



UKRAINE:

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

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Note by FAO

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CHAPTER 1

Introduction to Ukraine and its Agricultural Sector

1.1 TERRITORY, RELIEF AND RIVERS OF UKRAINE

Ukraine is situated in the Eastern Europe in latitudes between 44-52 North; it stretches for more than 1,300 km from West to East for almost 900 km from North to South. Ukraine covers an area of 603,7 thousand sq. km. The larger part of Ukraine is occupied by plains (95%), only in the West and the South there are the Carpathian and the Crimean mountains. Such geographical position favours the development of agriculture at large, except for the mountainous areas mentioned above. Flat steppe and forest-steppe zones are very good for establishment of highly-mechanized agriculture. However, there are many gorges and gullies on the Ukrainian plaines, that's why prevention of soil erosion, application of contour-land-reclamation agriculture is one of the most important goals in nature conservation in Ukraine.

Rivers are the main water resources of Ukraine, more than a hundred of them being above 100 km in lengthwise. The largest rivers are the Dnieper, the Dniester, the Danube, the Southern Bug, the Seversky Donets and the Tissa. Most waterways belong to the basins of the Black and the Azov Seas.

The rivers and other inland waters of Ukraine (reservoirs, lakes, ponds, subterranean waters) are very important for water-supply and they are used as a source of energy. Some southern zones are short of rivers.

1.2 SOIL AND CLIMATIC CONDITIONS

Latitudinal zoning on the plains and altitudinal one in the mountains is typical of Ukrainian soils. Derno-podzolic soils are predominant in the northern regions. There is deficiency in humus and nutrient substances in those soils. But the application of organic and mineral fertilizers as well as lime application increases its fertility. The lowlands in the Polesye are occupied by meadow and meadow-swamp soils.



In the Forest-Steppe zone, especially in Volyn and Podolsk Hills, gray and dark-gray podzolized soils prevail. Ukraine is famous for its chernozem soils (44% of its territory), which are the most valuable gifts of nature. In the middle Forest-Steppe zone they are predominantly podzolized, they gradually change into typical chernozem southwards. Solid tracts of chernozem soils are deposited in the Steppe zone.

Dark chestnut and chestnut soils are typical of the southern seaside regions and the Northern Crimea.

Ukraine is situated in a temperate zone. Its climate is moderate-continental and only at the southern coast of the Crimea-subtropical, similar to Mediterranean. Climatic conditions of Ukraine are due to the influence of moderate atmospheric masses for the most part, however owing to the country's rather smooth relief some atmospheric masses from the tropics and the Arctic regions pass freely through the country. Due to cyclonic progress dull weather is settled in the country during winter and autumn; it often thaws; in summer the weather is cool and there are rains with thunderstorms. With the active progress of anti-cyclones in winter the weather is fine and frosty, in summer it is hot and cloudless. It's typical of the Ukrainian climate to grow more continental from west to east. Precipitation and air humidity over the plains are distributed for the most part in latitudinal direction. In the Carpathian and the Crimean mountains the climatic conditions change with altitude: air temperature and pressure decrease, the amount of rain precipitation increases, the wind speed grows.

The average temperature in January in the coldest month of the year is -7°C in the north-west and it ranges from $+2$ to $+4^{\circ}\text{C}$ at the southern coast of the Crimea. During separate years in winter considerable decreases of average monthly temperatures are possible, during some separate days in the northern and north-eastern regions the temperature ranges from -30 to -35°C . July is the warmest month, average temperature in the north and the north-west ranges from $+17$ to $+19^{\circ}\text{C}$ and in the southern regions and the Crimea from $+22$ to $+25^{\circ}\text{C}$.

In cold season when high pressure predominates in Ukraine, eastern and north-eastern winds blow in the East and in the South; southern, south-eastern and south-western winds blow in the West and in the North. In summer transfer of air masses from west and north-west is shaped. In Ukraine, especially in the steppe zone dust storms are quite frequent due to strong winds and hot dry winds in summer can do considerable damage to plants.

Precipitation distribution is irregular. The larger amount of rainfall is observed in the Carpathians (over 1,500 mm per year). Rainfall amount decreases from west to east and south-east. In western regions its amount reaches 700 mm per year, at the seaside of the Black and the Azov seas about 300 mm. The annual



rainfall is 450-500 mm for the larger part of plains, that is sufficient on the whole for normal development of agricultural crops. Drought conditions are quite often for southern and south-eastern regions.

The peculiar feature of the Ukrainian climate is its considerable fluctuations in temperature year in year out. Territorial differences in climatic conditions have an influence on zonal specialization of agriculture.

1.3 POPULATION OF UKRAINE

Ukraine is one of the densely populated countries of Europe. The total population is 52 mln people, most of them (67%) live in cities and towns. In Ukraine there are 436 cities and over 900 settlements of urban type. Kiev, the capital of Ukraine, is the largest city, in which more than 2,6 mln people live. Kharkov is the second city in Ukraine as to its population (more than 1,6 mln people). Over 1 mln people live in Dnepropetrovsk, Odessa and Donetsk. The density of population in Ukraine averages 86 people per 1 km². The more densely populated regions are Donetsk, Lougansk, Dnepropetrovsk industrial south-eastern ones. Among economical regions the highest density of population is in Donetsko-Pridneprovsky region. There is also high density of population in the Forest-Steppe part of the South western economical region in Ivano-Frankovsk, Lvov and Chernovtsy regions, in particular. In these regions as well as in Zakarpatye and Ternopol ones more people live in the countryside (over 70 people per 1 km²). Few people live in the Polesye and the Steppe region (less than 30 people per 1 km²). Populated areas in the countryside of different geographical zones differ considerably between each other. In the Polesye they are small, the largest of them are in the Steppe zone.

1.4 FEATURES OF PLANT PRODUCTION

The agro-industrial complex of Ukraine at present is undergoing considerable changes in connection with a transition to a market economy and a break of economic relations first of all with the republics of the former USSR. On the basis of a rather high standard of development of productive forces and favourable natural conditions in Ukraine in 1990 there were produced 60% of sugar, 30% of vegetable oil, 30% of vegetables, 28% of potato, 21% of grain, 25% of



animal oil, 24% of meat, 30% canned diary products out of All-Union production. A considerable amount of sugar (50%), vegetable and animal oil, canned diary and meat products were exported to Russia and other republics.

The agricultural production of Ukraine has been grounded on different forms of property on means of production. The principal form of production is represented by large collective, state farms and agricultural associations. Farmer's movement has been recently emerged and various agricultural leases are also being concluded in the countryside.

The total area of Ukraine is 60 mln ha of which 42,4 mln ha is the land in agricultural use or about 70%, including plough land (57%), hayfields (4%), pastures (8%), orchards and vineyards (about 2%). In the country both plant and animal production are well developed, farm produce of which constitutes a half of national income in the period of gradual transition to private land ownership.

Crop production in Ukraine includes all its major branches: field-crop cultivation, grass-farming, vegetable, fruit and nut production. Grain production is of a prime importance in field-crop cultivation. It is combined with cultivation of technical, fodder, vegetable, melon and gourd cultures and potato.

In the structure of crop areas grain crops account for 46.6%, technical for 11.7%, potato, vegetable, melon and gourd for 6.6%, fodder crops for 35.1%. Grain production is 35-46 mln tonnes every year. The major grain crop is winter wheat; valuable crops are barley, maize, rye, oats. Cereal crops such as buckwheat, millet and rice play an important role in people's nutrition. The following leguminous plants as pea, bean, vetch, fodder lupine, soya are high- protein food and forage crops.

The main technical crop in Ukraine is sugar beet (28-30 mln.t.) The area under sugar beet is about 50% of all the sown area under technical crops. At present sugar is the chief product at purchasing fuel and energy, building materials, fertilizers, etc., therefore the cultivation of sugar beet is very important for all agricultural production management.

The area under sunflower is 40% of the total area under technical crops. It is generally grown in the Steppe and the Forest-Steppe, 1.6-2.1 mln. tonnes of oil seeds are harvested. It's one of the major agricultural crops in the conditions of market relations. Rape the other oil-bearing crop is grown in the Polesye and the Forest-Steppe, crown flax, peanut and palmcrist are grown in the Steppe. Fiber flax is sown in the Polesye and the Pricarpatye. The sown areas are reduced due to low purchase prices for flax fiber. Hemp is chiefly grown in Chernigov and



Soumy regions. The major volatile-oil-bearing plants and herbs of Ukraine are brandy mint, coriander, caraway, sage, rose, lavender, *Nepeta L.*, calendula, camomile, *Datura Stramonium L.*, and others.

Vegetable-growing is spread all over the territory of Ukraine. Here they grow over 40 species of vegetables, such as: cabbage, tomatoes, pepper, cucumber, red beet, carrot, onion, garlic, radishes and others. Vegetable-growing based on open and protected ground is being developed, but relative to energy crisis the number of operating green-houses is growing short.

In Ukraine 6% of sown areas are under potato growing. One third of the area under potato is in the Polesye where the highest yields are gathered, almost a half of the area is in the Forest-Steppe zone.

Cucurbits, such as: water-melons and melons, are mainly grown in the southern steppe regions (Kherson, Nikolaev, Odessa regions).

Fruit-growing is developed in the right bank Forest-Steppe (especially, in the Pridnestrovye); in the left bank, where there are large industrial centres, in the Crimea and Zakarpatye. Breaking-off in trade relations with the northern regions of Russia has a drastic effect on this branch of economy. Apple, pear, cherry, peach, apricot, grapes deliveries have been sharply reduced to these regions.

Berry fields with strawberries, currants, raspberries, gooseberries are grown in the Forest-Steppe and the Polesye. On the small plots near summer cottages good harvests of berries are gathered.

Vine-growing of Ukraine is centered in the south of the Steppe zone, the Crimea and Zakarpatye.

Planting new fruit gardens and making new berry-fields has been practically ceased owing to economical crisis.

The volumes of production in plant growing branch on the whole meet the requirements of the domestic market in major food-stuffs. However, the problems of quality of agricultural produce, its transportation, processing and storage have been remained unsolved.

In Ukraine the precise system of measures has being carried out to provide collective and private farms with high-quality stock seeds. After the inclusion of varieties and hybrids into the "List of plant varieties of Ukraine", they set the things going: the producers are supplied with certified seeds. Seed production and sale are accomplished by Originators (i.e. breeding institutions), seed-growing farms, agricultural firms. The network of such agricultural institutions and farms



ensures the production of the sufficient quantities of high quality seeds. The state-cooperative production association "Ukrainian Seeds" organizes this work. The seeds of vegetables and cucurbits are supplied by "Sortsemovoshch" association, which provides agronomical services for seed growing farms, stores up and sales seeds.

The planting material of fruit and berry cultures is grown in special fruit crop nurseries.

The seeds of foreign varieties and hybrids, recognized for cultivation in Ukraine, are distributed through the representative firms. The most active companies in the Ukrainian seed market are: "PIONEER" (USA), "KWS" and "SEMUNDO" (Germany), "COOP DE PAU" and "RUSTICA PROGRAIN GENETIQUE" (France), "HILLESHOG" (Sweden) and others. However, a high price of seeds in the foreign firms and insufficient adaptability of these varieties to growth conditions are the limiting factors for their distribution in Ukraine.

In spite of well organized breeding and seed-growing activities in different regions of Ukraine one can find quite a lot of local varieties of vegetable, fruit-berry, nutfruit, herbs and ornamental cultures. Amateur gardeners keep and distribute this valuable germplasm.

Seeds and planting material can be easily bought at the market- place. As the results of the collecting missions of the National Centre for Plant Genetic Resources of Ukraine to the Carpathians (1994) have shown, local farmers grow some valuable landraces (or farmers' varieties) of spring rye, *Faba vulgaris*, *Phaseolus vulgaris*, cucurbits, caraway, poppy, some old cultivars of maize and other cultures.

Before this expedition there was nothing known about spring rye cultivation in Ukraine. However, the attempts to collect *Triticum spelta*, *Triticum dicoccum*, *Hordeum sativum* var. *nudum* (hulless barley), being cultivated there, were unsuccessful. It serves again as a striking illustration of urgent measures to be taken for conservation of indigenous plant genetic resources.



CHAPTER 2

Indigenous Plant Genetic Resources

2.1 INDIGENOUS PLANT GENETIC RESOURCES. NATURALLY OCCURRING GENE POOL

Plant diversity in Ukraine is due to natural-climatic zoning, characterized by certain heat, moisture and solar balance, as well as it is closely related to soil surface, a type of relief, height above sea level. Over 30 thousand plant species grow in Ukraine, of which 4.5 thousand present higher sporiferous and floriferous. About 250 cultures are being grown and over 650 species are used as medicinal, food, forest, forage, ornamental and other plants, which are laid in the places of their natural occurrence.

Natural vegetation has greatly been changed under the influence of human agricultural activity. Virgin steppes were ploughed up long ago, a greater part of forests was cut down, 3 mln. ha of swamped land were dried and 2 mln. ha of ploughed land were irrigated. However, in game reserves, preserves, national parks and other protected territories all the diversity of animate nature is conserved.

Natural vegetation in Ukraine covers 19 mln. ha or about one third of its territory, including forests (8.6 mln. ha), hayfields (above 2 mln.), pastures (5 mln.), swamps (0.8 mln.). Plough lands occupy 34.3 mln. ha, orchards, vineyards and other perennial plantations 1.1 mln. ha.

Forests in Ukraine cover 14% of its territory, most of them are in the southwestern economic region, especially in the Carpathians and the Polesye. There are few forests in the Donetsko-Pridheprovskyi and the Southern economic regions. Here field and soilprotecting forest shelter belts, green zones of cities, forest plantations along the rivers prevail.

Availability of indigenous plant genetic resources is closely connected with peculiarities of vegetation in separate regions and high-altitude zones of Ukraine.

In the flat part of Ukraine we distinguish 3 geographical zones: the Polesye, the Forest-Steppe and the Steppe.



Ukrainian Polesye

The zone of mixed forests in Ukraine occupies the northern part of its territory. It is called the Ukrainian Polesye and it covers 14.5% of its territory (113.5 thousand km²).

Considerable moistening favoured growth of meadow, swampy and forest vegetation. The Polesye is one of the most important regions as to forest resources of Ukraine. Pine-oak forests predominate on its larger part. Oak-hornbeam forests grow on derno-podzolic or gray-podzolized soils in the southern part. On the left bank oak-line-tree forests are spread. There are many mushrooms in the Polesye forests.

The largest area of swamps in Ukraine is in the Polesye. These are lowland swamps with rich and diverse plant cover. Among arboreal species there predominate birch, alder-trees; pine-trees occur rarely, among bushes willow-trees. Rush, reed mace, sedge, horse-tail, *Laburnum* Medik. and others are typical grass vegetation; among family *Hypnaceae* from sort *Hypnum* order Bryales prevail. In the Polesye's swamps valuable berries, like cran-berries and in the forests huckle and bog bil-berries are laid in. Grassland-boggy and peat-boggy soils in the Polesye were drained by 45 and 69% respectively.

Forest-Steppe

The Forest-Steppe zone is situated to the south from the zone of mixed forests and stretches widely for 250-350 km from west to east and occupies 202.8 thousand km² (33.6% of its territory).

The peculiar feature of the zone is alternation of vast steppe areas with strips of broad-leaved forests. Forests and woods occupy about 15% of the zone. They are more regularly met in the western part of the Forest-Steppe. Here beech, oak-pine, oak-hornbeam, alder forests grow, the number of such trees as oaks, hornbeams and limes increases easternwards. Sycamore maples and smooth leaved elms are also met. On the left bank of the zone oak-lime forests are spread. Pine forests grow on sandy terraces. Dogrose, hawthorn, blackhorn, elder and other bushes grow on the hills and gullies. Grass land vegetation is very diverse here: they are cereal and leguminous perennial grasses, sedge grasses, etc.

Steppe

The Steppe zone is situated in the southern part of Ukraine and stretches for 1,100 km from south-west to north-east and for 500 km from north to south to the Black and the Azov seas and to the foothills of the Crimeans. The total area is 240.2 thousand km² (about 40% of the Ukrainian territory). As to its soil-climatic conditions this zone is divided into the northern, central, southern and dry Steppe.



Formerly steppes were covered with natural grass vegetation. At present they are ploughed up. Natural vegetation is preserved on the slopes of gullies, at the foothills' regions of the Crimea and in some reserves. Such plants as: arrow grass (*Stipa spartea*), *Festuca sulcata*, *Agropyron Gaerth.*, *Koeleria Pers.*, wormwood, are typical for the Steppe zone. In flood- lands of the rivers swamps with brush-woods of rush stretch.

Ukrainian Carpathians

The natural complex of the Ukrainian Carpathians consists of the Pre-Carpathian hilly plain, mountain ranges and Zakarpatye low land, it occupies 37 thousand km². Forests cover 40% of its area, natural forage lands 35%, agricultural land 25%. In the Ukrainian Carpathians there are more than 2 thousand higher sporiferous and flowering plants, 500 species of Musci and 860 species of Lichenes. Among flowering plants there are 70 tree species, 110 bush species, the remaining part grass vegetation. Five altitudinal vegetation belts can be singled out: 1) oak forests growing in foothills in Zakarpatye, height above sea level 100-580m, common and sessile oaks, beeches, hornbeams, ashes, elms, birches prevail; 2) beech forests (height 450-1,030 m) with strips of pure beech, fir-beech and fir-spruce-beech forests. This zone occupies 70% of the Ukrainian Carpathians' area; 3) spruce forests (up to 1,470 m height) with strips of pure spruce and mixed (fir and beech) forests in the undergrowth there is much blackberry, elderberry, in herbage-blackberry, cowberry; 4) the subalpestrine belt (1,200-1,600m), where *Pinus mugo*, *Juniper*, alder, blackberry, bog bilberry, rhododendron prevail; 5) an alpestrine belt, the so-called, the poloniny (1,800-1,850m), here the major areas are under grass vegetation: broom grasses (valuable forage lands), and sedge grasses, an alpine aster is often met.

The Prikarpatye is located between the valley of the Upper Dniester and mountains, here predominate meadow-forest natural complexes with brown and brownpodzolic soils. There is little agricultural land comparatively, there are considerably more natural hay-fields and pastures.

The Zakarpatye low land is a flat country with hills of volcanic origin. More than half of the low land's area is under hay-fields and pastures.

The Crimeans

The Crimeans are divided into 3 natural geographic zones. They are: the Foot-hills, the Main Range and the Southern coast of the Crimea. The Crimeans stretch for 150 km in length and up to 50 km in width along the Southern coast of the Crimean peninsula. The mountain vegetation is very diverse. The northern slopes are chiefly covered by oak and beech forests, the southern ones by separate forest tracts consisting of common and Crimean pine, oak and beech-trees. On the southern slopes of the Main Range and the Southern coast of the Crimea about 1,500 plant species, among them many relict and subtropical, grow.



2.2 WILD SPECIES AND WILD RELATIVES OF CROP PLANTS

Wild species and wild relatives of crop plants in Ukraine include practically all the groups of cultivated plants at present. It is peculiar that among those groups there are wild species and relatives of grain crops: wheat, barley, oats, rye, millet, *sorghum*.

Triticum boeticum Boiss.

Aegilops cylindrica Host.

Ae. geniculata Roth.

Ae. tauschii Coss.

Ae. triuncialis L.

Ae. biuncialis Vis.

Dasypyrum villosum (Coss. et Dur.) Borb.

Hordeum murinum L.

H. geniculatum All.

H. bulbosum L.

Taeniatherum crinitum (Schreb.) Nevski

These species grow in the Crimea and pre-Black Sea steppes of Ukraine and barleys are spread almost all over the territory of the Forest-Steppe and the Steppe of Ukraine.

Wild relatives of wheat are used for the transfer of valuable agronomic traits (immunity to diseases) to soft wheats by means of biotechnology. *H. bulbosum* is a highly efficient haplo-producer of *H. vulgare*.

On the basis of this technology a new commercial variety of spring barley Prairie has been developed.

Up to present cultured and wild relatives of rye have been practically less used: *Secale sylvestre* Host. and *S. cereale* L.; as well as oats:

Avena sativa L.,

A. fatua L.,

A. nuda L.;

millet:

Panicum miliaceum L.,

P. capillare L.;

sorghum:

Sorghum halepense L..



This is the list of wild species and their relatives for another groups of agricultural crops, grown in Ukraine:

Grain legumes:

Pisum sativum L.

Pisum elatius Bieb.

Lens ervoides (Brign.) Grande

L. nigricans (Bieb.) Webb. et Berth.

L. orientalis (Boiss.) Hand.-Mazz.

Technical crops:

Cannabis sativa L.

C. ruderalis Janisch.

Linum usitatissimum L.

L. humile Mill.

L. crepitans (Boenn.) Dum.

Beta trigyna Waldst. et Kit.

Humulus lupulus L.

Coriandrum sativum L.

Cichorium intybus L.

Technical crops are represented by meso, xero and hydro-phytic groups and spread all over the territory of Ukraine. A valuable forage grass, *Trifolium pratense L.*, predominates among perennial leguminous grasses in the northern and the western regions. The diversity of natural wild species makes available to introduce new varieties with high performance and quality in culture.

Among wild-growing perennial forage grasses of Ukraine the following ones are of great importance:

Medicago sativa L.

M. falcata L.

M. lupulina L.

Trifolium hybridum L.

T. repens L.

Melilotus albus Desr.

Onobrychus vicifolia Scop.

Lotus corniculatus L.

Phleum pratense L.

Alopecurus pratensis L.

Poa pratensis L.

P. pratensis L.

Bromus inermis Leyss.

B. arvensis L.



Agrostis gigantea Roth.
Phalaris arundinacea L.
Dactylis glomerata L.
Festuca pratensis Huds.
F. rubra L.
F. arundinacea Schreb.
Lolium perenne L.
L. multiflorum. Lam.
Arrhenatherum elatius (L.) J. et C. Presl.
Roegneria canina (L.) Nevski
Agropyrum pectinatum (Bieb.) Beauv.
A. repens (L.) Beauv.
Beckmannia eruciformis (L.) Host.

The diversity of forage grasses permits to improve pastures, to use boggy saline soils more intensively.

Last years the following forage plants were introduced into culture:

Silphium perfoliatum L.,
Bunias orientalis L.,
Kochia scoparia (L.) Schrad.,
Sorghum alnum Parodi,
Malva crispa L..

Annual forage leguminous plants of Ukraine *Vicia* L., *Ornitopus* L. and cereals - *Lolium multiflorum* (Lam.) have a great natural diversity.

Above-named species of forage plants are still supplemented within genera with a number of species at the natural locality, which can have both a direct practical importance and be used in selection.

Vegetable plants

Vegetable plants in Ukraine are represented by their valuable wild species and wild relatives.

Pastinaca sativa L.
P. silvestris Mill.
Daucus carota L.
Carum carvi L.
Rumex acetosa L.
R. patientia L.
R. alpinus L.
Lepidium sativum L.
L. latifolium L.



Armoracia rusticana Gaertn., Mey et Schieb.

Crambe tatarica Sebeok.

Lactuca sativa L.

Solanum nigrum L.

Physalis alkekengi L.

A vast diversity of cultivated as well as wild species and kinds of onion (*Allium* L.) is traditionally wide used for human nutrition and curement:

A. cepa L.

A. porrum L.

A. fistulosum L.

A. sphaerocephalon L.

A. rotundum L.

A. ursinum L.

A. sativum L.

These plants are able to restore people to health, to eliminate avitaminosis during hard times wars, starvation. Traditionally Ukrainian women use the leaves of *Atriplex hortensis* L. and *A. nitens* Schkuhr. when cooking borshch, the national first course. In early spring for the same purposes they also use young sprouts and leaves of *Urtica dioica* L., *Ficaria verna* Huds. Application of medicinal plants in people's curement has long-standing traditions in Ukraine. Healing properties of approximately 350 plant species have been recognized and are being utilized. A part of them is represented by exotic species. The predominating number of medicinal plant species grow in the natural localities, where laying-in of raw materials is carried out. There is a list of the more important wild medicinal plants below:

Cratiola officinalis L.

Aconitum nanum Baunig.

A. firmum Reichenb.

A. panicalatum Lam. - (rare species, very poisonous (toxic).

They are used in case of neuralgia, podogra, rheumatism).

Althea officinalis L.

Arnica montana L.

Ledum palustre L.

Vinca minor L.

Atropa belladonna L.

Conium maniculatum L. - (a very toxic plant, used in people's medicine as anaesthetic and antispasmodic remedy, while while tretment of cancer).

Sambucus nigra L.

Valeriana palustris kr.



V. excelsa Poiret.
V. angustifolia Tausch.
Crataegus oxyacantha L.
C. monogyna Jacq.
Achillea millefolium L.
Datura stramonium L.
Archangelica officinalis Hoffm.
Hypericum perforatum L.
Centaurium umbellatum Gilib.
Convallaria majalis L.
Asarum europaeum L.
Arctium tomentosum Mill.
A. lappa L.
Xanthium strumarium L.
Origanum vulgare L.
Digitalis ambigua Murr.
Inula helenium L.
I. britanica L.
Hepatica nobilis Gersault
Tanacetum vulgare
Sanicula europea L. - (stops haemorrhage at the lungs; it is used at gastric catarrh and catarrh of the bowels).
Colchicum autumnale L. - (slows down the growth of malignant cells in case of skin cancer).
Matricaria chamomilla L.
Scopolia carniolica Jacq.
Gentiana lutea L. - (an endemic of the Ukrainian Carpathians. It stimulates the appetite and digestion).
G. punctata L.
G. asclepiadea L.
Bidens tripartitus L.
Chelidonium majus L.
Cynoglossum officinale L.

Wild species and will relatives of fruit, berry and nut-fruit cultures are wide spread in forests, swamps and gullies of Ukraine. They give valuable food-stuffs to people. Berries and fruits growing in forests are of great biological value; from ancient time up to present local people gather them. The most popular in Ukraine is *Cerasus avium* (L.) Moench. In the forests of the Podolye, the Carpathians, the Crimea “cherry forests” are found. Local people make tasty jams, kissels (kind of starchy jelly) of them, dry and preserve berries.

Near the village of Snezhkovo in Valky district of the Kharkov region in the gorge called “Corsouniv forest” wild cherry-trees survive during cold winters and give abundant yields of valuable berries. It can be used in breeding work as a source of high frost-resistance.



The Ukrainian people lay in much of *Prunus spinosa* L., *P. insititia* (Jusl.) Schneid., *Berberis* L., *Sorbus* L., *Crataegus* L., *Rosa* L., *Viburnum* L., *Padus avium* Mill. In the Crimeans *Cornus* L., *Pistacia* L., *Prunus divaricata* Ledeb are widely found. Wild species, as a rule, are bearers of valuable gene complexes of adaptability to extreme environmental conditions, such as: drought, heat, frost, disease and pest-resistance.

Among wild species *Cerasus mahaleb* (L.) Mill. is of a special importance because it is used as a stock for cultivated varieties. *C. fruticosa* Pall. forms thickets with blackthorn and other bushes.

In the Ukrainian forests *Malus sylvestris* Mill. and *Pyrus communis* L. grow everywhere, the fruits of which are the sources of pectines. Their application as stocks is very important to selection of vigorous, vital, stress-resistant fruit-trees and amateur gardeners highly appreciate them.

In the village of Andreyevka in the Soumy Region an unusual 170-year old apple-tree grows, which occupies the area of about half a hectare. Its branches, falling down to the ground, take roots, enabling the growth of new plants.

The most valuable wild berry plants of Ukraine are *Fragaria vesca* L., *F. viridis* Duch.. The former grows at the borders of a forest among bushes chiefly in the Carpathians, the Forest and Forest-Steppe zones, the latter in the meadows, among motley grass on the slopes, at the borders of a forest all over the territory. The berries are consumed both as fresh, bottled or dried fruits. *F. vesca* L. possesses strongly expressed medicinal qualities and it is used in case of pneumonia. The leaves of this plant are also used for this purpose. In the Crimea as well as in the Forest-Steppe and the Steppe in the open places, meadows *F. campestris* Stev. is met from time to time.

Viburnum opulus L. is a valuable food, medicinal, melliferous, ornamental plant in Ukraine. This shrub grows almost all over the territory of Ukraine: in forests, meadows, on the banks of the rivers. Its red nutlets possess strong phytoncid effect and it is used in cases of respiratory diseases and simply for nutrition. Well dry-cure nutlets in the collective fruit are preserved in fresh for a year. Different parts of this plant (mainly, inflorescence and collective fruits) are used in folk rites. The breeding of this plant and its introduction into culture have been initiated.

In the Prikarpatye, the Right Bank of the Forest Steppe and more rarely in the western steppe and mountains *V. lantana* L. with black nutlets is found.



In forests, on cleared spaces, in shrubs of the Polesye and the Forest-Steppe and occasionally in the mountains of the Crimea the wild *Rubus idaeus L.* grows. In these locations *R. saxatilis L.* is found. On the whole territory of Ukraine many blackberry species are spread, which often generate natural hybrids. In the flat part of the country *R. caesius L.* and *R. nessensis W. Hall.* grow. Side by side with these species in the Carpathians *R. serpens Weihe ex Lej et Court.*, *R. hirtus Waldst. et. Kit.*, *R. villicaulis Kochler ex Weihe et Ness* are found.

In Zakarpatsye now and then one can find *R. discolor Weihe et Nees.*, *R. candicans Weihe*, *R. plicatus Weihe et Nees*, *R. sulcatus Vest et Tratt.* In the Crimea blackberry is widely spread at the borders of forests, near roads, on the banks of streams. *R. tauricus Schlecht ex Juz.* is a general resident of these places. The other species are more rarely found. They are *R. hirtimimus Juz.*, *R. anatolicus Foche ex Hausskn.*, *R. crimaeus Juz.*, *R. paratauricus Juz.*, *R. Scenoreinus Juz.*, *E. troitzkyi Juz.* The inhabitant of the open slopes *R. canescens DC.* often generates natural hybrids with *R. tauricus Schlecht. ex Juz.*

Ripe fruits of blackberry are used as a febrifugal medicine and a means for slaking one's thirst. The fruits are also good for cure of quinsy.

In the forests among shrubs in the Carpathians, the Polesye and the Northern Forest-Steppe wild relatives of *Ribes nigrum L.* and *Grossularia reclinata (L.) Mill.* are spread. In the Alpine belt of the Carpathians *R. carpaticum Schult.* occurs. Redfruit species of *R. ludicum Kit.* and *R. Spitacum Robson* are also distributed in the Ukrainian forests.

Coniferous and mixed forests of the Carpathians and the Polesye are rich in valuable small bushes of *Rhodococcum vitis-idaea (L.) Avror.*, *Vaccinium uliginosum L.*, *V. myrtillus L.* In the Carpathians and the Western Polesye the evergreen small bush of *Oxycoccus palustris Pers.* grow on sphagnum bogs. *Oxycoccus microcarpa* can also be found - this plant is under protection.

As a result of human agricultural activities the plant cover has been considerably transformed. During last decades in Ukraine complicated economic problems arose related to accelerating scopes of industrial use of natural resources. It is both an unbalanced approach to managing the territory and a sharp raising of power capacities of ecologically dangerous branches of production, and a low standard of their technology, and a breach in operating conditions.

The accident at the Chernobyl Atomic Power Station caused the greatest damage to nature. In the northern part of Kiev, Zhitomir, Chernigov, Rovny regions it assumed a grave character of ecological disaster as to its consequences. Nearly 5 mln. ha of lands, of which 3,5 mln. ha of agricultural lands, 1,5 mln. ha of forests were subjected to strong radioactive pollution. The local inhabitants were evacuated from the most polluted regions.



Therefore the problems of nature conservation are especially urgent. About 900 species demand the measures for their protection to be provided for. These are chiefly endemic, relict, borderline-area plant species, as well as those, which are gathered on a large scale as medicinal and early-spring, beautifully flowering plants (lily of the valley, peony, *Pulsatilla Mill.*, liverwort, *Trollius L.*, *Helleborus L.*, *Aconitum*, violets, etc.). In Ukraine 224 species of vascular plants of native flora are subject to conservation. For this purpose new reserves are established, some individual plants are carried to botanical gardens.

2.3 LOCAL VARIETIES

Old cultivars of cereal, grain leguminous and small grain crops are practically preserved only in the collections in Ukraine. Only one old local cultivar of maize - Zakarpatskaya Yellow Dent has been officially registered. The collecting mission, organized in the summer of 1994 by the National Centre for Plant Genetic Resources of Ukraine in the Carpathians, made it available, as it was noted, to find a new cultivar for Ukraine-spring rye (5 samples were collected).

Local farmers prefer it most of all than winter rye because the latter in the conditions with abundant snowfalls is infested with snow mold. In the Carpathians for many decades the people sow barley, oats, winter rye, buckwheat, bread wheat, more often winter than spring, maize, pea on their plots. The collected material of these cultivars (90 samples) will be studied and conserved.

In the Ukrainian countryside there are traditionally grown haricot and green bean, curly and climbing forms predominate, being notable for great diversity of traits: grain's plumpness, swelling and cooking ability, shade-enduring, resistance to *Colletotrichum lindemuthianum* (Sacc. et Magn.) Br. et Cav. and *Acanthoscelides obtectus* Say., drought resistance, earlyripeness. In such economical situation established in Ukraine some people enlarge their sown area under this economic, rich in protein, culture. Its sale is being noticeably increased at the market.

A lot of vegetable landraces are traditionally grown by the Ukrainians in their kitchen-gardens and plots round summer cottages in the countryside. Far from the borders of Ukraine valuable varieties of farmers' selection are known. These are Nezhenskyi cucumbers (excellent salting properties), Borshchagovskyi, Berlyzovskyi, Chernobryvets. The landraces of onion - Markovskyi, Balakleyevskyi, Odesskyi, Kroutyanskyi, Vergoulovskyi, Yaltinskyi. The latter variety and today is widely cultivated in the south of Ukraine as not a pungent salad variety.



The varieties of underground onion (*Allium ascalonicum*) of the Ukrainian origin are earlier-maturing and good for growing green leaves in open and protected ground. As before multiplier (*A.cepa var.aggregatum*) onions Kushchovka mestnaya and Kushchovka Kharkovskaya maintain their economically valuable qualities. Farmers' varieties of cucurbits - Mozolevskaya and perennial Ukrainskaya - are thick cortical with excellent keeping and edible qualities.

Conservation of local and old selection varieties in culture and often in the collections is connected with great difficulties. Epiphytoty of separate diseases practically destroy whole cultivars. It happened so to cucumbers during 1985-1990, when mildew was widely distributed. The local people and collective vegetable-growing farms abandoned an attempt to grow the most valuable cucumber variety - Nezhenskyi 12.

The application of valuable local gene pool of plants makes it possible today to provide the population of Ukraine with fruit and berry produce. The local farmers have an old tradition to manage their personal gardening at their farmstead plots.

Ukraine is famous for its wide choice of apple, pear, sour and sweet cherries, plum varieties. In the monastic gardens so far one can find the "relict" varieties of apples, pears as the most longlived trees. Yaroslav the Wise laid out the apple-garden in the Kiev-Pechersky Lavra in 1051. Such popular favourite apple landraces as Antonovka, White Kalvil, Doneshta, Papirovka, Kandyl Synap and others were selected and are being maintained by many generations of the people. The autumn variety "Antonovka" has good edible qualities, high pectin content, large size. "Papirovka" is an early-ripening variety with white fruits; the high frost-resistant local Crimean variety, "Kandyl Synap", is notable for its heat-resistance, high stable productivity.

The summer pear variety "Limonka" is wide spread in Ukraine and abroad. The variety of people's selection has especially tasty and sweet oily fruits. It is used in fresh, baked, dried and canned forms. The tree is well adapted to low winter temperatures. It is so called because of a yellow-lemon colour of its fruits.

The autumn variety "Alexandrovka" is also highly appreciated by amateur and professional gardeners for its resistance, high productivity and qualities of fruits.

The local pear varieties in the Crimea - "Armudy" - are notable for high drought and heat-resistance, have good edible qualities of fruits.

In Ukraine there are many valuable landraces of plums, *Prunus divaricata* Ledeb., (crimean erik), apricots (gerdeli), cherries, sweet cherries.



The most valuable and favourite fruits in Ukraine are sour cherries. Here, and now local varieties Gryot Ukrainian, Gryot Seridko, Chernokorka with a dark-coloured pulp are being grown. A very popular early variety of sour cherry is "Shpanka". In the private gardens of the local inhabitants one can find landraces with the whole complex of important traits: large-sized berries with a dark-coloured pulp, early ripening, frost and light frost-resistant, etc.

The local people maintain the economically important gene pool of the people's selection, passing it from one generation to the other. The scientific workers of the National Centre for PGR of Ukraine register and collect this gene pool for further studies, application and conservation. The next collecting search missions all over the country are planned.

In Ukraine the evaluation of contributions, made by the people in their gardens, to food production, at large, is conducted without separating traditional and improved varieties by their use. First of all, it is related to potato, vegetable, fruit and berry-cultures, grapes. In the total amount of production the contribution of these cultures ranges from 20% to 60%. In recent years it has been increased.



CHAPTER 3

National Conservation Activities

3.1 IN SITU CONSERVATION ACTIVITIES

The Law of Ukraine on “Conservation of Environment” adopted on June 25, 1991, has determined the fundamental provisions for further development of conservation activities, confirmed the list of territories in the major botanical-geographical regions, liable to protection. According to the Law and decisions of the Ukrainian Government five categories of reserves have been singled out: national reserves (*species*’ reserves), state nature parks, relics of garden-park art).

In situ conservation of PGR of Ukraine in natural localities is being carried out in 9 reserves: “Askaniya-Nova” - *Festuca sulcata* - feather-grasses steppe in the Kherson Region (since 1921,11 thousand ha), “Chernomorskyi” - steppe vegetation and overflow land on the border of the south of Ukraine (since 1927, 64 thousand ha), “Ukrainian steppe” - includes Khomutovskaya steppe, Stone graves, Mikhailovskaya virgin land (since 1928-1947, combined in 1961, above 1.6 thousand ha), “Kanevskyi” - ravines areas of the Forest-Steppe at the rightbank of the Dnieper with the hornbeam-forest tract (since 1923, above 1 thousand ha), “Karpatskyi” - the highest part of the Ukrainian Carpathians’ Range (since 1968, 12.6 thousand ha), “Luganskyi” - (Streletskaya Steppe, Stanichno-Luganskyi) - motley grass - *Festuca sulcata* - feather - grasses steppe and the banks of the Severskyi Donets-river, covered by forests (since 1936, about 1 thousand ha), “Polesskyi” - coniferous and subconiferous forests (1968, about 20 thousand ha). 4.5 thousand ha are under oligotrophic swamps. Highlands-Forest “Yaltinskyi” (since 1973, about 14 thousand ha), “the Cape of Martjyan” - an important coastal aquatic complex (since 1973, 240 ha).

Ukrainian reserves are under the authority of the National Academy of Sciences, the Ukrainian Academy of Agricultural Sciences, the Ministry of Forestry and the Ministry of Education. On their basis scientific investigations of geomorphology, climate, soils, flora and fauna are being conducted. The activities have been promoted within the framework of International Biological Programme and Global Environmental Facilities (Danube Delta Biodiversity and the Carpathian Mountains’ Biodiversity Protection). The scientific workers are working out methods of registration, restoration and sustainable use of flora and fauna resources in the national economy; measures on conservation and



restoration of a number of rare and vanishing flora and fauna species; biological methods of control of harmful plants and animals; efficiency and consequences of use of natural resources in the adjoining territories are being estimated.

At present important problems of financial and material and as a result of personnel provision in reserve activities are being solved. The cases of violation on the territories of reserves among local inhabitants became more frequent. One of the measures on maintenance of established approaches of these activities could have been the development of international scientific programmes with the researchers of other countries on the basis of the Ukrainian reserves. The virgin steppe of "Askaniya-Nova" can serve as a good experimental natural laboratory with its 365 plant species, among which there are feather-grasses (*Stipa pennata*), *Festuca sulcata*, Bulbous blue grass (*Poa bulbosa*), in lowering - *Agropyron Gaertn*, *Agropyron repens* (L.) Beauv. var. *pseudocaesium* Pacz., various species of leguminous grasses.

Among wild grasses hillocks *Sida L.*, *Limonium Mill.*, *Falcaria Fabr.*, *Corispermum L.* grow.

Investigation and conservation of wild plants in the Chernomorskyi reserve are of great scientific importance. Here there are 594 species. The steppe locations, the forest-steppe ones with small forests-kolkami, overflow lands, insular places with 150 species of forage grasses have gained prominence by rich diversity of medicinal plants (*Valeriana*, *Althaea*, *Erysimum L.*, *Hypericum L.*).

In the Khomutovskyi steppes virginal steppe tracts with 528 plant species were preserved. Here such plants as *Festuca sulcata*, lychnis, tulips, violets, saffron (*Crocus sativus*), *Actaea L.*, wild flax and other valuable plants grow.

The rare flora representatives of ancient times: Brown's fern, *Matteuccia Tod.*, *Ophioglossum L.*, *Polypodium L.*, *Asplenium L.*, *Cystopteris fragilis* (L.) Bernh., *Actaea spicata L.*, *Allium ursinum L.*, grow under the crowns of hornbeam-forests in the Kanevskyi reserve.

The Carpathian reserve with its 3 tracts include some unique ancient forests, diverse plant associations within the Carpathian mountain chain. In the Goverla tract there is prevalence of spruce forests, which together with beech-coniferous ones occupy nine tenth of the area under forests. Here Sub-Alpine and Alpine belts of vegetation are vividly presented: it is the richest area in flora and fauna.

The Chernogorskyi tract is the most severe "wild corner" in the Carpathian environment. Here there are many steep slopes, wonderful cliffs, stone placers, canyons, deep valleys of the Black Cheremosh river and its numerous inflows. Picturesque mountainous lakes are scattered on different height. Mountainous bogs are also met.



3.2 CONSERVATION OF PLANT GENETIC RESOURCES *EX SITU*

Conservation activities with genetic resources of cultivated plants in Ukraine went side by side with the progress in plant breeding. At the end of the 19th and the beginning of the 20th century the collections of the major field crops had been gathered in the established breeding stations.

After the declaration of independence of Ukraine the Ukrainian Academy of Agricultural Sciences (UAAS) has been financing the coordinating program on “Formation, mobilization, introduction, investigation, identification of the gene pool and creation of the genebank of plants in Ukraine” since 1992.

The Centre for Plant Genetic Resources of Ukraine (CPGRU) was created in yurjev Plant Production Institute (Kharkov), which started work on introduction, investigation and formation of the National Bank for plant genetic resources in Ukraine. In 1994 the Centre for PGRU on the basis of the decision taken by the Ukrainian Academy of Agricultural Sciences, the National Academy of Sciences, the Ministry of Agriculture and Food, the Ministry of Agriculture and Food, the Ministry of Forestry was reorganized into the National Centre for PGRU (NC). The Bureau for coordination and methodological activities and 9 sectors for groups of crops are attached to the National Centre.

The National Centre activities are proceeded in cooperation with other breeding and botanical institutions in accordance with the common coordination program. On the whole 42 scientific research institutes and experimental stations take part in its realization (Table 1 - next page).

Financing of the National Centre for creation of the genebank is done first and foremost by the Ukrainian Academy of Agricultural Sciences since 1994: 7,94 billion coupons in sum (132,4 thous USA dollars), as well as, by the state Committee for science and Technology of the Cabinet of Ministers of Ukraine - 0,44 billion coupous (7,3 thous. USA dollars).

At present the NCPGRU embraces all the diversity of the gene pool of plants, which are being grown and maintained in co-executing institutions. In 1994 136398 samples were put clown on the inventory, including the number of duplicates. The gene pool includes 37663 samples of cereal crops, 17933 of small grain crops and maize, 9419 of grain-legumes, 4601 of technical and oil crops, 2102 of fodder crops, 34981 of essential oil and medicine plants, 3825 of vegetable and cucurbit crops, 1651 potato samples, 17346 of fruit, subtropical and nut-fruit cultures, 1569 samples of berries and grapes.



Table 1 Research institutes and experimental stations connected with genetic resources activities within the National Centre for PGR of Ukraine

| Organization and location | Collection |
|---|---|
| Institute for Volatile-Oil Bearing & Medicine Crops, Simferopol | Volatile-oil, medicine crops. |
| Institute for Medicine Crops, Lubny, Poltavskay region | Medicinal crops. |
| Institute for Forages, Vinnitsa | Forage crops. |
| Institute for Vegetable & Melon growing, Merefa, Kharkov region | |
| - Kiev, Experiment Station, Kiev* | vegetable crops, water melon, |
| - Donetskaya Experiment Station, Donetsk* | melon and gourd. |
| - Skvirskaya Experiment Station, Skvira ³ Kiev region* | |
| -Dnepropetrovskaya Experiment Station Dnepropetrovsk* | |
| - Crimean Experiment Station, Simferopol* | |
| Institute for Potatoes, Nemeshaevo, Kiev region | Potatoes. |
| Zakarpatsky Institute for Agriculture Industry, Bakta, Zakarpatsky region | Maize, tobacco, fruit crops, grapes. |
| Institute for Horticulture, Kiev, Novoselkyi | |
| - Pridnestrovskaya Experiment Station, Chernovcy | Fruit and nut crops, berry crops. |
| - Lvovsky filial, Lvov | |
| - Donetsk filial, Donetsk | |
| - Podolskaya Experiment Station, Vinnitsa region | |
| - Institute for Irrigated Horticulture Melitopol | |
| Mlievsky Institute Horticulture, Mliev Cherkasky region | Apple, pear, plum, raspberries. |
| Crimean Pomological Experiment Station Crimea* | Fruit and nut crops. |
| Nikitsky Botanical Garden, Yalta, Crimea | Sub-tropical crops, fruit and nut crops, volatile oilbearing crops, ornamental plants, medicinal plants, forest plants. |
| Ukrainian Botanical Society, Ichnya, Chernigov region | Wild fruit crops and berries. |
| Institute for Viticulture and Wine-making, Odessa | Grapes. |



| Organization and location | Collection |
|--|--|
| Research Institute for Forestry & Forest Improvement Kharkov | Forest and nut crops. |
| Central Botanical Garden, Kiev Rare fruit, ornamental crops | Rare fruit, ornamental crops. |
| Yuriev Institute of Plant Breeding, Kharkov | Methodological and coordination Centre. Winter and spring wheats, rye, triticale, spring barley, maize, millet, peas, soya, beans (<i>Phaseolusvulg.</i>), chickpea, lentil, <i>Viciafaba</i> , sunflower. |
| Usttimovskaya Experiment Station, Poltavsky region | Wheat, triticale, barley, oats, maize, millet, buckwheat, <i>Ph. vulgaris</i> , chickling, beet, mustard (<i>Sinapsis</i>), poppy, forage and vegetable crops, potato. |
| Breeding & Genetics Institute, Odessa | Winter wheat, winter and spring barley. |
| Mironovsky Institute for Wheat, Mironovka, Kiev region | Winter and spring wheats and barley. |
| Institute of Agriculture, Chabany, Kiev region | Lupin, soya, <i>Ph. vulgaris</i> , perennial forage grasses. |
| Institute of Maize, Dnepropetrovsk | Maize, sorghum. |
| Institute of Irrigated Agriculture, Kherson | Wheat, maize, alfalfa. |
| Institute for Agriculture & Livestock | Oats, vetch, fodder beet, flax. |
| Farming of Western region, Obroshino Lvov region | |
| Luganskaya Experiment Station, Lugansk | Pea, chickpea |
| Uladovo-Lulinetskaya Experiment Station, Vinnitsa region | Pea. |
| Experiment Station for Rice, Skadovsk, Kerson region | Rice |
| Institute for Oil Crops, Zaporozhie | Sunflower, flax, rape, mustard, castor-oil plant. |
| Institute for Cruciferous Crops, Ivano-Frankovsk | Rape, wintercress. |
| Institute for Sugar Beet, Kiev, Umanskay BGS, Uman | Sugar beet, chicory. |
| Institute for Fibre Crops | Flax, hemp. |
| Experiment Station for Tabacco & Common Tobacco, Ternopolskya region | Tabacco, common tobacco. |
| Institute for Hop-growing, Zhitomir | Hop. |



The collections also include local forms and farmers' varieties, old and new commercial varieties of Ukraine and of neighboring countries/ states - Russia, Byelorussia, Moldova, as well as, of other countries of CIS and the Eastern Europe.

The lesser part of the major crops in the collections consists of the samples received from the Western Europe, America, Asia, Africa, Australia. Many cultures are represented by their wild species and wild relatives in the collection.

Along with them there are also collection lines, which are sources and clonors of valuable economic traits. As for separate crops there have been gathered and sustained genetic collections (soft wheat, barley, maize and others).

The whole member of crops is represented by autotetraploids (rye, wheat, barley, buckwheat, maize, clover, etc.), amphidiploids of different genome composition (wheat, triticale, potato, etc.), substituted lines (triticale).

As to crops obtained by heterosis (maize, sunflower, *sorghum* and others) varieties-populations, synthetic populations, self pollinated lines have been gathered in the collections.

The collections for perennial and vegetatively multiplying crops also include, the cloues with valuable traits, interspecific and intergeneric hybrids along with local and wild forms, farmers' varieties. One of the most important collections in Ukraine is the collection of winter soft wheat (15,031 samples), in which there are samples with good bread-making qualities. The varieties and lines of the Ukrainian selection are famous for their frost-resistance when the temperature is -18 -20° C at the depth of a tillering node.

Spring barley collection (7,760 samples) includes drought- resistant, high qualitative groats and brewer's varieties with high productivity and resistance to latent-stem pests.

As far as spring triticale are concerned (643 samples) there has been created the collection of accessions with the most important agronomic traits: an optimum type of a spike and a plant, dense and uniform stand, different vegetative periods, resistance to latentstem pests and diseases, technological and biochemical qualities of grain good thereshability.

The pea collection consists of 2,346 samples, among them those highly appreciated, which are resistant to *Ascochyta pisi*; there are isolated the group of samples with tendril, acacia-like and a compound type of a leaf, of limited growth, non-shattering seeds and others. The multiflowered type is represented by 7 samples, the wintering one by 14.



The millet collection numbers 3128 samples. At the Usttimovskaya Experimental Station the core collection of this valuable crop is being preserved. Among its samples there are local forms and farmers' varieties. The samples with short vegetative period, which are of a special importance, ripe within 80 days and are resistant to Ustilago digitariae. The large-size-grain samples have one thousand kernel weight as 8.9-9.6 g.

As for other grain crops in the process of investigation there have been isolated valuable sources of agronomic and biological traits. Owing to it the collection samples are used in breeding, scientific and educational programs every year.

In 1994 2,822 samples were sent to different Ukrainian institutions for those purposes. 508 samples were mailed to CIS countries, 30 to other foreign countries. The main users of these collections are Ukrainian breeders.

The great bulk of the samples in the collections is received from Vavilov Plant Breeding Institute (Russia), CIMMYT (Mexico, Turkey), the Check Genebank and other organizations. The number of the introduced samples (2,266) has been close to its distribution as the demand for some separate samples is repeated.

The composition of the national collections must be replenished with landraces, new forms and varieties, and lines-bearers of economic traits and their associations. The goal is to form description and core collections for a number of crops.

The replenishment of the gene pool will continue both through the exchange with genebanks, research institutions and by means of collecting missions. In 1995 there has been planned to investigate the southern steppes for the purposes of collecting forage grasses, landraces of vegetable and cucurbit crops.

At the current stage these collecting issions are being planned and conducted for search of separate valuable species, traits, as well as, the complex exploration of territories.

In as much as the collections have been generally established as the initial material as to separate crops, which in due time will be removed from the collections. Such material at present is not catalogued, but stored temporarily.

The exchange of germplasm samples with some genebanks and institutions of other countries is constant.



3.3 STORAGE OF COLLECTIONS

Storage of crops multiplying with seeds in base and active collections is carried out under the same uncontrollable temperature conditions of store-houses. In the store-house the air mean temperature is +7°C, which ranges from -10°C to +20° C. Under the provision of the optimum drying level for seeds of the base collections to 4-7% of moisture, seeds of the predominant number of crops in the hermetic glass packing can be stored during 20-25 years.

In connection with the fact that the store-house for PGR seeds remained on the Russian territory (Cuban), we are regulating the process of drying, packing and storing seeds for middle term in our National Centre.

The duplicate collections are stored in some separate institutions co-executors (Ustimovskaya Experimental Station, Breeding Genetical Institute, Research Institute for Vegetable and Melon Growing, etc.). Seeds of active collections are packed in paper packets and kept in metal boxes.

Thanks to the support given by International institute for PGR (Rome, Italy) in the NC seed drying has been set going by means of silica gel to 5-6% of moisture. The drying (the dryer of "Munters" Firm, Sweden) and storing equipment (the freezing chamber from Finland) enabling to store seeds under low temperatures has been received. Obtained from IIPGR foil seed pouches will be used for seed storage in the chambers at low temperatures.

Today the permanent store-house has been prepared, which will contain 65,000 samples under middle-term conditions. Now it is being filled. This must provide urgent conservation for genetic resources during the period by the time when a new modern store-house with the complex of necessary laboratory premises will be built. Now we need a help in the choice of the project and determining its cost.

It's also important now to provide our co-executors with tightly closed boxes for storing seeds of active collections in paper packets to avoid samples' damage by pests and rodents.

Active collections of fruit, berry and other perennial vegetatively multiplied crops are being maintained in natural plantings.



3.4 DOCUMENTATION

Documentation of collections has been conducted for a long time in registration, inventory journals and books for data summaries of agronomic evaluation and description. These data always follow all the samples of the collection.

At the time of the NC formation the activities for the creation of computer bases without data were initiated. The structure of the NC Information System "Gene Pool" has been developed, which includes Introduction, Passport, Description databases. The computerized Passport DB is created for 30% of all the samples in the collection; the computerized Description DB (economic value and description) is developed for 10% of samples. The activities on collection of information is carried out on the basis of international and national classifiers.

The information about samples is made available to users both in computer print-outs' form and diskettes. On the basis of Dbase "Bulletins for Introduced Samples and "Catalogues" (as to investigation data) are formed and published. To create the common network Ukraine together with other countries of Western Europe coordinates its activity on structuring and programming of PGR Information Systems.

In the National Centre the information on sample pedigrees, which will start as an independent base in future, is being accumulated.

There has been developed Seed Stock DB, which includes the seed material, being stored for a middle term. Duplicated information is preserved in computers, on diskettes and in the form of print copies depending on the crop in one or several places.

3.5 EVALUATION AND CHARACTERIZATION

In Ukraine the National Programme makes a clear distinction between the processes of characterization and evaluation of germplasm samples of different crops. In case of field crops these data are clearly distinctive and for fruit ones they are interlaced. Evaluation of collections is made according to the most valuable economic characters. These processes are carried out by specialists of PGR who use International and National descriptor lists. 50% of collections have been characterized using international descriptors. 90% of germplasm samples have undergone preliminary evaluation.



In practice all collections have been fully evaluated at the locality of the NC institutions co-executors. The samples originating from these institutions and adjacent regions have been evaluated at the locality of origin. As for separate crops the samples have been evaluated at the localities of germplasm maintenance.

Disease and pest resistance, biological, physiological and microbiological evaluation is of a special importance in the work with agronomically valuable forms. In solving special tasks here is conducted search for sources and large quantities of collections are analyzed.

All available characterization and evaluation data are published in catalogues, in scientific papers, but not in full.

The collecting strategy for formation of the important germplasm collections is defined by the analysis of Passport and evaluation data and the decisions for their conservation is made up. This way the absence of separate old varieties of Ukrainian selection in our wheat, barley, pea collections has been determined and search for them is being carried out in research institutions, genebanks of other countries.

The data resulting from evaluations carried out by users of the samples, especially in connection with new varieties and sources of valuable characters, are returned to the National Centre. In some cases we make the provision of such data a condition for supplying material to users and in turn the NC provides such data to genebanks from which we obtain material for study.

In Ukraine germplasm evaluation of field crops' collections is conducted in three stages: the first - preliminary study during 1-2 years the second - basic study during 2-3 years; the third - special, for only separate samples, including ecological study in special backgrounds and by means of special methods (biochemical, physiological and genetical). It permits to differentiate samples for the degree of expression of specific characters, to isolate the sources and donors of economic traits for application in practical selection. The expenditures for evaluation are justified through application of the isolated sources and donors in selection and at the development and acclimatization of new crops.

Evaluation data help to use PGR in breeding, genetical and other investigations. Therefore the institutions co-executors must evaluate the introduced samples. It is necessary to optimize the scope of research and to exclude ungrounded duplication.

International collaboration could help to achieve better results in evaluation by the exchange of information on evaluation data between genebanks and by mutual improvement of methods for evaluation. The more effective way in solving these problems today is bilateral cooperation of interested genebanks, regional



and European Cooperative Program for PGR, the leading role of which belongs to the International Institute for PGR. As far as separate crops are concerned a favour could be given to that or to another level of cooperation.

The collections *in situ* are characterized and evaluated according to a special complex programme, including botanical description, visual estimates and evaluation of environmental conditions (soil, climate). In such a way monitoring is conducted. It is the more effective from botanical and economical point of view working technique with *in situ* collections. It's important to develop computerized databases. To make evaluation, characterization and DB computerization in the nearest future in Ukraine it can be done only with the support of the persons concerned from other countries and international organizations.

3.6 REGENERATION

Regeneration of the accessions in active collections of seed multiplying crops is made, as a rule, once in 5 years for the most of crops. The base collections, laid in storage at 5-8% of moisture, will be regenerated in 20 years or as far as the need occurs in shorter or longer term. Today we have available the certain basis, but it needs to be renewed and strengthened.

We have some difficulties when regenerating our samples susceptible to diseases (rust, smut, powdery mildew, etc.), but in different years the infection rate varies and we manage to obtain filled grains. It is also difficult to regenerate unstable forms (dominant short-stemmed, etc.).

Our regeneration procedures are adequate to maintain the genetic character of the original samples. At the larger amount of work and use of imperfective and old threshers, from design point of view, it can cause little contamination. Therefore constant weeding out is necessary on the plots of some crops at resowings. In order to improve the results it is required to renew old threshers and to train high qualified personnel.

The skilled specialists working with PGR and breeders control the purity of variety in regenerated samples. We have enough land, but insufficient material and people resources. We have inadequate facilities for regeneration of cross-pollinated crops: the sufficient amount of the regenerated sample requires much isolation material and separate plots. The quality of seeds, obtained by use of isolation bags, do not often answer the requirements thus causing reasons for resowing these samples more often.



The new programme for regeneration of samples envisages registration of the regeneration history of each sample. At present the seeds of two generation of one sample are being stored, as a rule, as well as, the original seeds even then, when they have lost germination ability (for the purpose of identification).



CHAPTER 4

In-Country Uses of Plant Genetic Resources

The genetic resources of Ukraine are used for the following purposes: 1) as initial material for breeding activities in Ukraine; 2) for the same purposes they are sent to research institutions and genebanks of other countries; 3) they are studied for determination of new economic traits and finding plant forms, which possess these traits. The genetic resources from other countries, received by Ukraine, are tested firstly, studied, and then are used as initial material for breeding.

4.1 USE OF PGR COLLECTIONS

New selected varieties, developed in the last 10 years are most frequently used in national plant breeding programmes. Table 2 shows the crops most frequently used in national projects in the past 3 years. 5-10 % of all plant genetic resources samples (depending on a certain crop) used in commercially related activities within the country come from the national collections.

Table 2 Plant Genetic Resources' utilization in Ukraine in 1992-1994 years.

| Crops, which germplasm is the most frequently used in Ukraine | The number of requested samples | Percentage of accessions used % | The number of PGR users | |
|---|---------------------------------|---------------------------------|-------------------------|-------------|
| | | | Institutions | Specialists |
| Soft winter wheat | 1500 | 60 | 10 | 15 |
| Maize | 428 | 80 | 6 | 10 |
| Spring barley | 416 | 65 | 6 | 10 |
| Soft spring wheat | 382 | 65 | 4 | 8 |
| Pea | 355 | 60 | 6 | 8 |
| Flax | 191 | 70 | 3 | 6 |
| Triticale | 168 | 63 | 5 | 11 |
| Apple | 84 | 50 | 6 | 15 |
| Pear | 70 | 50 | 4 | 10 |
| Carrot | 56 | 70 | 2 | 4 |



The major external sources of germplasm are genebanks and scientific institutions in Russia, Byelorussia, Moldova, Czechia, Slovakia, Poland, Germany, England, Austria, the USA, Mexico and other countries.

15 % of species maintained by our genebank have not been used for in-country projects of actual and potential commercial significance during the last 3 years. We expect these species to be used at the same level in the next few years.

Farmers have free access to genetic resources of the country with provision for keeping to Breeder's Rights on Plant Varieties. Farmers use the seeds, preserved by community banks, these are grain-legume, vegetable, fruit and other crops, in particular.

4.2 CROP IMPROVEMENT PROGRAMMES AND SEED DISTRIBUTION

The main functions of national plant breeding programmes are: improvement of varieties for specific characters and their complex. As to some crops we improve local varieties and cultivate wild species (forage, medicinal, some vegetable crops). Adaptation of imported germplasm of maize, fruit, some vegetable and oil crops to local needs is conducted. The ultimate objectives of these plant breeding programmes are to increase production, to improve its quality and resistance to unfavourable environmental.

National plant breeding activities are focused primarily on meeting national food needs, as well as, increasing export opportunities. During last years export opportunities with sunflower, sugar beet, winter and spring wheat, triticale have been made more active. The amount and quality of scientific plant breeding currently being undertaken in the country is adequate to meet national needs in most cultivated crops. High standards in breeding winter soft and hard wheats, spring soft and hard wheats, winter rye, triticale, spring barley, pea, hemp, sunflower and some other crops are traditional in Ukraine.

The main constraints in breeding are a low level of supply with modern equipment, a weak basis of material provision, in a number of cases it is insufficient level of staff training. Establishing and developing of market-relations will enable us to solve many of these problems. Plant breeding activities are conducted primarily by government - funded programmes for most crops. Private breeding companies are now being in the process of emergence. Foreign companies introduce their varieties of maize, sugar beet, some vegetable crops.



The products of in-country crop improvement are made available to farmers easily and quickly. The most valuable varieties of agricultural crops are produced for large-scale collective farms; a lot of them are successfully used by subsistence farmers.

Collective farms and farmers are involved in production evaluation of new perspective varieties. Improved varieties are available to all farmers and collective farms. Insufficient supply with equipment and material provision are the identifiable constraints to better seed production and distribution.

4.3 BENEFITS DERIVED FROM THE USE OF PLANT GENETIC RESOURCES

The Ukrainian Genebank maintains the genepool, which is of primary importance to our country. However, the most part of this genepool can represent some interest to foreign users. It gives us the opportunity to exchange germplasm collections with genebanks of other countries.

Ukraine is deriving clear, direct benefits from its indigenous plant genetic resources. The first benefit is introduction of valuable genetic potential of local PGR into new generations of commercial varieties; the second - direct obtaining of produce while cultivating local varieties and forms of some crops, especially, in private farms (fruits - apple, pear, plum, cherry and other; vegetables - onion, garlic, horse-radish, cucumbers; cucurbit, etc.). The country is deriving indirect benefits by providing the local PGR to overseas institutions from which it is obtaining the necessary stocks in turn. In addition the country is collaborating with other partners in research.

Ukraine is deriving direct benefits from the use of foreign PGR, maintained in its National Genebank. They are included into national breeding and research programmes. The country of origin of these genetic resources is also deriving a clear benefit, as it is obtaining the necessary material in exchange for its germplasm, which are used in solving its national problems.



4.4 IMPROVING PGR UTILIZATION

We regard as the main achievements of our plant genetic activities:

- in improving traditional and other plant production;
- in preserving PGR in viable state;
- in collecting germplasm of traditional crops for renewal of cultivation - *Triticum dicoccum*, hulless barley, lentil, chick- pea, beans; some farms of fruit and other crops;
- in introducing new non-traditional crops into production, such as:

Sorghum alnum,

Rhaponticum carthamoides (Willd.) Iljin,

Echinacea purpurea (L.) Moench.,

Amaranthus L.,

Isatis L., *staevia*, *daicon* (*Raphanus sativus* convar.*raphanistroides* Sazon.),

artichoke and other.

We are satisfied with the relationship between our national PGR system and breeding, seed production, utilization system. To make better use of the resources it is necessary to strengthen their versatile study by means of modern technologies; to provide the users with information on PGR. We regard as the greatest value of plant genetic resources in the fact that they are the initial material for breeding and the objects of the theoretical investigations; in conservation of germplasm diversity for the present and future generations; they are the integral part of the national culture. We regard these resources as potentially more valuable in the long term. To make PGR more profitable in the short term it is necessary:

- better documentation;
- elaboration of new trends and methods for better characterization and evaluation data;
- closer integration of the genebanks with other agricultural and forestry facilities;
- better co-ordination policies and planning processes at the national and international levels;
- resolution on Ukraine's joining the European Cooperative Programmes for PGR;



- to simplify custom and quarantine procedures in the process of PGR exchange.

To improve utilization of Ukrainian PGR we need assistance

- in On-line exchange of information, including information on pedigrees;
- in improvement of evaluation facilities, particularly, in provision with new modern equipment;
- in staff training.

Training and greater access to technical expertise and facilities would help to add value to our genetic resources, and namely:

- to passport data;
- to pedigrees;
- to PGR evaluation data;
- to bibliographical information on PGR;
- to new software and information networks for PGR.

We would prefer to obtain such assistance from international, regional and national PGR institutions on the terms of mutually beneficial scientific collaboration.



CHAPTER 5

National Goals, Policies, Programmes and Legislation

5.1 NATIONAL PROGRAMMES FOR PGR

In order to form the National Bank for plant genetic resources in Ukraine the National Centre for PGR of Ukraine with the network of scientific research institutions (Table 1) has been organized the activities of which are officially funded by the state through the Ukrainian Academy of Agricultural Sciences, National Academy of Sciences and Ministry of Forestry. The NC coordinates the activities on collections of cultivated plants and their wild relatives and the National Academy of Sciences - for *in situ* conservation.

The National Programme for PGR in Ukraine cover conservation and the use of plant genetic resources.

The activities for conservation and the use of PGR are integrated with national plans for sustainable development, including preservation of environment, development of agricultural production and forestry. Legislative standards, measures, directed at conservation of plant genetic resources, are stated in the Law of Ukraine “On the Preservation of Environment”, “Forest Code”. The Ukrainian Law “On Protection of Breeder’s Rights and Varieties” has no limitations for the use of varieties and in the other experimental purposes. The Supreme Council of Ukraine has ratified the international Convention on Biological Diversity.

The main goals and objectives of the government in maintaining a national genetic resources programme are preservation and their effective use.

In the Ukrainian government there is the Committee for PGR use and the National Centre for PGR has a scientific methodological board for plant genetic resources. The head of the programme for PGR is accountable to UAAS and he ranks equal with the coordinator for breeding programmes. The head of the NCPGRU works in accordance with “Status of the National Centre for PGRU and is appointed or abolished from the position by the Presidium of the Ukrainian Academy of Agricultural Sciences. The State Committee for Science and Technology National Academy of Sciences and Ministry of Forestry approve the annual programme and budget for PGR.



The complex programmes for collections *ex situ* and preservation *in situ*, as well as, separate supplementary scientific programmes are funded. In transitional period the Government cannot fully provide financing for PGR programmes, however, gives it the priority.

The PGR programme is an important basis of selection and plant production on the whole. Preservation, investigation and utilization of PGR ensures the high standard of achievements in plant production and therefore plays an important role in provision of the country with foodstuffs. But the PGR activities, as a rule, do not give profits fast from inputs and is considered to be perspective.

5.2 TRAINING

The National Programme for PGR of Ukraine is adequately staffed with trained personnel. However, the most scientists and specialists have got a general breeding, agronomical, botanical training and they gain their experience in specific activities with PGR in the process of work. There is a special course on the preservation of Environment and genetic resources in the institutes and universities with biological and agrarian profile. To obtain good, well trained staff is necessary to organize training courses in the best genebanks. Firstly, this refers to specialists working at storing, introduction, documentation problems.

The specialists for agronomic evaluation, breeding, genetics, immunology, seed investigation, systematization, the specialists for databases are represented in our programme.

Our country could offer training at scientific and technical level in regional aspect on documentation and evaluation of PGR on the basis of the National Centre and research institutes. International financial assistance would be needed.

The broader agricultural/user community has the opportunity to gain the necessary knowledge and experience on PGR. Our national policy-makers understand why the country should have a PGR programme. Men and women are equally involved in training programmes at all levels. All the country's ethnic groups are involved in PGR activities and have equal rights for training.

Staff turnover is at the average level. There is a serious problem as to involvement of the talented young people, who are not satisfied with the level of their wages. With regard for the importance of the solving problems and their priority, special grants for PGR specialists should be established. International assistance is considered to be very important and necessary.



5.3 NATIONAL LEGISLATION

The quarantine laws of Ukraine regulate the import and export of plant genetic resources accessions by the control as to available quarantine and of seeds is allowed.

There is no need for more stringent quarantine controls as for PGR transfer, because they ensure the fulfilment quarantine laws.

National laws do not restrict the planting out of imported genetic resources. The Government provides incentives to private persons and farmers for the conservation of traditional varieties by imposing taxes at selling their agricultural produce in the market.

The Ukrainian law on “Protection of Varieties” envisages the use of plant varieties for experimental purposes. The joining of Ukraine to UPOV is restrained only by financial difficulties.

The sale and distribution of seeds is governed by the Law of Ukraine on “Seeds”, which regulates seed production and seeds sale at the market, under the circumstances there is a full availability for collective farms and private farmers to the trade in varieties. The seeds of vegetable, medicine crops, planting material of fruit and berry cultures can be sold legally to farmers. The seeds of the collective farms can be traded only in case of availability of licences on major field crops.

The Ukraine has Intellectual Property Rights (IPR) legislation, which doesn't extend its application to PGR, but only includes the methods of creation/ development of the sources and donors of economic traits. Such a condition restrains the exchange of valuable material between specialists and makes its introduction to the genebank difficult. Some researchers assert their rights to this material via the agreements.

The decisions on PGR exchange are taken by the NC and the holders of the collections on the basis of “The Status of NC” and direct agreements between collaborators. The exchange is carried out above all on the basis of mutually beneficial conditions when efficient quantities of the material are available. At present there is an urgent possibility to cover the expenses for samples' postage abroad. Foreign expeditions are allowed only in case of joint programmes, common financing.



5.4 OTHER POLICIES

There are no special incentives for production and marketing of seeds of improved varieties. Certified seeds costs very much and it stimulates its production, but low solvency of collective farms and farmers doesn't permit to redeed it in recent years. To stimulate marketing of certified seeds the Government pays some compensations for varietal bonuses that to some extent help to purchase improved varieties. It doesn't affect PGR conservation as in those crops or local varieties with such characters, which are seldom inquired. As to vegetables the supply of large quantity of seeds of new varieties is gradually excluding the local varieties.

National PGR programme staff and experts are involved in the planning of all major agricultural development projects. Projects are specially appraised, monitored and evaluated for their impact on the conservation and utilization of PGR and for their impact on environment.

Among international agreements affecting the national programme for PGR the "Convention on Biological Diversity" can be mentioned.

In developing its policy in the areas of trade and commerce our government didn't re-focused its activities on PGR that enables free use of plant genetic resources.



CHAPTER 6

International Collaboration

6.1 FAO INITIATIVES

We consider that international collaboration is the basis for developing and realizing the effective system for PGR conservation, their mutually beneficial utilization. Planning the activities on conservation of plants and the whole biological diversity is closely connected with use of the decisions of UNCED and the Convention on Biological Diversity permitted to from the opinion and to take the decisions for the establishment of the National Centre for PGR of Ukraine. The Convention is used at working out the international agreements aimed at PGR conservation and utilization.

The collaboration with International Agricultural Research Centres enables Ukraine to improve its national system on PGR.

IPGRI, the International Institute, in the period of 1993- 94 accomplished three missions in Ukraine on the evaluation of the NC activities with PGR and, particularly, activities related to vegetable genetic resources. The proposals were made and the financial assistance to collaboration between Eastern European countries and the elaboration of European programmes for PGR will enable Ukraine to solve its problems and take part in the international PGR programmes. Especially wide and close collaboration of Ukraine is with the International Centre on improvement of wheat and maize (CIMMYT, Mexico). There exists the exchange of PGR, of evaluation techniques on the base of the agreement. Ukrainian scientists have got training courses in CIMMYT. Wheat, triticale, barley and maize programmes are being developed now. The Joint Seminar on wheat is now in the process of its preparation, which will discuss the PGR activities and it will be held in June 1995 in Ukraine.

The National Centre has also mutually beneficial ties and contacts as to exchange of international and specialists with ICARDA (Aleppo, Syria), International Rice Institute (Manila, the Philippines), International Vegetable Centre (Taiwan).

Within the regional collaboration Ukraine has information relations with the Genebank of Scandinavian countries. Collaboration with the Eastern European countries is related with the exchange of information, seeds and specialist.



Due to the initiative of the Centre for PGR of the Netherlands and the support of IPGRI Ukraine together with six countries of Eastern Europe is carrying the project on PGR documentation. The project stipulates the creation of the unified databases, such as: Passport, Description, etc.

6.2 UNITED NATIONS INITIATIVES

Ukraine was among those that adopted Agenda 21 at UNCED in June 1992. Since that time the Supreme Council ratified the Convention on Biological Diversity, the National Centre for PGR of Ukraine was formed, the PGR system was developed, the inventory of collections was conducted, the steps were taken for PGR preservation - the storehouse for 65 thousand samples was equipped where middle term storage for seeds of the collections is planned.

According to the results of evaluation the sources and donors of valuable economic characters were singled out, which were included into breeding programmes for development of new series of varieties. New species have been introduced into culture: Bunias orientalis L., Kochia roth, Colombian grass, etc.

As to the conservation of biological diversity the work has been done in connection with preservation, characterization and evaluation of plants in the Chernomorskyi Reserve - in the Danube Delta, the Carpathian and other reserves.

The Convention on Biological Diversity complements and strengthens the role of the FAO Commission in the direction of the fuller protection of PGR, creates the legislative basis for activities on different PGR aspects. The role of the Conservation on Biological Diversity and the FAO Commission is to complement each other and to solve an important task - conservation and effective use of PGR

6.3 FAO GLOBAL SYSTEM

Ukraine is not member of the Commission, however, we fully approve its activities and when we overcome the financial difficulties, we shall join it. We always respond to the initiatives of the Commission on conservation and utilization of PGR. They stimulate our more effective activities at the national and regional level. The supposed "International Fund" of the Commission can play an important role in solving the following problems, such as: 1) *in situ* conservation; 2)



conservation *ex situ*; 3) the development of international information nets for PGR; 4) staff training for PGR; 5) maintaining of national programmes for PGR in the countries with the transitional economy and valuable collections.

We envisage our country both as a beneficiary and a potential contributor to this Fund.

6.4 INTERNATIONAL AGRICULTURAL RESEARCH CENTRES

The CGIAR commodity centres have made their contribution to the Ukrainian genetic resources programmes, IPGRI has accomplished tree missions of its specialists and experts on the evaluation of the status of field crops, fruit-berry crops and grapes collections. The CGIAR centres provide methodical (information support on different aspects of PGR activities) and pecuniary aid (equipment for drying and storing seeds of the collections).

CIMMYT (Mexico) sends the genetic resources of spring and facultative wheats, barley, lines and varieties of maize, which after their trials in the local conditions are included into our collections and are used in the breeding programmes in Ukraine.

The similar activities have been initiated between the Ukrainian Rice Experimental Station and International Rice Institute (the Philippines).

We hope to receive a greater support from the CGIAR centres as to the exchange with PGR, evaluation techniques, documentation system (programmes for databases), staff training.

The new initiatives of the CGIAR centres in plant genetic resources could be:

1. regular exchange of information about the composition of collections and material evaluation in the similar zones of other countries;
2. formation of cooperative working groups for evaluation of samples by special methods (for winter and frost-resistance, resistance to latent-stem insects, etc.).

We regard as the most important functions for IPGRI in the next decade would be:

1. support to national and regional programmes;
2. staff training (registration, training courses, seminars);



3. activities directed to the development of strategy and tactics of PGR storing and their effective use;
4. organization of workshops and scientific conferences;
5. formation of common information net for PGR;
6. elaboration of legal recommendations and rules for PGR.

The agreements with the International Centres promote to develop collaboration.

6.5 REGIONAL RESEARCH CENTRES

Ukraine is now establishing a relation with the European Cooperative Programme for GR of onion, wheat, barley and other crops. Information exchange has been establishing. However, we can't become a member of this Programme because of financial difficulties.

Regional initiatives as to their directions solve the following problems:

1. information exchange on germplasm collections and assistance in PGR exchange;
2. organization of workshop and scientific conferences;
3. improvement of evaluation techniques, use and germplasm conservation;
4. further development of international collaboration for solving problems of PGR.

Thus they promote to fulfil the national programmes for PGR.

6.6 BILATERAL INTERGOVERNMENTAL INITIATIVES

The National Centre for PGR of Ukraine has bilateral agreements with All-Russian Plant Breeding Institute named after N.I. Vavilov. The agreement sets up a mutually beneficial collaborative relationship on sharing, using and conserving of PGR, as well as, regeneration of accessions of the collections.



CHAPTER 7

National Needs and Opportunities

After the declaration of independence Ukraine made the first steps for the creation of the National Bank for Plant Genetic Resources. Having old traditions of collecting, investigation and using plant germplasm there was established the National Centre for PGR of Ukraine with the network, based on breeding-genetical and botanical institutions.

There have been established working relations with the International Institute for PGR (Rome, Italy), International Rice Institute (Manila, Philippines), Eastern European Genebanks, with the Genebanks in Germany, France, Holland, Scandinavian countries, USA and others.

The efforts of different institutions for conservation, documentation and application of genetic resources have been combined. The foundation for developing and adopting the Uniform National Program for PGR has been prepared.

The most important necessities at solving the National problems are:

1. for preservation of genetic resources of crops, propagating by seeds it is necessary to build a storehouse, which should be equipped with:

- freezing chambers (-20° C) - 2 pcs;
- moisture-measuring devices - 3 pcs;
- foil seed pouches:
 - 19*16 cm - 40000
 - 20*12 cm - 60000
 - 15*12 cm - 15000
 - 8*10 cm - 50000
 - 6*8 cm - 20000

2. for seed regeneration purposes:

- small tractors - 6 pcs;
- sowing-machines for portion sowing - 6 pcs;
- small threshers - 12;
- seed-cleaning machines - 7;



- means for isolation of cross-pollinated crops;

3. the set of equipment for the laboratory in the process of control of seed viability in the gene pool;

4. for identification and evaluation of germplasm accessions sets of equipment and reagents are required for:

- protein electrophoresis
- polymorphism of DNA restrictors' analysis
- analysis for protein, starch, extractive substances' vitamins, alkaloids, volatile oils, etc. content;

5. for documentation and exchange of information the following equipment is necessary:

- computers - 10
- xeroxes - 4
- E-mail - 1
- CD-ROM player - 1
- editing system with multiplying equipment - 1

6. for storage of vegetative propagated crops *in vitro* it is necessary to get a set of equipment and reagents;

7. for conservation of perennial crops it is necessary to get

- irrigation devices - 4 sets;
- means for plant protection;

8. for conducting collecting missions all over the territory of Ukraine for the purpose of collecting and preservation of local and wild species' genetic resources it is necessary to purchase

- an expedition car - 1
- an altimeter, the devices for orientation in a certain locality
- special clothes for expeditions

9. training the personnel of the Ukrainian centre in the leading Genebanks and research institutions of the world on subject areas:

- seed storage in the Genebank - 2 persons
- in vitro* conservation - 2 pers.
- data documentation - 2 pers.
- new methods of identification and evaluation - 5 pers.



10. For the material support and keeping of qualified staff in the system of the National Centre for PGR of Ukraine there is a need to receive International grants.

The solution of the above-mentioned problems requires reliable financial and material provision for Plant Genetic Resources Program of Ukraine.

The national opportunities for implementation of the PGR programme are limited at the present stage. However, in spite of the economical crisis, the Government finances these activities, considering them the order of priority. International support in recent years is also regarded as important and necessary.



CHAPTER 8

Proposals for a Global Plan of Action

The National Centre for PGR of Ukraine considers the most important issue in conservation and effective use of plant genetic resources the following:

1. creation and maintenance of the National programs, directed to conservation of landraces and wild relatives of cultivated crops;
2. forming international scientific groups for the development of new low-power-consuming technologies for germplasm seeds' storage, because contemporary technology with the use of freezing chambers is high-power-consuming;
3. development of reliable technology *in vitro* for long-term storage of vegetative propagated crops;
4. giving an international status to the preservations located in the Carpathians, the Crimea and the Ukrainian Steppe zone;
5. systematic preparation of the scientific staff for the work with PGR with regard to the international requirements, especially, working on coordination and information exchange;
6. organization of International seminar for national curators of PGR Program.