the control and consulting activities. Based on the report by the FGMRI of December 31, 1994, the recent state of forest resources has been described in the pevious chapter.

Natural distribution of the main native forest species must be considered very important with regard to the fact that improvement of biological diversity and a shift to natural species composition belong to the long-term basic principles of forest policy and are necessary tools for the improvement of forest stands stability.

Specie composition	Natural	Actual (in %)	Planned optimum
Spruce	11.2	54.3	40
Fir	19.8	1.0	2
Pine	3.4	17.6	11
Larch	0	3.4	15
Dwarf pine		0.3	
Douglas fir		0.2	
Introduced spruces		0.5	
Other coniferous	0.3	0	
conifers (total)	**34.7**	**77.2**	**68**
Oak	19.3	6.1	9
Beech	40.1	5.5	11
Hornbeam	1.5	1.2	
Maple	0.7	0.7	
Ash	0.6	0.9	
Birch	0.8	2.9	
Alder	0.6	1.4	
Lime	0.8	0.9	
Poplars unimproved	0.4		
Poplar hybrids	0.1		
Willows	0.1		
Black locust	0.5		
Other broadleaves	0.2	0.3	12
Broadlaves total	**65.3**	**21.2**	**32**
(clearing)	1.6		

In situ and *ex situ* conservation actions are necessary in threatened zones. These needs concern mainly air polluted areas in the north of the Czech Republic.

Also studies of intra-specific diversity should be considered as an instrument of rescuing the gene pool. Very rare populations could be found in the provenance or progeny trials, etc. Genetic marker studies are planned, but necessary equipment is still needed (see Chapter 6).

4.4 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES

Benefits derived directly or indirectly from indigenous plant genetic resources can be specified as follows:

a. use in breeding as initial materials and donors of specific characters,

b. use in research as initial and experimental materials,

c. exchange of materials in international collaboration,

d. use of selected accessions and information in testing and protection of registered varieties,

e. direct introduction of PGR in agricultural practice (exceptionally, e.g. medicinal and spicy plants, few alternative crops),

f. introduction of marginal crops in agriculture,

g. use of PGR in culture and education,

h. PGR as components of environment and landscape (e.g. *in situ* maintained PGR in orchards, protected areas, trees in a landscape).

The use of PGR mentioned in e, f, g and h) have not yet been fully developed. Both indigenous and non-indigenous PGR in collections are utilised in similar ways and to a similar extent. There is no special scheme of sharing benefits from the use of non-indigenous PGR with its country of origin.

4.5 IMPROVING PGR UTILISATION

Improvement of commercial plant production is an evidently major effect of the utilization of PGR. Close cooperation between breeders and researches dealing with PGR has a long tradition in this country. Researchers often become members of breeding teams and share in the development of new cultivars. Also, breeders provide recommendations for methodology of evaluation of collections as well as new materials to add to the collections. The framework for this cooperation is provided by the National Board on Plant Genetic Resources, in which several breeders are involved. Close collaboration between the curator of a collection and breeders of the relevant crop is usual.

The greatest value of PGR is in their utilization as a source of genes for crop improvement, and for increasing diversity of agricultural systems. In our opinion PGR will be potentially even more valuable due to the increasing importance of plant breeding for sustainable development of agriculture. To support this progress additional projects on PGR evaluation and better characterization should be adopted on both national and international levels. Assistance to such projects will probably be the most effective way to improve utilization of PGR.

CHAPTER 5
National Goals, Policies, Programmes and Legislation

5.1 NATIONAL PROGRAMME ON PLANT GENETIC RESOURCES CONSERVATION AND UTILIZATION

During the last five years funds for agricultural research have been sharply reduced. This of course caused a decrease of funds for plant genetic resources. Due to this fact and the lack of coordination (study and maintenance of germplasm were incorporated in many research projects without mutual links) there was a real danger of irreplaceable losses of materials and discontinuity of the work. Under these circumstances the Czech Ministry of Agriculture decided to secure germplasm as one of the priorities in agricultural research. As a result of this decision the „National Programme on Plant Genetic Resources Conservation and Utilization" was prepared and launched in 1994 for the period 1994 - 1996. This project provides necessary funds for all eleven institutions dealing with plant genetic resources (including private companies) and covers all essential activities on germplasm study, maintenance and utilization. RICP Prague, gene bank, is in charge of coordinating this programme; the Czech Board on Plant Genetic Resources is supposed to act as an expert panel and scientific coordinating body.

The following main tasks of the Programme have been formulated:

- Collecting of local landraces and wild relatives, gathering of all accessible materials of Czech origin; documentation, evaluation and conservation of these materials.
- Fast transfer of all seed-propagated collections to the long-term storage in the gene bank.
- Further increase of collections aimed at covering breeder's needs and gathering a wide diversity.
- Regular study and evaluation of collections, screening of donors of important characters.

- Systematic documentation of collections, continuous formation of databases of EVIGEZ (passport and evaluation data), further progress in structure and functions of IS EVIGEZ.
- Long-term preservation of germplasm for the needs of further generations.
- Services to users, exchange of germplasm and information, international collaboration.
- Gathering of knowledge and resources for the further development of breeding and wider diversity of crops and cultivars spectra in agricultural practice.
- Creation of collections of crops which were originally maintained in Slovakia or of new crops (if there is a need for it).

The „National Programme...“ is fully financed by the Czech Ministry of Agriculture. The gene bank in RICP Prague provides coordination of the programme, information systems and long-term storage of seed collections. The coordinator of the programme, Dr. Ladislav Dotlačil, is a member of the staff of the gene bank and Director of the Division of Genetics and Plant Breeding, RICP Prague. He has been appointed the coordinator by the Czech Ministry of Agriculture; he also acts as chairman of the Czech Board of Plant Genetic Resources.

Collections are held in 11 institutions (see App. 5, 6); there are two state research institutes (RICP Praha, RIOG Prùhonice), one university (MAFU Brno), and eight private companies dealing with agricultural research and breeding involved in the „National Programme...“. Funds are annually provided to the Gene Bank, RICP Prague, which signs agreements with particular institutions specifying their tasks. The „National Programme...“ is considered a long-term project. However, budget and working plans are annually negotiated in the Board of PGR and its recommendations are considered by the Ministry of Agriculture, which decides the annual budget.

National legislation on PGR is still missing. However, the Czech Government has signed documents from the UNCED Conference as well as the International Undertaking on Plant Genetic Resources. The „National Programme ...“ is based on principles formulated in both of these documents. Despite these measures we consider national legislation on PGR to be very important for the future.

The „National Programme...“ became essential for PGR activities in the Czech Republic. In our opinion it should be the basis of a long-term project aimed at assuring national needs and international responsibilities of the Czech Republic concerning PGR.

5.2 TRAINING

Most of the staff involved in the „National Programme ...“ are skilled specialists who have been working with collections for a long time. Training is regularly organised in the form of workshops, study stays and consultations by the gene bank, RICP Prague. Also the Czech Board on Plant Genetic Resources organizes conferences, short training courses or workshops focusing on techniques and methods in PGR conservation, documentation and evaluation (annually cca 2 actions). Only some specialists have had the opportunity to get training abroad or in international courses. We greatly appreciate the support of IPGRI, thanks to which this training was possible. It would be a significant boost to Czech PGR activities and to the „National Programme ...“ if our young specialists can obtain international experience and training in the near future. To this end we would appreciate the assistance of FAO and IPGRI.

Specialists in genetics, tissue culture, plant breeding, agronomic evaluation, data management and statistics, seed science, taxonomy and quality testing are presently involved in the „National Programme...“. Staff should be expanded by one or two specialists on cryopreservation, and germplasm health control.

Local training programmes on PGR cannot meet all national needs. We cannot provide training in such skills as fingerprinting in characterization of PGR, seed physiology, etc. on an appropriate level. Such training is necessary for only a few specialists and could most effectively be provided through international cooperation. All staff have been equally involved in training.

Despite some of the above-mentioned limits, we believe that the Czech Republic could offer regional courses in basic skills in plant genetic resources. Some special lectures could be delivered by specialists from abroad if necessary. The gene bank, RICP Prague could provide technical facilities for such training (lecture room, excursions, convenient accommodation).

The broader agricultural community (first of all breeders, but also researchers and farmers) are regularly informed about national activities on PGR through seminars and articles in journals and newspapers. However, a further increase in public awareness of the importance of PGR is one of the primary aims of the „National Programme...“ and Board on Plant Genetic Resources. The importance of PGR and conservation of biodiversity are supported by the Czech Ministry of Agriculture, evidenced by the relevant research projects which have been prepared - „National Programme ...“, and the Project on Biodiversity Conservation and Use for Sustainable Development (under preparation).

5.3 NATIONAL LEGISLATION

Quarantine laws in the Czech Republic enable the international transfer of germplasm (including in vitro materials and parts of plants in vegetatively propagated species). Delays in passage of PGR (esp. in vegetative parts of the plant) have caused damage to materials in a few cases in the past, mostly due to bureaucracy or poor management, not due to barriers in law. Present level of guarantine control is acceptable. In some species, introduced PGR are planted in quarantine nurseries under common control of the collection curator and responsible specialist from the State Institute for Control and Testing in Agriculture.

The Czech Republic has national legislation on the Protection of Varieties, and the Certification of Seeds and Seedlings. This law is presently being updated, and the new version will be submitted for discussion and should be adopted by the Parliament in autumn of 1995. The Czech Republic has joined the UPOV convention, and national legislation respects Intellectual Property Rights and all principles accepted by European Community. Free access is guaranteed to protected materials (genetic resources) if they are utilized exclusively in breeding and/or research. Legal protection concerns only cultivars of species listed in the National List of Species (major crops grown in the country). In the species mentioned in this List of Species seeds (seedlings) can be distributed only as:

- officially approved (certified),
- standard (only in vegetables and medicinal plants).

In species which are not on the List of Species, seeds can be distributed as commercial, standard or certified.

Local legislation does not negatively affect PGR activities; it enables all PGR activities, free and safe movement and availability to local as well as international communities. There are no restrictions on exchange of PGR in Czech collections (it is not valid for breeder's lines and special genetic stock, if these materials are not included in collections as freely available).

The Czech Republic respects the principles of „The International Code of Conduct for Plant Germplasm Collecting and Transfer" (FAO, 1994). There are no specific restrictions for foreign collectors.

5.4 OTHER POLICIES

The Czech Ministry of Agriculture provides support (credits, subsidies) for breeding (breeding companies) as well as for purchasing certified seed of improved varieties (selectively, in some crops and for perspective farmers). Farmers can also receive credits and subsidies for investmenting in new technologies which would improve environmental protection, etc. We especially hope that subsidies for environmental protection will positively influence projects in PGR conservation and utilization (*in situ* and perspectively also „on farm“ conservation of PGR, biodiversity conservation and utilization). Several specialists in PGR are involved in planning research projects as well as strategy for agricultural development. During preparation of these projects, the impacts on PGR and biodiversity were discussed. We hope that aspects concerning PGR will be considered during the monitoring of these projects also.

We cannot indicate any impacts of recent developments in trade or commerce policies on national PGR activities.

5.5 BASIC PRINCIPLES OF FOREST POLICY, PROGRAMMES, LEGISLATION

The fundamental strategic principles of forestry are **the regeneration and maintenence of stable forest ecosystems through the application of the principle of sustainable development in all forests**.

Particular targets dealing with genetic resources cover:

- the increase in diversity of forest tree species and changes closer to the natural structure of forests through adequate utilization application of suitable species; the modification of species composition, particularly by increasing the proportion of deciduous tree species;
- maintenance and development of the gene pool of forest tree species through management of resources and reproductive materials by natural regeneration, controlling the handling of reproductive materials, conservation of local populations and threatened species, and support to research and training programmes;

- significant reduction of the forest dammage caused by hooved deer by achieving an acceptable number of deer, while retaining the game gene pool at a sufficient level.

It is necessary to include in short-term targets the consistent appliccation of management technologies (mainly in felling, transportation of timber and forest conservation) to complete restoration of property rights to forests, to find and reach an optimal and stabilized organizational structure of state forests, to increase public awareness of the role of forests and forest management for sustainable development.

The document "The Basic Principles of Forest Policy" was agreed by the government of the Czech Republic in May 1994. It considers forest resources problems which correspond to a more natural method of forest management. It respects current trends, based also on resolutions from conferences on European forest protection. The concept of preservation and reproduction of genetic resources is considered to be the main strategic goal, the base for the preservation and improvement of the stability of forest stands and forests as an important landscape component in general.

It should be mentioned that the Czech Republic is a signatory state of several international agreements concerning the topic mentioned above. (Resolutions from conferences in Rio, Strasbourg and Helsinky, statements of Forestry Congress, and COFO meetings as well).

Recently, in the period of changes in forestry, responsible foresters have been trying to change their approach to forest resources, which cannot be considered only as economic sources. For society, so-called "non wood benefits" are of the same value, even in the proposal of the Forest Act, which was approved by the government in January 1995. Discussion and agreement on this law in the Parliament is expected in the first half of this year.

The reality must be considered by the new law, where new property relations (which, of course, also affect forest resources) will have to be reconsidered.

The strict regulations on the use of genetically suitable material for forest regeneration stated by the law (the Fores Act and Directives), which is not dependent on the form of ownership, is basic.

Otherwise there is a risk of the use of unsuitable material, (e.g. purchase from producers without licence), or the use of improper self-seedlings. It may cause many problems in future generations, which we are trying to prevent today.

In this sense, the role of forest management experts and regional forest administrators, inspecting end also reviewing the state of forests, will expand. Proper subvention policy will also be important to influence the forest owners in decision-making.

It is expected that the non-productive role of forests can be well guaranteed in state forests. We expect that the transformation process will soon be finished, restitution problems solved etc., and a way can be found to make this approach attractive also for other, mainly small forest, owners.

There will also be a wide field for education, information, training, extension and consultation services.

The National Forestry Committee, a new NGO created in the autumn of 1993 could be a suitable body for supporting activities in this field.
FGMRI is authorized to provide certification and registration and has a reponsibility for preservation of gene pool of forest tree species. Based on annually completed specifications 450,000 Kč (Czech crowns - approximately 15,000.- USD) have been dedicated to the annual programme and budget for forest genetic resources.

CHAPTER 6
International Collaboration

The Czech Republic is deeply interested in international collaboration on PGR. The possibilities of such collaboration were limited until 1989 (with few exceptions, only cooperation among communist countries was allowed). Conditions have changed since the revolution in 1989 and international collaboration has been developing faster during the last five years. In our opinion, however, the possibilities of international collaboration are still not fully employed. We consider effective participation of the Czech National Programme and local specialists in international projects to be one of the significant reserves in our work.

6.1 INTERNATIONAL COLLABORATION IN PGR

The Czech Republic was among the countries which signed the UNCED Convention in 1992. Agenda 21 (including Chapter 14) became one of the bases for construction of the „National Programme on Plant Genetic Resources Conservation and Utilization". The principles of Agenda 21 are implemented in this project, though the extent of particular activities is of course limited by available funds. The Czech Ministry of Agriculture has also started work on the project „Biodiversity and its Utilization for Sustainable Agriculture". This project extends the „National Programme..."; it is aimed at *in situ* conservation, the increase of diversity of agro-ecosystemms, the maintenance of landscape and support of rural communities.

We believe that the Convention on Biological Diversity forum can and should strengthen the role of the CPGR/FAO. The Convention forum can formulate and implement global environmental policy. Nevertheless, the role of CPGR/FAO seems to be irreplaceable in terms of the application of policies and actions in agriculture. In our opinion only FAO can guarantee the application of global intentions in agricultural practice with respect to specifications of agriculture and on the professional level.

The Czech Republic joined CPGR/FAO and signed the „International Undertaking...“ in 1994. We consider the following to be significant benefits:

- Mediation of information on PGR (in cooperation with IPGRI).
- Development of international legislation.
- Development of international standards in the work with PGR.
- Building up the International Network of base collections.

We greatly appreciate the direct support of FAO to our „National Programme ...“ through the project of RICP, Prague: „Establishment Transfer and Safe Duplication of Plant Genetic Resources Collections of Selected Species in the Czech Republic for Safe Maintenance of Germplasm“ which is provided for the period of 1. August to 31. December 1995. Because all of our intentions cannot be completed during this relatively short period, we would welcome the opportunity to extend this project for the years 1996 and 1997, in cooperation with the Slovak Republic, which should be directly involved in the project.

We also consider the European Cooperative Research Network on Flax as important assistance to local research and breeding projects. AGRITEC Šumperk, which holds a significant collection of flax, is responsible for hosting the International Flax Database.

We would consider it a very important task of CPGR/FAO in the next decade to achieve progress in international legislation of PGR and establishment of a functional international network of base collections. In our opinion, the assistance of FAO in PGR evaluation and utilization should increase - e.g. extension of regional or even global (in some crops) networks of evaluation and exchange of crop genetic resources (in cooperation with IPGRI).

The Czech Republic joined the Undertaking in 1994. Responsibilities declared in this document stimulated preparation and adoption of the“National Programme on PGR“. Because of a lack of national legislation the principles of the Undertaking are generally accepted as essential rules in the work with PGR in the Czech Republic.

In our opinion an International Fund should be established as part of the Global System, especially as a source of funds for:

- rescue of endangered germplasm,
- transfer of new technologies to all parts of the world,
- international education and training (courses, study stays),

- evaluation and utilization of germplasm in crops of global importance and in new crops which could have importance in agriculture.

At present, the Czech Republic would probably be more in the position of a beneficiary country. However, we believe that we can also become a donor country in the near future.

The institutes holding collections in the Czech Republic have contacts to four CGIAR centres.

Long-term contacts have been developed to CIMMYT, Mexico (RICP Prague, ARI Kroměříž, universities). CIMMYT has provided our research institutes and cereal breeders with very valuable materials, which were successfully used in local breeding and research projects. Czech specialists also participated in international evaluation of selected nurseries. Several scientists and plant breeders from this country had the opportunity to visit CIMMYT and learn some of the latest research and breeding methods.

The Research Institute for Potatoes, Havlíčkův Brod, is involved in fruitful collaboration with CIP, Peru. Both institutes exchange germplasm and information; CIP has also assisted RIP Havlíčkův Brod by organizing a collecting mission in the Andean region.

In the last few years RICP Prague - Ruzyně has started collaborating with ICARDA, Syria. We exchange samples of PGR and information. One Czech specialist spent a 3-week study stay in ICARDA.

Long-term and very effective assistance from IPGRI to Czech institutes holding collections and to the Czech gene bank was principal in our international contacts and in building the „National Programme...“. IPGRI supported or organized training for several Czech specialists, already in the period when this support was the only opportunity for Czech researchers to receive training abroad. Training and expertise from IPGRI have been widely implemented in the construction and methodology of the Czech gene bank in RICP, Prague, as well as in Czech documentation system on PGR and progress in evaluation of collections. IPGRI has also been an essential source of information and know-how on PGR on a global scale.

The former Czechoslovakia joined the ECP/GR programme in 1983. Since that time Czech researchers have participated in the work of all crop working groups. Besides mutual cooperation in documentation and evaluation of PGR, the gene bank in RICP Prague (working place Olomouc) maintains an international collection of vegetatively propagated *Allium* sp., RIGP Zubří

hosts a data base of two species of grasses. At present, we plan to continue active participation in all working groups, including the newly established Grain Legumes Group. ECP/GR can significantly contribute to better documentation and utilization of PGR in the Czech Republic. Therefore, we are seriously interested in international networks of crop germplasm evaluation.

We greatly appreciate the role of IPGRI and its significant assistance to the work with PGR in the Czech Republic. In our opinion the new philosophy and initiatives of IPGRI are effective and topical, in accordance with both global policies of FAO and the Convention on Biological Diversity. The Czech Republic would welcome more emphasis on evaluation and utilization of PGR (through international networks and regional research projects). We are also very interested in international training and study stays for Czech specialists.

Multilateral international cooperation within the framework of the former COMECON played an important role in Czechoslovakia until the revolution in 1989. In the last decade of this era, however, more productive bilateral contacts between institutes in several COMECON countries were established. Some of these bilateral agreements are still valid and active; new bilateral agreements with western countries have been established, as well. Most of the institutes involved in the „National Programme...“ have such bilateral agreements. They usually declare mutual exchange of materials and information, exchange of specialists and participation on joint projects, respectively. In most cases bilateral projects concern evaluation and utilization of PGR. At present they are not as significant for our „National Programme...“ as international cooperation with FAO and IPGRI.

6.2 INTERNATIONAL COLLABORATION IN FOREST RESOURCES

International colaboration concerns conservation, evaluation and use of forest genetic resources.

Several regional programmes and projects are currently supported by foreign or international organizations and institutions.

Jizerské hory Mts., Prince Bernard Fund (Netherlands)
Jizerské hory, the Ministry of Agriculture of Saxonia
Jizerské hory, the Embassy of the United Kingdom
Krkonoše Mts., FACE Foundation (Netherlands)

This topic represents a substantional part of the GEF Biodiversity Project supported by the World Bank. Support of forest restoration requres the purchase of izozyme equipment for identification of native gene resources of forest tree species, cooling boxes for storage of reproductive materials, and several regional sub-projects concerning restoration of native vegetation in forests.

- S/H Follow-up and relevant international agreements have resulted in the decision to affect the system of forest management on an international scale. We hope to accomplish this through activities of forest specialists in the Czech Republic by ongoing cooperation in further programmes.
- An example of such new programmes is the joining of the EFI programme with the Helsinki resolutions, and the planned participation of the Forestry and Game Management Research Institute (FGMRI).
- Under the auspices of the Timber Committee of EEC/FAO the Czech FGMRI is preparing an international workshop entitled "Forest Seeds, Treatment and Seed Storage" to be held in June 1995 in Opočno, East Bohemia.
- Also worth mentioning here are the joint sessions of Czech and Slovak representatives from the Forestry Biological Commission of the former Czechoslovak Academy of Agricultural Sciences.
- A representative of FGMRI Jíloviště - Strnady (the ISTA station) is collaborating in the COST project 813 "Diseases and Disorders in Forest Nurseries".
- The national report concerning the First Norway spruce Meeting of EUFORGEN Picea abies Network (Stará Lesná, Slovakia) was prepared by the national coordinator and submitted to IPGRI in March, 1995. Further cooperation under this project is expected in the future.

CHAPTER 7
National Needs and Opportunities

The Czech Republic is a small country with great differences in climate and soils. Agriculture and forestry are advanced, using modern technologies and cultivars (genotypes). Local breeding has a significant impact on the increase of production and its quality. Even though this country is not very rich in indigenous species, valuable domestic as well as foreign genotypes can be found in our collections. There is a long and successful tradition of cooperation between curators of collections and breeders. On the basis of these facts we consider effective conservation and utilization of PGR and FGR essential for sustainable development and wider diversity in agriculture and forestry. This strategy could be realized through the following main tasks (most of which have been mentioned in previous parts of the Report):

- Collection of all local landraces and wild relatives, their documentation, evaluation and conservation.
- Evaluation and maintenance of indigenous resources in both active and base collections; secure conservation of vegetatively propagated species.
- Fast transfer of all seed-propagated collections to long-term storage in the gene bank.
- Development of safe duplicates of selected valuable materials (in cooperation with the Slovak Republic and in other international cooperations).
- Further increase of collections and establishment of new collections according to breeders´ needs.
- Systematic documentation of collections and more active participation in international cooperation (international databases).
- Evaluation of collections, choice of donors of important characters (in cooperation with breeders); participation in international and regional projects for better and more effective use of collections;
- Application of new methods in PGR activities (cryopreservation, fingerprinting).

- Further development of the „National Programme ...“ as an essential framework for PGR activities in the Czech Republic. Support of complementary research projects dealing with biodiversity, plant genetics, breeding methods, etc...
- More effective collaboration with institutions dealing with wild flora, protection of the environment, informal groups and professional organizations.
- Building public awareness of the importance of PGR.
- Education and training of young specialists, preferably on an international level.
- Broader and more effective participation in international cooperation (esp. in international databases, networks and regional projects).
- Preparation of domestic legislation on PGR and biodiversity protection.

As concerns forestry, the devastating anthropogenous impact on forests is continuing, despite better conditions with regard to air pollution in the last two years.

The transition to multiple-resource management of forests is additionally complicated as a consequence of the current economic reform - especially restitution of private and public property and changes in the organizational structure of forestry management.

The implementation of necessary forest management practices is more expensive and financial problems can create difficulties if all respective needs are to be covered.

The most important needs of Czech forestry are:

- solving of the old ongoing problems which are as follows:
  - air pollution,
  - inconvenient tree species composition of forests,
  - too high a number of high deer in forest stands,
- completion of transformation processes,
- adoption of a new Forest Act,
- change in our approach to the forest and forestry in general,
- step-by-step solution to the problem of the relationship foresters and environmentalists,
- creation of a stable and long-lasting system of funding for education and research activities.

The establishment of the "forest gene bank", prepared by the Forests of the CR Seed enterprise in Týniště nad Orlicí, will be an important measure. Recently its status has been under discussion, and colaboration with the gene bank in RICP, Praha is planned.

It is important to remember some alochtonous genotypes of forest tree species e.g. „adamovský " larch etc. The preservation of some rarer forest tree species, such as wild cherry, wild pear, rowan, whitebeam, other service trees, and of trees not forming compact stands (maple, lime) is also considered important.

The preservation of forest resources and also the use of proper and genetically suitable seedlings by the new forest owners must be ensured not only by continuing education programmes, but mainly by the new Forest Act and Directives respectively, which should be agreed as soon as possible.

Support of common research needs is of importance. Necessary and urgent research tasks cover inter alia investigation of the influence of forestry silvicultural practices on the changes of the genetic structure of populations, the relationship between the genetic diversity measures and morphological and adaptive traits, development of long-term storage techniques of reproductive material, tissue cultures research, ecophysiology studies and provenance testing.

Last but not least, moral and financial support for people dealing with the forest problems is necessary, keeping in mind that the forest, whatever its current state, is an important part of the state welfare.

CHAPTER 8
Proposals for a Global Plan of Actions

8.1 PROPOSALS FOR FUTURE ACTIONS IN PGR

Our country is interested in participation in international efforts towards achieving:

- Collection and conservation of endangered germplasm (participation in international collecting missions).
- Establishment of a global system of base collections (under the auspices of FAO) and their safe duplications.
- Preparation of international (regional) databases in major crops.
- Further development of international (regional) crop networks for the effective evaluation and utilization of genetic resources (preferably in the most important or potentially significant species).
- Preparation of international research projects aimed at further progress in methods of conservation of PGR, seed physiology, fingerprinting of genotypes and methods of evaluation of PGR (and participation in such projects).
- Support for the Czech Republic and the Slovak Republic for the project „Establishment Transfer and Safe Duplications of PGR of Selected Species in the Czech and Slovak Republics“. This project could help both countries to fill the gaps in their collections since the division of the former Czechoslovakia and, at the same time, to develop an effective system of safe duplications of selected valuable materials.

In connection with the above-mentioned efforts and aims, we propose that the following additional measures be included in the Global Plan as important for the Czech Republic:

- Creation of international policies and legislation on PGR.
- Dissemination of information on PGR to all national communities.
- International training for young researchers and a scheme of further education for specialists in PGR.
- International Fund for PGR.

We propose the following essential activities as priorities in the Global Plan of Action:

- Safe conservation of existing collections.
- Rescue of endangered PGR in natural habitats.
- Evaluation of PGR for their better utilization.
- Better documentation of PGR for identification of duplicates.

8.2 PROPOSALS FOR FUTURE ACTIVITIES IN FGR

An important part of current forestry is the ending of restitution and ensuring the control of management of all forest stands by experts. The failure of such an approach will have a negative impact also on gene resources, bearing in mind that in unprofessionally managed forests overlogging can occur, as well as insufficient calamity clearcuts, negotiating of regeneration, and generaly deterioration of forest state and stability.

The creation of a functional system of state administration, an association with small owners, including expert consultations and control of management, instruments for motivation and compensation of forest owners´ interests will be of importance.

The measures mentioned above must be based on the new legislation reflecting social and economic changes, but respecting the forestry ecological approach in forest management.

Following common principles foresters must overcome the pressure of economic lobbies and/or too green ideas to be able to save our forests as the most important part of the environment and a heritage for future generations.

Basic targets:

- preservation and improvement of species variability,
- support of natural regeneration,
- education of foresters and the general public,
- movement towards the positions of nature protection bodies and foresters at all levels,
- rational use of gene resources.

Other targets:

- own forest seed material sourcesn,
- selection of valuable trees and populations not considering the species origin,
- closing of the programme of clonal archives which established the mountain spruce,
- similar for the broadleaves (according to region) - Scots elm and European white elm, sycamore maple, ash in higher elevations and detritic slopes, narrow-leaved ash, lime (large and small-leaved), speckled alder, service trees and wild cherry.

The national system for better forest seed use supposes innovation of "Directives for the certification and ensuring of reproductive material sources and its transfer" but it seems that the organization of forest seed supply under the changed conditions of forest ownership could be problematic. Also due to the fact that the creation of so-called Seed Inspection was not accepted into the last proposal of the Forest Act. Here is also a wide space for education and extension of information.

We believe that the benefits derived from the use of forest genetic resources are considerable; that is, only if the seeds of suitable provenances are used can we expect a higher quality and greater production of wood. We can also expect increasing stability of forest stands if whole spectrum of native species and their local populations are used.

APPENDIX 1
Growing Areas of Major Agricultural Crops in the Czech Republic (in 1994)

Crops	Growing area 000 ha	Index 94/92	Index 94/93	% of growing area of crops on arable land
Winter wheat	765.1	1.04	1.01	24.5
Spring wheat	23.0	2.05	1.66	1.5
Rye	78.9	1.20	1.18	2.5
Winter barley	184.4	0.93	0.95	5.9
Spring barley	459.6	1.05	1.03	14.7
Oats	76.7	1.13	1.14	2.5
Tritikale	14.9	0.69	0.87	0.5
Corn-maize	29.9	0.90	1.01	1.0
Other cereals	6.4	1.70	1.75	0.2
Cereals - total	**1,660.3**	**1.05**	1.03	53.3
Peas	62.4	0.81	0.73	2.0
Legumes - total	**72.3**	**0.79**	0.77	2.3
Potatoes	76.8	0.69	0.73	2.5
Sugar beet	91.2	0.73	0.85	2.9
Fodder beet	12.4	1.20	1.04	0.4
Root crops - total	**182.8**	**0.73**	**0.80**	**5.9**
Rape	190.7	1.40	1.14	6.1
Sunflower	16.2	1.5O	1.54	0.5
Poppy	29.3	2.36	2.95	0.9
Oil crops - total	**250.5**	**1.50**	**1.29**	**8.0**
Flax	11.0	1.12	1.41	0.4
Technical crops - total	**269.9**	**1.44**	**1.30**	**8.7**
Maize for silage	272.3	0.83	0.90	8.7
Red clover	141.4	0.80	0.94	4.5
Alfalfa	146.6	0.93	1.01	4.7
Fodder plants - total	**886.9**	**0.86**	**0.92**	**28.5**

Crops	Growing area 000 ha	Index 94/92	Index 94/93	% of growing area of crops on arable land
Vegetable	34.3	1.04	0.97	1.1
Crops on arable land total	**3,117.6**	**0.98**	**0.99**	**100.0**
Hop gardens	11.4	-	-	0.3
Vineyard	15.4	-	-	0.4
Orchards and gardens	197.3	-	-	4.6
Meadows	603.0	1.0	1.08	4.2
Pasture	257.7	1.09	1.08	6.1
Agricultural land	4,253.5	1.02	1.09	100.0
Forests	2,629.0			
Ponds	55.0			
Other water area	15.9			
Build areas	20.0			
Other areas	144.0			
Total area of Czech Republic	**7,886.0**			

(source: ČSN VÝKAZ 3-01)

APPENDIX 2
Wild Relatives and Ancestors of Cultivated Plants Growing in the Territory of the Czech Republic

Cereals - Triticeae	
Aegilops L.	occasionally occurs as a temporary introduction
Agropyron cristatum (L.) GAERTN.	on steppes in thermophytic regions
Avena fatua L.	weed in cereals
Elymus caninus L.	scattered in open woodlands
Elytrigia repens (L.) DESV.	synanthropic, weedy
Hordelymus europaeus (L.) JESSEN in HARZ	scattered in natural vegetation
Hordeum L.	wild synanthropic
Secale sylvestre HOST	wild, rarely on river deposits/ in the mountains
Thinopyrum intermedium (HOST) BARKW, DEWEY	in thermophytic natural vegetation or weedy
Food legumes	
Lathyrus sativus L.	rarely available in S. Moravia, escaped
Lupinus L.	often escaped from cultivation
Vicia (Faba) narbonensis L.	ancestor, scattered in warmer regions
Vicia pannonica CRANTZ	wild forms available in thermophytic regions
Vicia sativa L.	wild and escaped forms
Vicia villosa ROTH.	wild forms available in thermophytic regions

Vegetables

**Allium* L.	wild related species widely distributed
Atriplex hortensis L	escaped from gardens or synanthropic plant
Brassica L.	escaped from cultivation and may be itrogressed with wild spp.
Cichorium intybus L.	direct ancestor widely distributed
Daucus carota L.	direct ancestor widely distributed
Foeniculum vulgare MILL.	may occur in thermophytic regions
Helianthus tuberosus L.	escaped from gardens or synanthropic plant
Lactuca serriola (L.) TORN., L.sativa L.	direct ancestor widely distributed
Pastinaca sativa L.	direct ancestor widely distributed
Petroselinum hortense HOFFM.	escaped from gardens or synanthropic plant
Portulaca oleracea L.	synanthropic plant widely distributed in warmer reg.
Rumex L.	synanthropic plant
Valerianella L.	weedy or synanthropic plant

Oil plants

Brassica L.	scattered plants escaped from cultivation and may be introgressed with wild spp.
Papaver somniferum L.	very interesting types escaped from cultivation especially in Moravia, various seed colour, shape of capsules
Raphanus sativus L.	scattered plants escaped from cultivation and may be introgressed with wild spp.
Sinapis alba L.	wild ancestor, weedy

Grape vine	
Vitis vinifera L.	old landraces escaped from cultivation in old abandoned vineyards
Vitis sylvestris C.C.GMEL.	wild species rarely in river open woodlands

Industrial plants	
Cannabis sativa L.	escaped from cultivation in ancient times
Humulus lupulus L.	wild species climbing on scattered bushes
Linum usitatissimum L.	escaped from cultivation in ancient times
**Linum* L.	wild species in meadows, one protected

Alternatives cereals	
Amaranthus L.	wild weedy species, synanthropic
Echinochloa BEAUV.	thermophytic serious weed
Fagopyrum esculentum MOENCH.	escaped from cultivation
Setaria BEAUV.	thermophytic wild and weedy species

Fruit woody plants

Wild related species occur widely in landscape, spontaneous trees and shrubs as original landraces escaped from cultivation and their progeny, often intogressed with wild species occur generally.

Aronia melanocarpa (MICHX.) ELLIOT

Cerasus avium (L.) MOENCH

Cerasus fruticosa P. MILLER

Cerasus vulgaris P. MILLER

Cornus mas L.

Corylus avellana L.

Cydonia P. MILLER

Grossularia uva-crispa (L.) MILL.

Malus domestica BORKH.

Fruit woody plants

Malus sylvestris P.MILLER

Mespilus germanica L.

Morus L.

**Oxycoccus* HILL

Prunus cerasifera EHRH.

Prunus domestica L.

Pyrus L.

Ribes L.

Ribes nigrum L.

Rubus fruticosus agg.

Rubus idaeus L.

Sambucus L.

Sorbus aucuparia L.

Sorbus L.

Vaccinium vitis-idaea L.

Grasses

Wild species collected only in certain regions especially in Moravia great possibilities for collecting within the whole Czech Republic.

Agrostis canina L.

Agrostis capillaris L.

Agrostis gigantea ROTH

Agrostis stolonifera L.

Alopecurus L.

Anthoxanthum L.

Arrhenatherum elatius (L.) PRESL

Avenella flexuosa (L.) DREJER

Brachypodium BEAUV.

Grasses

Briza L.

Bromus s.l.

Calamagrostis ADANS.

Cynosurus L.

Dactylis L.

Deschampsia caespitosa (L.) BEA

Festuca arundinacea SCHREB.

Festuca ovina L. s.l.

Festuca pratensis L.

Festuca rubra L. s.l.

Helictotrichon BESSER

Hierochloe R.BROWN

Holcus L.

Koeleria PERS.

Lolium perenne L.

Melica L.

Milium L.

Molinia SCHRANK

Phalaris L.

Phalaroides arundinacea (L.) RAUSCHERT

Phleum L.

Phragmites ADANS.

Poa L.

Puccinellia PARL.

Sesleria SCOP.

**Stipa* L.

Trisetum PERS.

Aromatic and medicinal plants

Wild species freely available on meadows and woodlands, in thermophytic regions and in the mountains, some of them are rare or protected, there are cultivated landraces in some of them.

Achillea millefolium L.

**Aconitum napellus* L.

Acorus calamus L.

**Adonis vernalis* L.

Agrimonia L.

Armoracia GAERTN., MEYER et SCHERB.

Alchemilla L.

Althaea officinalis L.

Anthemis L.

Anethum L.

Archangelica L.

Arctium L.

**Arctostaphylos* ADANS.

Aristolochia L.

**Arnica* L.

Artemisia L.

Asperula L.

Atropa L.

Bistorta (L.) ADANS.

Borago L.

Calendula officinalis L.

Carum L.

Centaurium HILL

Chamomilla recutita (L.) RAUSCHERT.

Chelidonium L.

Aromatic and medicinal plants

Cicuta L.

Centaurea L.

Cnicus benedictus L.

Colchicum autumnale L.

Conium L.

Convallaria majalis L.

Coriandrum L.

Corydalis VENT.

Datura stramonium L.

Digitalis L.

**Drosera* L.

Equisetum L.

Erigeron L.

Euphrasia L.

Filipendula P.MILLER

Foeniculum vulgare MILLER

Fumaria L.

Galega officinalis L.

Galium L.

**Gentiana* L.

Glycyrrhiza L.

Hepatica MILLER

Herniaria L.

Hyoscyamus L.

Hypericum L.

Hyssopus L.

Inula L.

Aromatic and medicinal plants

**Iris* L.

Lamium L.

Lavandula angustifolia MILLER

Levisticum HILL

Linaria MILLER

Majorana MILLER

Marrubium L.

Malva L.

Melissa L.

Mentha L.

**Menyanthes* L.

**Nasturtium* R.BROWN.

Nigella L.

Nuphar SMITH

Ocimum L.

Origanum L.

Petasites MILL.

Pimpinella L.

**Pinguicula* L.

**Primula* L.

Plantago L.

Potentilla L.

Pulmonaria L.

Rhodiola L.

Rosmarinus L.

Ruta L.

Salvia L.

Aromatic and medicinal plants

Saponaria L.

Satureja L.

Sedum L.

Silybum ADANS.

Solanum dulcamara L.

Solidago L.

Stachys L.

Symphytum L.

Tanacetum vulgare L.

Thymus L.

Trigonella foenum-graecum L.

Tussilago L.

Valeriana L.

Verbascum L.

Fodder plants

Wild species generally distributed, some of them rare; it is a unique wide gene pool available for collecting; already collected samples only from certain regions, especially from Cental Moravia.

**Astragalus* L.

Anthyllis L.

Coronilla L.

Dorycnium MILLER

Galega L.

Genista L.

Chamaecytissus LINK.

Lotus L.

Medicago L. (other species)

Fodder plants

Medicago lupulina L.

Medicago sativa L.

Medicago x varia MARTYN

Melilotus MILLER

Onobrychis MILLER

Ononis L.

Ornithopus L.

Tetragonolobus SCOP.

Trifolium hybridum L.

Trifolium L.

Trifolium pratense L.

Trifolium repens L.

Trigonella L.

Ornamental Plants

Rarely in steppes, meadows, bushes, woodlands, the most of them are protected, often growing in national parks and protected regions.

**Adonis vernalis* L.

Andromeda polifolia L.

**Anemone sylvestris* L.

**Arum maculatum* L.

Aster alpinus L.

Campanula glomerata L.

Colchicum autumnale L.

Convallaria majalis L.

**Cyclamen europaeum* L.

**Cypripedium calceolus* L.

**Daphne mezereum* L., *D. cneorum* L.

Ornamental Plants

**Dictamnus albus* L.

**Erica carnea* L.

**Erythronium dens-canis* L.

**Fritillaria meleagris* L.

**Galanthus nivalis* L.

**Gentiana asclepiadea* SCOP.

Gladiolus imbricatus L. G. paluster GAUD.

Hedera helix L.

Helianthemum nummularium (L.) MILL.,*H. canum* (L.) BAUMG.

**Iris* L.

**Ledum palustre* L.

**Leucojum vernum* L.

**Crocus heuffelianus* HERB.

**Lilium martagon* L., *L bulbiferum* L.

Lupinus polyphyllus LINDLEY

**Nymphaea alba* L., *N. candida* PRESL

**Nymphoides peltata* (GMEL.) KTZE.

**Primula* L.

**Pulsatilla* L.

**Rosa gallica* L.

**Trollius europaeus* L.

* protected species/within a genus

APPENDIX 3
The Oldest Czech and Slovak Cultivars still Released in the Czech Republic

Crop	Cultivar	Year of release
Vicia faba	Chlumecký	1928
Cichorium intybus	Špièák	1934
Trifolium pratense	Chlumecký	1935
Festuca rubra	Táborská	1937
Phleum pratense	Větrovsky	1937
Brassica oleracea convar. capitata	Pourovo polopozdní	1939
Agrostis stolonifera	Rožnovský	1940
Arrhenatherum elatius	Rožnovský	1940
Cynosurus cristatus	Rožnovská	1940
Daucus carota	Višňovská žlutočervená	1940
Festuca pratensis	Rožnovská	1940
Lolium multiflorum var. westerwoldicum	Rožnovský	1940
Poa palustris	Rožnovská	1940
Trisetum flavescens	Rožnovský	1940
Allium porrum	Elefant	1941
Althaea cannabina	Černá, krajová	1941
Artemisia dracunculus	Ruský krajový	1941
Asparagus officinalis	Iva	1941
Beta vulgaris ssp. vulgaris var. conditiva	Červená kulatá	1941

Crop	Cultivar	Year of release
Calendula officinalis	Plamen	1941
Daucus carota	Nanteská	1941
Digitalis lanata	Krajový	1941
Humulus lupulus	Lučan	1941
Lactuca sativa var. capitata	Altenburský	1941
Levisticum officinale	Magnus	1941
Lycopersicon lycopersicum	Sláva Poryní	1941
Melissa officinalis	Citra	1941
Mentha piperita	Perpeta	1941
Petroselinum crispum convar.vulgare	Kadeřavá	1941
Raphanus sativus var. major	Podlouhlá bílá	1941
Raphanus sativus var. radicula	Rampouch	1941
Spinacia oleracea	Matador	1941
Valeriana officinalis	Širokolisty krajovy	1941
Vicia pannonica	Dìtenická panonská	1941
Vitis	Neuburské	1941
Beta vulgaris var. crassa	Bučiansky Žl´tý válec	1943
Anethum graveolens	Pražsky jemný	1944
Allium cepa	Všetana	1946
Allium schoenoprasum	Pražská	1946
Brassica oleracea conv.acephala v. gongylodes	Kozmanova modrá	1946
Cichorium endivia	Eskariol zelený	1946
Coriandrum sativum	Hrubčicky	1946
Cucumis sativus	Mělnické	1946
Foeniculum vulgare	Moravsky	1946
Onobrychis viciifolia	Višňovsky	1946

Crop	Cultivar	Year of release
Pastinaca sativa	Dlouhy bíly	1946
Brassica oleracea conv. capitata v. sabauda	Předzvìst	1948
Lotus corniculatus	Malejovsky	1950
Melilotus alba	Krajová	1950
Solanum tuberosum	Blaník	1950
Trifolium repens	Víglašská	1950
Agrimonia eupatoria	Krajový	1952
Althaea officinalis	Moravský	1952
Archangelica officinalis	Jizerka	1952
Cnicus benedictus	Krajový	1952
Cucurbita maxima	Veltruská obrovská	1952
Inula helenium	Goliáš	1952
Levandula angustifolia	Krajová	1952
Malva mauritiana	Krajový	1952
Marrubium vulgare	Moravský	1952
Matricaria recutita	Bohemia	1952
Phaseolus vulgaris var. vulgaris	Dětenická	1952
Salvia officinalis	Krajová	1952
Thymus vulgaris	Krajový	1952
Trigonella foenum graecum	Krajová	1952
Verbascum densiflorum	Zlata	1952
Corylus avellana	Hallská obrovská	1954
Cydonia oblonga	Champion	1954
Fragaria	Rujana	1954
Malus	Průsvitné letní	1954
Mespilus germanica	Holandská	1954

Crop	Cultivar	Year of release
Prunus amygdalus	Sladkoplodá krajová	1954
Prunus armeniaca	Mad'arská	1954
Prunus avium subsp. duracina	Napoleonova	1954
Prunus cerasus	Morela pozdní	1954
Prunus domestica	Nancyská	1954
Prunus persica	Elberta	1954
Pyrus communis	Williamsova čáslavka	1954
Ribes uva crispa	Zlatý fík	1954
Rubus idaeus	Lloyd George	1954
Scorzonera hispanica	Libochovický	1954
Sorbus acuparia subsp. moravica	Moravský sladkoplodý	1954
Anthyllis vulneraria	Třebíčsky	1956
Alopecurus pratensis	Levočská	1958
Cannabis sativa	Rastislavické	1958
Brassica napus var. napobrassica	Milevský	1959
Helianthus tuberosus	Běloslupké	1959
Ribes sylvestre	Vierlandenský	1959
Rubus fruticosus	Wilsonův raný	1959
Trifolium hybridum	Táborský	1960
Allium sativum	Japo	1961
Apium graveolens var.secalinum	Jemný	1965
Brassica oleracea conv. oleracea v. gemmifera	Závitka	1965
Brassica oleracea convar. botrytis v. bortytis	Expres	1965
Lepidium sativum	Dánská	1965
Valerianella locusta	Deutscher	1965

Crop	Cultivar	Year of release
Galega officinalis	Běla	1966
Lolium perenne	Baèa	1966
Ocimum basilicum	Ohře	1966
Armoracia rusticana	Krenox	1967
Rheum rhabarborum	Jara	1967
Atropa bella-donna	Satan	1971
Juglans regia	Apollo	1971
Linum usitatissimum	Belan	1971
Lens culinaris	Lenka	1972
Trifolium incarnatum	Kardinál	1972
Phaseolus vulgaris	Magna	1973
Sorbus melanocarpa	Nero	1973
Galeopsis segetum	Jantar	1974
Dactylis glomerata	Milona	1975
Glycine max	Dunajka	1975
Panicum miliaceum	Unikum	1975
Ribes nigrum	Nigra	1975
Triticum aestivum (spring)	Jara	1975
Agrostis tenuis	Golf, Teno	1976
Brassica oleracea var. acephala	Inka	1976
Capsicum annuum	Koral	1976
Hyssopus officinalis	Blankyt	1976
Ribes niveum	Viktoria	1977
Carum carvi	Rekord	1978
Medicago sativa	Bobrava	1978
Pisum sativum	Smaragd	1978
Chamaemelum nobile	Doksan	1979

Crop	Cultivar	Year of release
Pisum sativum var. medullare	Mojmír	1979
Arctostaphylos uva-ursi	Arbuta	1981
Brassica rapa	Albina	1981
Deschampsia cespitosa	Meta	1981
Festuca arundinacea	Lekora	1981
Hordeum vulgare (spring)	Krystal	1981
Satureja hortensis	Pikanta	1981
Triticum aestivum (winter)	Košútka	1981
Arctium lappa	Herkules	1985
Papaver somniferum	Dubník	1985
Brassica napus var. napus	Solida	1986
Festuca ovina	Jana	1987
Ononis arvensis	Renata	1987
Poa pratensis	Krasa, lezanka	1987
Avena sativa	Adam, Zlaťák	1988
Plantago lanceolata	Libor	1988
Prunus amygdalus x Prunus persica	Kando	1988
Silybum marianum	Silyb	1988
Triticum durum .	Soldur	1989
Fagopyrum esculentum var. alata	Pyra	1990
Hordeum vulgare (winter)	Lunet	1990
Secale cereale	Albedo	1991
Sorbus acuparia x Crataegus sanquinea	Granatina	1992
Cichorium intybus	Decema	1993
Brassica oleracea var. acephala	Kadet	1944

APPENDIX 4
Accessions of Czech and Slovak Origin in Czech Collections

		Status				
Crop/crop group	No.of. Acc.	Wild	LV	cv.	breed.m.	not known
Avena	49	0	4	33	1	11
Hordeum	667	0	7	150	494	16
Secale	35	0	2	28	0	5
Triticum	650	0	56	164	430	0
xTriticale	143	0	0	1	142	0
tribe Triticeae	13	13	0	0	0	0
Cereals	**1557**	**13**	**69**	**376**	**1067**	**32**
Faba	20	0	0	12	8	0
Glycine	17	0	0	7	5	5
Lens	12	0	1	8	3	0
Lupinus	3	0	0	1	0	2
Phaseolus	37	0	3	22	5	7
Pisum	153	0	10	82	51	10
Vicia	41	0	8	17	15	2
Food legumes	**283**	**0**	**22**	**149**	**87**	**26**
Allium	185	0	134	42	9	0
Brassica oleracea	29	0	2	27	0	0
Capsicum	43	0	2	41	0	0
Cucumis	14	0	0	13	1	0
Lactuca	68	0	12	54	2	0
Lycopersicon	138	0	63	52	23	0

		Status				
Crop/crop group	No.of. Acc.	Wild	LV	cv.	breed.m.	not known
Vegetables	**477**	**0**	**213**	**229**	**35**	**0**
Cerasus	35	0	32	3	0	0
Corylus	2	0	2	0	0	0
Juglans	11	0	10	0	0	1
Malus	83	0	27	54	0	0
Prunus	33	0	28	5	0	0
Pyrus	30	0	11	19	0	0
Rubus	6	0	0	1	5	0
Fruit trees	**200**	**0**	**110**	**82**	**5**	**1**
Antirrhinum	5	0	0	5	0	0
Callistephus	51	0	0	51	0	0
Dahlia	95	0	0	92	3	0
Matthiola	24	0	0	22	2	0
Pelargonium	26	0	0	26	0	0
Petunia	39	0	0	37	2	0
Primula	23	0	0	23	0	0
Rhododendron	63	0	0	62	1	0
Salvia	23	0	0	13	10	0
Tagetes	4	0	0	4	0	0
Tulipa	16	0	0	16	0	0
Zinnia	4	0	0	4	0	0
Flowers	**373**	**0**	**0**	**355**	**18**	**0**
Medicago	34	0	0	8	26	0
Trifolium	40	0	0	8	32	0
Fodder legumes	**74**	**0**	**0**	**16**	**58**	**0**
Agrostis	2	0	0	2	0	0
Arrhenatherum	2	0	0	2	0	0

		Status				
Crop/crop group	No.of. Acc.	Wild	LV	cv.	breed.m.	not known
Dactylis	19	0	0	4	14	1
Festuca	19	0	0	10	8	1
Festulolium	8	0	0	5	3	0
Lolium	33	0	0	13	18	2
Phleum	13	0	0	2	11	0
Poa	32	24	0	4	2	2
Grasses	**128**	**24**	**0**	**42**	**56**	**6**
Brassica napus	15	0	0	9	6	1
Brassica rapa	2	0	0	2	0	0
Sinapis	3	0	0	3	0	0
Papaver somnif.	26	0	1	22	1	2
Helianthus annuus	2	0	0	2	0	0
Oil plants	**48**	**0**	**1**	**38**	**7**	**3**
Fagopyrum	2	0	0	0	0	2
Panicum	1	0	0	0	0	1
Zea	713	0	134	15	545	19
Other cereals	**716**	**0**	**134**	**15**	**545**	**22**
Aromatic and medic	95	66	0	19	6	4
Beta	83	0	0	24	54	5
Humulus	53	1	11	30	11	0
Nicotiana	47	0	1	17	28	1
Linum	407	0	11	19	376	1
Solanum tuberosum	98	0	0	98	0	0
Vitis	46	0	0	20	26	0
Other	**829**	**67**	**23**	**227**	**501**	**11**
TOTAL	**4685**	**104**	**572**	**1526**	**2379**	**101**

APPENDIX 5
List of Institutions Cooperating in the Framework of the Czech National Programme of Conservation and Utilisation of Plant Genetic Resources

Institution, location	Responsibility for activities (number of accessions in collections)
1. Research Institute of Crop Production, Gene Bank Drnovská 507 161 06 Praha - Ruzynì tel.: +42 2 360851 fax: +42 2 365228	Gene bank operation including long-term storage of all seed propagated species in CR maintained in active collection and selected valuable duplicated accessions in basic collection. Service for collections holders in CR (also for Slovakia based on agreement) providing of seed samples to users free of charge (only for non - commercial purposes). EVIGEZ GR information system service. Providing of output information to users. Coordination of the „National Programme...“ and participation of CR in international cooperation GR collections of wheat (including wild species), winter barley, sunflower, triticale, buckwheat, millet, sorghum and *Amaranthus*. In collections **12,712 accessions**
Gene Bank, workplace Olomouc Šlechtitelů 11 783 71 Olomouc - Holice tel.+fax: +42 68 5228355	Vegetables; spice, aromatic and medicinal plants. In collections **8,172 accessions** Part of them: International collection *Allium* **798 accessions** Maintenance vegetatively propagated species in field collection.
Workplace Karlštejn, Station of Viticulture 252 43 Karlštejn tel.: +42 311 94131	Grapevine (part of field collection) cooperation with other institutions. In field collection **216 accessions**

Institution, location	Responsibility for activities (number of accessions in collections)
2. Agricultural Research Institute ltd. Kroměříž Havlíčkova 2787 767 41 Kroměříž tel.: +42 634 426111 fax: +42 634 22725	GR collections of spring barley, oats, rye (working collection of wheat). In collections **4,886 accessions**
3. AGRITEC ltd. Šumperk Zemědělská 16 787 12 Šumperk tel.: +42 649 5411 fax: +42 5975	GR collections of pea, vetch, broad bean, lupine, flax and other legumes and fibre crops. In collections **3,884 accessions**
4. Research Institute for Potatoes ltd. Havlíčkův Brod Dobrovského 2366 580 03 Havlíčkův Brod tel.: +42 451 323 fax: +42 451 21578	Potatoes (including wild and related species). Long - term collection maintenance (field collection, *in vitro* conservation). In collection **1,771 accessions**
5. Research Institute for Fodder Plants, Troubsko Zahradní 1 664 41 Troubsko tel.: +42 5 43210145 fax: +42 5 321529	Alfalfa, clover, other fodder plants (including perspective wild forms). In collections **1,807 accessions**
6. OSEVA PRO ltd. Grassland Research Institute, Zubří 756 54 Zubří 698 tel.: +42 651 583195 fax: +42 651 583197	Grasses including wild ecotypes, phytocenoses of flowery meadows. In collections **1,747 accessions**

Institution, location	Responsibility for activities (number of accessions in collections)
7. SEMPRA a.s. Research Institute for Fruit Trees Growing and Breeding Holovousy 507 51 Holovousy tel.: +42 435 92121 fax: +42 435 92433	Cherry trees, sour cherry trees, strawberries, raspberries, plum trees, apple trees, pear trees, perspectively other fruit trees (transfer from Slovakian collections, if needed by other institutions abroad). Long - term maintenance of collections (field collections). In collections **1,969 accessions**
8. Hop Institute ltd. Žatec Kadaòská 2525 438 36 Žatec tel.: +42 397 2061-3 fax: +42 397 2064	Hop. Long - term maintenance of collection (field collection). In collection **260 accessions**
9. Research Institute for Ornamental Gardening Prùhonice 252 43 Prùhonice tel.: +42 2 67750027 fax: +42 2 67750023	Ornamental plants. Long - term maintenance of vegetatively propagated species. In collections **1,600 accessions**
OSEVA PRO ltd. Research Institute for Oilseed Crops, Opava Purkyňova 6 746 01 Opava tel.: +42 653 216560 fax: +42 653 216742	Oilseed crops, poppy. In collection **1,020 accessions**
11. Mendel University of Agriculture and Forestry, Brno Faculty of Horticulture Lednice na Moravì 691 44 Lednice na Moravì tel.: +42 627 98210 fax: +42 627 98411	Perennial vegetables, ornamental plants, apricot trees, plum trees, almond trees, if needed other thermophile fruit trees. Partial grapevine collection (cultivars bred out via interspecific crossing). Long - term maintenance of vegatatively propagated species. In collections **1,950 accessions**

APPENDIX 6
Survey of Genetic Resources Collections and Collection Curators

Institution (workplace) Collection	Collection curator
RICP, Gene Bank Praha-Ruzynì	
Cereals	
Triticum sp. (winter)	M.Vlasák
Triticum sp. (spring)	Z. Stehno
Hordeum sp. (winter)	M.Vlasák
xTriticale sp.	L. Dotlačil
wild species of *Triticeae* tribe	V. Holubec
• **Alternative cereals** *Fagopyrum* sp., *Sorghum* sp., *Panicum* sp., *Amaranthus* sp.	A. Michalová
• **Other groups**	
Helianthus annuus	V. Škaloud
Beta vulgaris var.altissima, *Beta vulgaris var. crassa, Zea mays*	M. Manev
RICP Praha, workplace GB Olomouc	
Aromatic and medicinal plants:	K. Dušek

- **Intensively:**

  Achillea milefolium, Althaea officinalis, Borago officinalis, Calendula officinalis, Carum carvi, Chamomilla recutita, Coriandrum sativum, Hyssopus officinalis, Lavandula sp., *Majorana hortensis, Mentha* sp., *Ocimum basilicum, Origanum vulgare, Plantago lanceolata, Ruta graveolens, Salvia officinalis, Satureja hortensis, Thymus vulgaris, Verbascum* sp.

- **Other genera actually, resp. perspectively:**

  Aconitum sp., *Acorus* sp., *Adonis* sp., *Agrimonia* sp., *Alchemilla* sp., *Ammi* sp., *Anchusa* sp., *Anthemis* sp., *Anethum* sp., *Anthriscus* sp., *Archangelica* sp.,

Institution (workplace)
Collection **Collection curator**

Arctium sp., *Arctostaphyllos* sp., *Aristolochia* sp., *Arnica* sp., *Artemisia* sp., *Asperula* sp., *Atropa* sp., *Bellis* sp., *Betonica* sp., *Bryonia* sp., *Calluna* sp., *Capsella* sp., *Carlina* sp., *Centaurium* sp., *Centaurea* sp., *Chamaenerion* sp., *Chelidonium* sp., *Cicuta* sp., *Cnicus* sp., *Colchicum* sp., *Conium* sp., *Consolida* sp., *Convolvulus* sp., *Convallaria* sp., *Corydalis* sp., *Cynoglossum* sp., *Datura* sp., *Digitalis* sp., *Drosera* sp., *Epilobium* sp., *Equisetum* sp., *Erigeron* sp., *Eryngium* sp., *Euphrasia* sp., *Filipendula* sp., *Foeniculum* sp., *Fumaria* sp., *Galega* sp., *Galeopsis* sp., *Galium* sp., *Gentiana* sp., *Geranium* sp., *Geum* sp., *Glechoma* sp., *Helleborus* sp., *Hepatica* sp., *Herniaria* sp., *Helichrysum* sp., *Hyoscyamus* sp., *Hypericum* sp., *Inula* sp., *Iris* sp., *Imperatoria* sp., *Lamium* sp., *Levisticum* sp., *Linaria* sp., *Leonurus* sp., *Leucanthemum* sp., *Lithospermum* sp., *Lobelia* sp., *Lycopus* sp., *Lythrum* sp., *Malva* sp., *Marrubium* sp., *Melissa* sp., *Menyanthes* sp., *Nasturtium* sp., *Nepeta* sp., *Nerium* sp., *Nigella* sp., *Nuphar* sp., *Petasites* sp., *Pimpinella* sp., *Pinguicula* sp., *Potentilla* sp., *Polemonium* sp., *Primula* sp., *Pulmonaria* sp., *Pyrola* sp., *Rosmarinus* sp., *Rhodiola* sp., *Rubia* sp., *Saponaria* sp., *Sanquisorba* sp., *Sanicula* sp., *Scutellaria* sp., *Sedum* sp., *Senecio* sp., *Silybum* sp., *Solanum dulcamara* sp., *Solidago* sp., *Stachys* sp., *Symphytum* sp., *Tanacetum* sp., *Taraxacum* sp., *Tussilago* sp., *Trigonella* sp., *Valeriana* sp., *Verbena* sp., *Veronica* sp., *Vinca* sp.

Vegetables — V. Chytilová

- *Brassica oleracea, Daucus carota, Beta vulgaris var. conditiva, Pastinaca* sp., *Petroselinum* sp., *Solanum melongena, Apium graveolens, Scorzonera* sp., *Spinacia sp.*

E. Křístková

- *Cucumis* sp., *Cucurbita* sp., *Lufa* sp., *Lagenaria* sp., *Momordica sp. + other Cucurbitaceae; Lactuca, Cichorium sp.*

J. Losík

- *Lycopersicon* sp., *Physalis* sp., *Pisum sativum* (hort.), *Phaseolus vulgaris* (hort.)

P. Havránek

- *Allium* sp., *Nicotiana sp*

H. Stavělíková

- *Capsicum annuum*

- **alternative vegetables** — P. Havránek

- *Amaranthus* sp. *(vegetable forms), Arracacia xanthorrhiza, Lepidium meyenii, Mirabilis expansa, Oxalis tuberosa, Polymnia somnifolia*

Institution (workplace)
Collection **Collection curator**

RICP Praha, Reseach Station of Viticulture Karlštejn
Grapevine M. Hubáčková

Vitis vinifera L.

Agricultural Research Institute, Kroměříž Ltd.
Cereals

J. Milotová

Hordeum sp. (spring)

F. Macháň

Avena sp.

F. Macháň

Secale sp.

Z. Kryštof

(Triticum sp. - working collection)

AGRITEC Ltd., Šumperk
Legumes M. Hýbl

Pisum sp. *(field), Glycine* sp., *Lens* sp., *Phaseolus* sp. *(field), Cicer, Vicia* sp., *Faba* sp., *Lupinus* sp. *Lathyrus sativus*

Fibre crops M. Pavelek

Linum sp., Cannabis sp.

Research Institute for Potatoes Ltd., Havlíčkův Brod
Potatoes J. Domkářová

Solanum tuberosum

- **perspective species of** *Solanum* **genus**

J. Frček

S. muricatum, S. quitoense

OSEVA PRO, Ltd. Research Institute for Fodder Plants Troubsko
Forage crops J. Pelikán

Medicago sativa

I. Zapletalová

Trifolium pratense, T. repens

Institution (workplace)
Collection **Collection curator**

- **marginal species of forage legumes viciaceae** I. Zapletalová

  Trifolium incarnatum, T. hybridum, Melilotus albus, Anthyllis vulneraria, Coronilla varia, Lotus corniculatus, Onobrychis viciifolia

- **other forage crops** I. Zapletalová

Phacelia tanacetifolia, Malva verticillata (Borago, Carthamus)

- **perspective forage crops** J. Pelikán

  Astragalus glycyphyllus, A. cicer, Medicago lupulina, Galega officinalis, G. orientalis, Trigonella foenum-graecum, T. coerulea, Lotus ornithopodioides, Cicer arietinum

OSEVA PRO Ltd., Grassland Research Station Zubří

Grasses

- **intensively** M. Ševčíková

  Lolium sp., Festuca sp., Poa sp., Arrhenatherum elatius, Agrostis sp., Alopecurus sp., Bromus sp., Dactylis sp., Phleum sp., Trisetum flavescens

- **other collections** M. Ševčíková, P. Šrámek

  Anthoxantum sp., *Apera* sp., *Avelnella* sp., *Briza* sp., *Brachypodium* sp., *Calamagrostis* sp., *Cynosurus* sp., *Danthonia* sp., *Deschampsia* sp., *x Festulolium* sp., *Helictotrichon* sp., *Holcus* sp., *Koeleria* sp., *Melica* sp., *Milium* sp., *Molinia* sp., *Nardus* sp., *Phalaris* sp., *Phalaroides* sp., *Phragmites* sp., *Puccinelia* sp., *Stipa* sp., *Sesleria* sp.

- **ornamental species** M. Ševčíková

  Cortaderia sp., *Lagurus* sp., *Miscanthus* sp., *Polypogon* sp.

SEMPRA a.s., Research Institute for Fruit Trees Growing & Breeding, Holovousy

Ffruit trees F. Paprštein

Malus domestica, Malus sp., *Pyrus communis, Pyrus* sp., *Cerasus avium, Cerasus vulgaris, Prunus domestica, Prunus* sp., *Ribes* sp., *Cydonia* sp., *Sorbus* sp., *Aronia* sp., *Rubus idaeus, Rubus fruticosus, Grossularia uva-crispa, xNigrolaria* sp., *Fragaria* sp., *Juglans* sp., *Corylus* sp., *Vaccinium* sp.(american cv.)

Institution (workplace)
Collection **Collection curator**

Hop Institute Ltd., Žatec

hop

F. Beránek, A. Rígr

Humulus lupulus

Research Institute for Ornamental Gardening, Průhonice

Flowers:

- **generatively propagated** V. Benetka

  Ammi majus, Bupleurum griffithi, Craspedia globosa, Didiscus caeruleus, Erigeron karvinskianus, Eucalyptus sp., *Helianthus debilis, Lobelia erinus, Marrubium vulgare, Polygonum capitatum, Vaccaria hispanica*

- **vegetatively propagated** V. Petrová

  Tulipa sp., *Gladiolus* sp., *Dahlia* sp.

- **annuals** E. Petrová, H. Urbánek

  Argyranthemum sp., *Asteriscus* sp., *Bidens* sp., *Brachycome* sp., *Calceolaria* sp., *Cuphea* sp., *Felicia* sp., *Gamolepis* sp., *Gazania* sp., *Heliotropium* sp., *Heterocentron* sp., *Impatiens* sp., *Lantana* sp., *Lotus* sp., *Lysimachia* sp., *Mimulus* sp., *Osteospermum* sp., *Petunia* sp. *(Surfinia), Plectanthus* sp., *Portulaca* sp., *Scaveola* sp., *Solanum* sp., *Sutera* sp., *Verbena* sp., *Wedelia* sp.

- **ornamental trees and bushes**

  V. Benetka

  Rosa sp.

  I. Tábor

  Rhododendron sp., *Quercus* sp., *Fagus* sp., *Malus* sp. (ornamental cv.)

OSEVA PRO Ltd., Research Institute for Oilseed Crops Opava

Oilseed crops

J. Havel

Brassica napus, Brassica rapa, Brassica juncea, Brassica nigra, Sinapis alba, Papaver somniferum, Camelina sp., *Crambe* sp., *Eruca* sp.

Institution (workplace)
Collection **Collection curator**

Mendel University for Agriculture and Forestry, Faculty of Horticulture, Lednicena Moravì

Vegetables

K. Petříková

Asparagus sp., *Rheum* sp., *Armoracia rusticana, Glycyrrhiza glabra*

Flowers

F. Kobza

Canna sp., *Callistephus* sp., *Zinnia* sp., *Salvia splendens*

K. Petříková

Carthamus sp.

J. Pidra

Tagetes sp.

Fruit trees

Z. Vachůn

Armeniaca sp., *hybrids*

I. Oukropec

Persica sp., *Amygdalus* sp.

- **perspectively**

  Mespilus germanica, Sambucus niger, Cornus mas, Hippophae rhamnoides, Vaccinium vitis-idaea, Oxycoccus sp., *Actinidia* sp., *Castanea sativa, Lonicera edulis, Rosa pomifera*

Grapevine

J. Michlovsky, V. Holleinová

Interspecies hybrids *V. vinifera,*hybrids of wild *Vitis species* .

APPENDIX 7
Seed Collections Stored in the Gene Bank (as of 1.1. 1995)

Crop (group of crops)	Total number of accessions
Cereals	
Winter wheat	3.532
Spring wheat	3.295
Winter barley	1.148
Spring barley	3,36
Triticale	114
Rye	132
Oats	204
Maize	983
• **alternative cereals**	
(buckwheat, sorghum, Amaranthus)	69
wild species of tribe *Triticeae*	1.100
Cereals total	**10.913**
Legumes	
Peas	78
Bean	69
Soya	76
Lentil	93
Faba bean	113
Wetch	11
Lupin	16
Psophocarpus	326
Legumes total	**1.116**

Crop (group of crops)	Total number of accessions
Oilseed crops	
Rape	144
Mustard	12
Poppy	14
Sunflower	74
Oilseed crops - total	**244**
Vegetables	
Onion	112
Beet	23
Lettuce	219
Tomatoes	63
Brassica oleracea	33
Cucumber	10
other vegetables	53
Vegetables - total	**513**
Aromatic and medicinal plants	
Carum sp.	55
other aromatic plants	108
Aromatic and medicinal plants - total	**163**
Forages	
Alfalfa	196
Trifolium sp.	190
other forages	43
Forages - total	**429**
Grasses	
Dactylis sp.	43
Festuca sp.	169
Poa sp.	147
Lolium sp.	326
other grasses	23
Grasses - total	**708**

Crop (group of crops)	Total number of accessions
Flowers	
Callistephus sp.	61
Matthiola sp.	27
other flowers	132
Flowers - total	**220**
Beet	56
Flax	111
Tobacco	189
Seed samples in GB (without duplications)	**14.662**

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CZECH REPUBLIC