

COUNTRY REPORT ON THE STATE OF PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE

REPUBLIC OF SERBIA



COUNTRY REPORT

Republic of Serbia

Note by FAO

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INTRODUCTION

1. Description of the country

Serbia is located in Southeast Europe, in the central part of the Balkan Peninsula. Serbia borders to the East with Bulgaria, to the North East with Romania, to the North with Hungary, to the West with Croatia and Bosnia and Herzegovina, and to the South with Albania and Macedonia. Serbia is referred to as the cross-roads of Europe, its river valleys make up the shortest link between Western and Central Europe, on the one side, and the Middle East, Asia and Africa, on the other.

Longest river is Danube (flows for 588 of its 2 783 kilometer course through Serbia). With the commissioning of the Rhine-Main-Danube Canal in September 1992, the Black Sea and the Near and Far Eastern ports have come much nearer to Europe. Serbia is linked to the Adriatic Sea and Montenegro via Belgrade-Bar railway.

The Republic of Serbia occupies the surface area of 88.361 sq. km. The length of Serbia's border is 2 114.2 km. The total length of railway network is 3 619 km, while the total length of roads is 42 692 km (asphalt) and 24 860 km (concrete).

Largest Cities are: Belgrade (1 576 124 citizens), Novi Sad (299 294), Nis (250 518). Belgrade is the capital of Serbia, the country's administrative, economic and cultural centre.

Northern Serbia is mainly flat, while its central and southern areas consist of highlands and mountains. The flatlands are mainly in the Pannonian Plain (Vojvodina) and its rim: Macva, the Sava Valley, the Morava Valley, Stig and the Negotin Marches in Eastern Serbia. The Morava-Vardar valley is the most important connection between the north and the south of the Balkan peninsula. Near Belgrade, it intersects the Danube east-west direction, thus creating a geo-strategic knot. Farmland comprises 70% of the total surface area of Serbia, while 30% is woodland. Of its mountains 15 reach heights of over 2 000 meters, the highest being Djeravica in the Prokletija range (2 656 m).

Serbian rivers belong to the basins of the Black, Adriatic and Aegean Seas. Three of them, the Danube, Sava and Tisa, are navigable. Longest rivers are: Danube, Zapadna Morava (flows for 308 km of its 308 km course through Serbia), Juzna Morava (295 km of 295 km), Ibar (272 km of 272 km), Drina (220 km of 346 km), Sava (206 km of 945 km), Timok (202 km of 202 km), Velika Morava (185 km of 185 km), Tisa (168 km of 966 km), Nisava (151 km of 218 km), Tamis (118 km of 359 km), and Begej (75 km of 244 km).

The river Danube with its tributaries has nowadays the biggest hydro potential. The Danube and its tributaries Tisa, Sava and Begej are connected with a water irrigation system. The whole length of the irrigation system is 939 kilometres, 673 of which are navigable.

Apart from Serbia proper, the Republic of Serbia contains two autonomous provinces: Vojvodina and Kosovo-Metohija. According to the 1991 census, Kosovo-Metohija has 1 956.196 inhabitants, and the latest 2002 census puts the population of Serbia proper and Vojvodina at 7 498 001.

Vojvodina consists of 45 municipalities and seven districts whose seats are Subotica, Zrenjanin, Kikinda, Pancevo, Sombor, Novi Sad and Sremska Mitrovica. Novi Sad is the administrative, economic and cultural seat of the province. Vojvodina is intersected by three big navigable rivers: the Danube, Tisa and Sava. They divide its territory into three clearly visible units: Banat in the east, Backa in the north-west and Srem in the south-west. All three regions are characterised by fertile arable land, economic and cultural development, high population density and demographic variety. The relief of Vojvodina is primarily flat except for Srem which is dominated by the Fruska Gora mountain and the south-east of Banat with its Vrsacki Breg hill.

Kosovo - Metohija is an autonomous province within the Republic of Serbia and on the basis of the United Nations Security Council Resolution 1 244 which was adopted on June 10, 1999, it is under the interim civil and military administration of the UN. Metohija consists of 29 municipalities and five districts, with seats in Pristina, Pec, Prizren, Kosovska Mitrovica and Gnjilane. Pristina is the administrative seat of the province. Kosovo-Metohija is separated from neighbouring Albania by the mountain massif of Prokletije and is separated from Macedonia by Sar mountain. The province is made up of two regions which differ from each other in the soil content and climate and are divided by Cicavica and Crnoljevo mountains. The characteristic of the province is high population density with a pronounced domination of Albanian population. This Serbian southern province has a varied relief: it is edged with mountainous wreaths which are intersected by canyons and very wide valleys of the rivers Binacka Morava, Lab and Beli Drim. Kosovo

is placed in the south-eastern and eastern part of the province, near the Morava-Vardar valley. It is primarily hilly land so that wealth in ores is the main natural potential of this region. On the other hand, Metohija is placed in the west and north-west of the province and consists of fertile arable land. The geographic division between Metohija-Kosovo caused the difference of their flora and fauna. Metohija has the characteristic influence of the Mediterranean thus being the region with the highest number of Mediterranean species of flora and fauna in the whole Serbia, while Kosovo does not differ from the rest of Serbia.

The official language in Serbia is Serbian and the script in official use is Cyrillic, while Latin script is also used. In the areas inhabited by ethnic minorities, the languages and scripts of the minorities are in official use, as provided by law.

Climate in Serbia is temperate continental, with a gradual transition between the four seasons of the year. An average annual temperature is 11-12°C. The temperatures in January and June average -1 - +1°C and 22 - 23°C respectively. Average annual precipitation ranges from 600mm to 800mm in the plains and between 800 mm and 1 200 mm in the mountains.

Natural features, diverse relief and climatic diversity result in great wealth of plant species (including many endemic plants). They are good prerequisites for agricultural production, but still very insufficiently utilized.

2. Agricultural sector

Land and climate conditions are highly conducive to the development of agriculture.

Primary agricultural production and agro-processing was estimated to be 15 percent of GDP and 20 percent of exports in 2005. Agricultural land amounts to 5 718 599 ha (0.56 ha per capita).

Out of Agricultural land 4 674 622 ha are arable land (0.46 ha. per capita), 1 006 473 ha pastures, and 37 504 ha fish-ponds.

The total 4 674 622 ha of arable land is sown with cereals (2 453 374 ha, 52 %), reed-marshes and ponds forage (494.598 ha, 11%), industrial crops (348 641 ha, 7.5%), vegetables (300 484 ha, 6.5 %), orchards (256 887 ha, 5.5 %), vineyards (85 763 ha, 2 %), nursery-gardens (2 164 ha, 0.05%), not cultivated (64 722 ha, 1.5%), meadows (666 702 ha, 14%).

Serbia's irrigation system covers 180 000 ha. Yet only 30 000 ha of cultivated land are irrigated, which means that irrigation in Serbia is minimal. For this reason, potential for greater production of sugar beet, sunflower, soy, vegetables and forage are not fully exploited.

The rural population, at 1.3 million, is 16% of the Serbian total and the number of these economically active within agriculture is about 0.67 million. According to the latest data, the population engaged in agricultural production is rapidly aging. There are about 6 000 townships (villages) in Serbia. Rural regions stage numerous events presenting ethno-culture and folk art, including fairs, exhibitions, kermises and various competitions. The structure of Serbia's agricultural labor force is as follows: livestock breeding (43%), field crop farming (42%), fruit and wine production (12%), other crops (3%).

Livestock production is dominated by cattle, while fields and gardens cover most farmland. There is a marked neglect of the potential of meadows, pastures and fields for more intensive and efficient livestock production.

Agricultural land is cultivated using 425 000 double-axle tractors, 261 000 single-axle tractors, 25 000 combines and more than 3 million machine tools. Rural transport infrastructure is underdeveloped, while agricultural machinery and equipment are in generally poor condition. The average age of tractors is 12 years, while combines average 15 years old.

Mineral fertilizer consumption is 40 kilos per hectare. The use of agrochemicals is fairly low and kept in check, with a highly organized system of regular veterinary, phytosanitary and sanitary inspections.

The agricultural sector is characterized by double structure:

- Large corporate farms and agro-companies (about 1 050), with 15% of the arable land (0.7 mil ha)
- Privately-owned farms, with 85% of the arable land (around 4.0 mil ha). They can be divided on two categories: commercial farms and small private farms. Privately owned commercial farms, averaging about 10 ha, account for 46 percent of arable land. Only 5.5 % producers of the total of 778 891 cultivate over 10 ha. The remaining 39 percent of arable land comprises over 600 000 small private farms, most under 5 ha and often consisting of several fragmented parcels of land, which produce agricultural products primarily for their own use and depend heavily on non-farm income.

Serbia has significant comparative advantages in agriculture, thanks to an abundance of high quality agricultural land, a strategic trading location, and an educated workforce.



MAIN BODY

THE STATE OF DIVERSITY



1.1 The state of diversity

Serbia is characterized by a huge geographic and biological diversity reflected in the richness of its indigenous flora which exists as various vegetation formations of terrestrial and aquatic ecosystems. Dominant ecosystems (biomes) in Serbia include deciduous forests, steppes, coniferous forests, meadows and alpine “tundra”.

Serbia is considered as one of the 158 world biodiversity centers, based upon the total number of plant species (including mosses) and territory size (biodiversity index of 0.718). The main factors of such floral diversity are: historical background of vegetation development, geographical position, climate, relief, presence of streams.

According to the most recent estimates the flora of Serbia contains 3 662 taxa, i.e. 3 272 species and 390 subspecies, making Serbia a country with very high floristic diversity and density per unit area compared to other European countries. All plant species are included in 141 families and 766 genera. Considering the vegetation diversity of Serbia, over 600 individual plant communities have been identified, including forests (deciduous and coniferous), steppes, meadows, pastures, vegetation of sand dunes and saline soils, swamps, alpine tundra, etc.

1.1.1 Major crops

Maize and wheat are the most widespread crops in the country. Other important cereals in country are: barley, oat and rye.

Main industrial crops grown in Serbia are: sunflower, soybean, sugar beet, oil turnip, tobacco, industrial pepper, and hop.

From fodder crops, the highest importance has: alfalfa, clover, sweet-pea, forage peas, forage (silage) maize, fields, grasslands and forage beet.

Out of vegetable, significant areas cover: potatoes, tomato, pea, cabbage and kale, onion, pepper, beans, melons and watermelons, carrot, and cucumber.

Regarding fruit, high number of trees was recorded in apples, pears, plums, nuts, cherries, sour cherries, apricots, peaches, and quinces. In this group could be added grapes, strawberries, and raspberries.

1.1.2 Main products based on plant production

The main products based on plant production from Serbia are: mercantile grains, fresh products, commercial seeds, food and drink, wood and wood products, meat and meat products etc.

Total export of agricultural products is about 1.7 billion dollars, and total import is about 1.1 billion dollars. In near future Serbia expects to sell 1.5 million tones of maize, 1 million tones of wheat, 150 000 tones of meat, more than 200 000 tones of sugar and 100 000 tones of plant oils. About 53% of total Serbian export goes on EU market.

Main products of Serbian food and drink industry are: fruits and vegetables, edible oils and margarine, ice-cream and frozen blends, milling products, starch and starch products, bread, pasties and cakes, biscuites, sugar, macaroni and noodles, spices, supplements and herb teas, tobacco, alcoholic drinks, wines, brewing, refreshment beverages, fruit and vegetable juices, etc.

Several agribusiness sectors in Serbian can be emphasized:

Fruits sector

Serbia is World leader in raspberry production; other key fruits are apples, plums, grapes and cherries. Fruit industry exports juices, concentrates, purees, jams, and frozen and dried fruit. Demand for Serbian fruit is growing steadily, with exports showing an upward trend not just in quantity, but also in the number of countries which are becoming importers. Apart from being sold fresh, Serbian plums are also often processed. Plums are used in the production of šljivovica, a traditional Serbian plum brandy. In 2004, šljivovica production exceeded 400 000 liters. Dried plums are also a specialty of Serbia but most people, and children in particular, would claim that plum jams and preserves are the most delicious types of processed plum product.

Vegetable sector

The vegetable processing industry in Serbia encompasses roughly 25 companies with the capacity for production of frozen, canned and dried vegetables. The biggest producers of vegetables are located in the northern region and central parts of Serbia. Serbia is equally known for the production of high quality crops with year round supply (potatoes, pepper, onions, tomatoes, mushrooms, cabbage, carrots, and beans) and seasonal vegetable crops such as lettuce, leek and spring onion. Other major vegetable crops are also widely grown (spinach, carrots, zucchini, radish, red radish, horseradish, parsley, parsnip, and celery).

Organic sector

There is a wide range of organically produced raspberries, sour cherries, prunes, organic frozen products like strawberries, blackberries, apples, vegetables and other juice concentrates, dried prunes and other dried fruit, wheat, barley, sunflower, corn, pumpkin seed. Organic food production has a long standing tradition in Serbia. This is especially true in the field of fruit and vegetable production. As Serbia is considered to be a country with one of the lowest rate of pesticides utilization in Europe (40 kg per ha), the growth of organic food production will be easy to achieve.

Forest communities in Serbia are abounding with wild berries and collecting is traditionally present in rural economies. Wild fruits are processed in households as a part of tradition, particularly in hilly and mountainous regions, but also in lowland rural areas. In mountainous regions, the population mostly gathers blueberry, juniper blackberry, raspberry, dog rose, forest strawberry and, in hilly region, walnut, hazelnut, pomes and drupes etc. In lowlands, quite often they use elderberry and alike. Most of the harvested organic food is exported to foreign markets where this type of Serbian good is highly rated.

The agribusiness sectors employed 154 712 people in 2002 - around 10.61% of the workforce in Serbia - within 3 269 enterprises. Many companies have acquired quality standards such as Hazard Analysis and Critical Control Point (HACCP) and others.

1.1.3 Economic significance of the major crops and the main products

Maize is sown in 2007 at 1 201 832 ha (with total yield of 3 904 825 t). Other important cereals covered in 2007 the follow areas: wheat at 559 257 ha (1 863 811 t); barley 93 844 ha (258 998 t), oat 39 724 ha (76 880 t) and rye 5 548 ha (10 902 t).

Average yield of maize in 2007 was 3 249 kg per ha, while other cereals formed: wheat 3 332 kg per ha, barley 2 759 kg per ha, oats 1 935 kg per ha, and rye 1 965 kg per ha.

Most important industrial crops were sown in 2007 on the follow area: sunflower at 154 793 ha (294 502 t); soybean 146 988 ha (303 950 t), sugar beet 79 016 ha (3 206 380 t), oil turnip 12 934 ha (29 825 t), tobacco 8 043 ha (11 136 t), industrial paprika 4 972 ha (8 764 t), and hop 76 ha (82 t).

For industrial crops, average yields were: in sunflower 1 902 kg per ha, in soybean 2 067 kg per ha, in sugar beet 40 578 kg per ha, in oil turnip 2 305 kg per ha, in tobacco 1 384 kg per ha, in industrial paprika 1 762 kg per ha and in hop 1 078 kg per ha.

In 2007, harvest area of vegetable was: potato 81 379 ha (total production of 743 282 t), tomato 20 583 ha (152 005 t), pea 13 149 ha (35 384 t), cabbage and kale 21 245 ha (280 191 t), onion 19 018 ha (116 037 t), pepper 19 252 ha (150 257 t), Beans 22 405 ha (39 224 t), melons and watermelons 15 758 ha (205 351 t), carrot 7 597 ha (56 735 t), and cucumber 9 113 ha (59 754 t).

Average yields of vegetable were estimated as follow: potato 9 133 kg per ha, tomato 7 384 kg per ha, pea 2 691 kg per ha, cabbage and kale 13 188 kg per ha, onion 6 101 kg per ha, pepper 7 804 kg per ha, beans 947 kg per ha, melons and watermelons 13 031 kg per ha, carrot 7 468 kg per ha, and cucumber 6 557 kg per ha.

Fodder crops covered in 2007: alfalfa 186 268 ha with total production of hay 904 838 t, clover 118 876 ha (435 499 t), sweet pea 8 132 ha (22 537 t), forage peas 5 137 ha (15 013 t), forage maize 26 302 ha (460 329 t), fields 613 907 ha (906 404 t), grasslands 739 588 ha (360 413 t), and forage beet 5 357 ha (53 829 t).

Average yields of fodder crops were the follow: alfalfa hay 4 857 kg per ha, clover hay 3 663 kg per ha, sweet pea 2 771 kg per ha, forage peas 2 922 kg per ha, forage maize 17 501 kg per ha, fields 1 476 kg per ha, grasslands 487 kg hay per ha, and forage beet 10 048 kg per ha.

In Serbia there are 15 037 000 apple trees of productive age, 4 723 000 pear trees, 41 885 000 plum trees, 1 730 000 nut trees, 1 823 000 cherry trees, 8 651 000 sour cherry trees, 1 572 000 apricot trees, 4 064 000 peach trees, 859 000 quince trees. There are also 309 000 grape vines of productive age. Strawberries grows on 7 829 ha, and raspberries on 14 496 ha.

Fruit production in Serbia is 245 228 t of apples (16 kg per tree), 60 523 t of pears (12 kg per tree), 680 566 t of plums (16 kg per tree), 24 823 t of nuts (14 kg per tree), 28 546 t of cherries (15 kg per tree), 99 893 t of sour cherries (11 kg per

tree), 22 952 t of apricots (14 kg per tree), 65 624 t of peaches (16 kg per tree), 13 444 t of quinces (15 kg per tree), 353 343 t of grapes, 33 129 t of strawberries (4 231 kg per ha) and, 76 991 t of raspberries (5 311 kg per ha).

1.1.4 Regional variation in production systems and products

There is a significant regional variation in production systems and products. The most significant effect on production system has the elevation. From this aspect, Serbia can be classified into four regional types:

- Lowland, up to 200 m (30 % of the total land surface area) with the dominant productions of cereals, industrial plants, beef and pork, milk, together with the developed industrial processing of agricultural crops. Large farms and agro-companies are settled in this region.
- Lowland-hilly, from 200 to 500 m (10%) with dominant small farmers' households, and production of field crops, different domestic animals, fruits, and grapes.
- Hilly, from 500 to 1 000 m (35%), with dominant spring grain crop, potato, cattle, sheep. Meadows, pastures and forests occupy the significant part.
- Mountainous, exceeding 1 000 m (20%) with predominantly pastures and forests. This is a livestock raising region - sheep, cattle, and the region of potato growing.

The plains of Vojvodina, Kosovo, Metohija, Pomoravlje, Posavina, Tamnava, Krusevac and Leskovac offer favorable conditions for mechanized field crop farming and vegetable production.

Rolling hills and foothills support fruit and wine production and livestock breeding. The hills and mountains of Zlatibor, Rudnik, Stara Planina, Kopaonik and Šara are attractive for developing sheep and cattle production and forestry.

1.2 Diversity within and between crops

1.2.1 State of diversity of major crops

Total number of plants species used in Serbian commercial agricultural production is 233 (without flowers). There are 185 species of field crop and 48 species of fruits and grape.

The forests are composed of about 155 indigenous species of trees (120 deciduous and 35 coniferous species). The most represented species of broadleaf trees are beech and oak, and pine and spruce of coniferous species.

Out of 185 mentioned commercial agricultural species, there are 205 different kinds of crops because some species contain several varieties. Such species are *Brassica oleracea* (with varieties *capitata*, *sabauda*), *Beta vulgaris* (with varieties *vulgaris* and *conditiva*) etc.

Major crops in Serbia are:

- **Cereals** (*Avena sativa*, *Hordeum vulgare*, *Secale cereale*, *Triticosecale*, *Triticum aestivum*, *Zea mays*)
- **Industrial plants** (*Beta vulgaris*, *Brassica napus*, *Cucurbita pepo*, *Glycine max*, *Helianthus annuus*, *Humulus lupulus*, *Nicotiana tabacum*)
- **Fodder crops** (*Dactylis glomerata*, *Festuca pratensis*, *Festuca rubra*, *Lolium multiflorum*, *Lolium perenne*, *Medicago sativa*, *Phleum pratense*, *Trifolium pretense*)
- **Vegetables** (*Allium cepa*, *Brassica oleracea*, *Capsicum annuum*, *Citrullus lanatus*, *Cucumis sativus*, *Daucus carota*, *Lactuca sativa*, *Lycopersicon lycopersicum*, *Phaseolus vulgaris*, *Pisum sativum*, *Solanum tuberosum*).
- **Fruits and grape** (*Armeniaca vulgaris*, *Cydonia oblonga*, *Fragaria*, *Juglans regia*, *Malus domestica*, *Prunus avium*, *Prunus cerasus*, *Prunus domestica*, *Prunus persica*, *Pyrus communis*, *Rubus*, *Vitis vinifera*).

Very rarely some old cultivars introduced from abroad long time ago could be found in fodder (Reichersberger in *Trifolium pretense*, Angeliter Milka in *Trifolium repens*), as well as in vegetable crops (Autumn Beauty, Bianca di giugno, Stuttgarter Riesen, White Lisbon, Zittauer gelbe in *Allium cepa*, Amager, Braunschweiger, Delfi, Ditmarcher Fruher, Fruheste Wunder in *Brassica oleracea*, Californian Wonder, Kalvil, Paradiconalaku zold in *Capsicum annuum*, Sugar Baby in *Citrullus lanatus*, Honey Dew, Ananas in *Cucumis melo*, Corto piccolo di Vorgebirg, Lungo verde degli ortolani, Sportresisting in *Cucumis sativus*, Demi-longue de Chantenay, Danvers Half Long, Nantese, Mercado de Paris in *Daucus carota*, Parris White, Winter Butterkopf in *Lactuca sativa*, Campbell, Heinz 1370, Marmande in *Lycopersicon lycopersicum*, Mezza rama di Cipro, Top Crop in *Phaseolus vulgaris*, American Wonder, Wunder von Kelvedon in *Pisum sativum*, Bintje,



Desiree in *Solanum tuberosum*. After long period of growing in Serbia, these foreign old cultivars changed their genetic structure and became adapted to local conditions.

Domestic population of field crops and vegetables are still grown on-farm. Several example of such population will be given in later chapters.

Some old cultivars are still maintained in the fruit production. However, there is a danger of genetic erosion of these resources.

1.2.2 State of diversity of minor crops and underutilized crops

Minor crops and underutilized crops in Serbia are:

- **Cereals** (*Triticum durum*, *Triticum spelta*, *Fagopyrum esculentum*, *Panicum miliaceum*, *Sorghum bicolor*),
- **Industrial plants** (*Arachis hypogea*, *Brassica nigra*, *Cannabis sativa*, *Carthamus tinctorius*, *Helianthus tuberosus*, *Linum usitatissimum*, *Ricinus communis*, *Papaver somniferum*, *Sesamum indicum*, *Sinapis alba*, *Sorghum bicolor*),
- **Fodder crops** (*Arrhenatherum elatius*, *Agrostis gigantea*, *Cichorium intybus*, *Festuca arundinacea*, *Lathyrus sativus*, *Lolium baucheanum*, *Lotus corniculatus*, *Onobrychis viciaefolia*, *Phalaris canariensis*, *Poa pratensis*, *Setaria italica*, *Sorghum sudanense*, *Trifolium incarnatum*, *Trifolium repens*, *Trifolium subterraneum*, *Vicia pannonica*, *Vicia sativa*, *Vicia villosa*)
- **Vegetables** (*Allium ascalonicum*, *Allium fistulosum*, *Allium porrum*, *Allium schoenoprasum*, *Apium graveolens*, *Armoracia rusticana*, *Asparagus officinalis*, *Atriplex hortensis*, *Beta vulgaris* var. *conditiva*, *Cicer arietinum*, *Cichorium endivia*, *Cichorium intybus*, *Cucurbita maxima*, *Cucurbita patissonina*, *Cucurbita pepo*, *Cynara cardunculus*, *Foeniculum vulgare*, *Hibiscus esculentus*, *Lagenaria siceraria*, *Lens culinaris*, *Lepidium sativum*, *Pastinaca sativa*, *Petroselinum hortense*, *Phaseolus angularis*, *Phaseolus coccineus*, *Portulaca oleracea*, *Raphanus sativus*, *Rheum rhaponticum*, *Rumex acetosa*, *Rumex patientia*, *Scorzonera hispanica*, *Solanum melongena*, *Spinacea oleracea*, *Taraxacum officinale*, *Valerianella locusta*, *Vicia faba*, *Vigna radiata*).
- **Fruits and grape** (*Achinidia chinensis*, *Amygdalus communis*, *Castanea sativa*, *Ceratonia siliqua*, *Citrus grandis*, *Citrus medica*, *Cornus mas*, *Corylus avellana*, *Ficus carica*, *Mespulus germanica*, *Morus alba*, *Morus nigra*, *Pistacia vera*, *Prunus cerasus*, *Prunus persica* var. *nectarine*, *Punica granatum*, *Ribes grossularia*, *Ribes nigrum*, *Ribes niveum*, *Ribes rubrum*, *Rosa domascena*, *Sambucus nigra*, *Sorbus domestica*, *Vaccinium vaccinium*, *Ziziphus jujube*)
- **Medicinal and aromatic plants** (*Achillea millefolium*, *Acorus calamus*, *Agrimonia eupatoria*, *Alcea rosea*, *Althaea officinalis*, *Anethum graveolens*, *Angelica archangelica*, *Artemisia absinthium*, *Artemisia dracunculus*, *Borago officinalis*, *Carum carvi*, *Chamomilla recutita*, *Coriandrum sativum*, *Digitalis lanata*, *Digitalis purpurea*, *Foeniculum vulgare*, *Glycyrrhiza glabra*, *Gypsophyllia paniculata*, *Hypericum perforatum*, *Hyssopus officinalis*, *Lavandula angustifolia*, *Leonurus cardiaca*, *Levisticum officinale*, *Majorana hortensis*, *Malva silvestris*, *Melissa officinalis*, *Mentha spicata*, *Ocimum basilicum*, *Pimpinella anisum*, *Ruta graveolens*, *Salvia officinalis*, *Salvia sclarea*, *Satureja hortensis*, *Satureja montana*, *Sideritis scardica*, *Silybum marianum*, *Sinapsis alba*, *Thymus vulgaris*, *Trigonella foenum graecum*, *Urtica dioica*, *Valeriana officinalis*, *Verbascum densiflorum*)

Number of registered cultivars in minor crop is significantly lower than in major crops, i.e. common buckwheat – 2, millet – 2, and sorghum – 3 cultivars. Great value of genetic resources in this group of plants lies in a numerous old, primitive varieties and bewildered populations, landraces, indigenous material, etc.

Some of them are still maintained in the production (Wena in *Arrhenatherum elatius*, Rossa mammoth in *Beta vulgaris* var. *crassa*, Bangholm wilby otofte and Hoffman's Gelbe in *Brassica napus* var. *napobrassica*, Magdeburger in *Cichorium intybus* var. *sativus*, Jabelska in *Festuca pratensis*, Naki in *Lolium perenne*, Bosnalotus in *Lotus corniculatus*, Foka in *Phleum pratense*, Poppelsdorfer in *Vicia villosa*). However, there is a danger of genetic erosion of these resources caused by gradual introduction of modern high-yielding cultivars.

1.2.3 State of diversity of wild plants

In marginal area, which is not used for agriculture, there is many wild relatives of crop plants. A number of cultivated crops have their wild relatives in natural meadows and forests.

The most valuable indigenous plant genetic resources are legumes (26 species of *Lathyrus*, 50 species of *Trifolium*, 27 species of *Vicia*) and grasses (*Festuca*, *Agrostis*, *Poa*). In the natural plant communities there are also many wild relatives of fruits (*Prunus avium*), vegetables (30 species of *Allium*, wild chicory), as well as a wide range of aromatic, medicinal (*Atropa belladonna* - banewort, *Centaureum umbellatum* - common centaury, *Chelidonium majus* - celandine, *Primula veris*

- cowslip, *Veratrum album* - white hellebore) and flower plants (bluebell etc.).

Many forest endemic species have their primary gene centers in the territory of Serbia, i.e. conifer species (*Pinus peuce*, *Pinus heldreichii*, *Pinus nigra*, *Picea omorika*, *Taxus baccata*) and broadleaf species (*Prunus laurocerasus*, *Acer heldreichii*, *Fraxinus pallisae*, *Forsythia europaea*, *Corylus colurna*). Within forest genetic resources, numerous wild fruit species in forest ecosystems are especially significant. In the natural forests could be found *Crataegus monogyna* (hawthorn), *Juniperus communis* (common juniper), *Betula pendula* (birch), etc.

All these wild species show a high degree of diversity.

1.2.4 List of protected and endangered species

A total of 215 plant species is protected by Direction of natural rarities protection in Serbia (Kišgeci i Cvetković, 1998), what means 17.7% of species of the total Serbian flora is under state control. The Direction includes 12 fern species, 7 angiosperms and 196 vascular plants.

In aim to protect the biodiversity in Serbia, scientific publication "Red data book of Serbian flora and fauna" was written in 1999. This book contains the preliminary list of the most threatened plants, according to IUCN, the International Union for Conservation of Nature. Some of threatened plants are included in the worlds and European Red List. Some of them are listed below:

Picea omorika (in regions of Drina, Tara and Milesevka rivers, western Serbia), *Taxus baccata*, *Pinus peuce* (mountains Sar-planina and Prokletije), *Paeonia tenuifolia* (sand Deliblatska pescara), *Adonis vernalis* – yellow pheasant's eye (mountain Fruska Gora, sand Suboticka pescara), *Drosera rotundifolia* (mountain Stara Planina, Vlasina river), *Pulsatilla grandis* (Fruska Gora, Deliblatska pescara), *Leontopodium alpinum* (mountains Kopaonik, Mucanj, Prokletije), *Gentiana lutea* (mountain Golija), *Cypripedium calceolus* (mountain Suva Planina) – protected by UNESCO as world's natural rarity, *Anemone nemerosa*, *Nimphaea alba*, *Lilium martagon*, *Stipea pennata*, *Fritillaria gracilis*, *Ramonda nathaliae* etc.

Despite the significant efforts in protection of natural resources (especially in meadows and pastures), a great number of plant species has disappeared.



THE STATE OF *IN SITU* MANAGEMENT

2.1 Cereals and maize

According to estimation, a total of 8 646 accessions belong to the “Cereals and maize” group in Republic of Serbia (RS), including 1 509 accessions in wheat, 447 accessions in barley, 260 accessions in oat, 46 accessions in rye, and 6 384 accessions in maize. Out of this number, 2 758 accessions (cultivars, breeds, landraces, and relatives) are grown on-farm and *in situ*, mostly within germplasm collections of state or private institutions (Table 1).

TABLE 1
Number of accessions of cereals and maize grown *in situ*

		Wheat	Barley	Oats	Rye	Maize
Instituts	Cultivars	200	70	10	1	700
	Breeds	500	100	20	5	950
Others	Landraces	50	10	5	5	50
	Relatives	50	20	10	2	0
Total		2 758	800	200	45	1 700

The great part of cereals grown *in situ* is registered domestic cultivars (data for 2008): oat – 10 cultivars, barley – 70, rye – 1, triticale – 25, wheat – 200, and maize – 700. In addition, genetic resources of cereals consist of breeding lines selected at different breeding institutes. Old, primitive varieties and local populations (landraces) of major cereals could be found only on the farmer’s fields in marginal agricultural regions.

Wild relatives of cereals could be also finding *in situ*. According to Josifović (1977) floristic long term screening, biodiversity of cereal wild relatives, *Elimus*, *Secale*, *Hynaldia*, *Triticum* and *Aegilops* genera has been denoted in Serbia. The results reported require revision and further examination to be updated, cause of rapid localitiy degradation, and biodiversity erodion that is most likely in progress (Table 2).

TABLE 2
Wild relatives of cereals in Serbia (Josifović, 1977)

Classification	Local name	Localities
<i>Elymus crinitus</i>	Maljenica	Sandy and stony localities in Danub area from Ram to Radujevac, and near Čačak and Valjevo
<i>Elymus europaeum</i> (<i>Hordeum europaeum</i>)		Sandy and stony localities near Majdanpek, Potropinje, Peklen
<i>Secale silvestre</i>	Divlja raž	Growing spontaneously on sandy soil along the Danube from Ram to Radujevac
<i>Secale montanum</i>	Divlja raž	Stony soil, and mountain pasture land near Kruševac
<i>Haynaldia villosa</i> (<i>Triticum villosum</i>)		Dry pastures, sands, uncultivated land around Smederevo
<i>Triticum monococcum</i>		Very rare, at high altitude localities may be found cultivated
<i>Triticum dicocum</i>		Sporadically grown in mountain regions of East Serbia
<i>Triticum spelta</i>	Krupnik	In mountain areas of Raška, only
<i>Aegilops triuncialis</i>		Could be found on different localities in Serbia



2.2 Industrial crops

There is 10 species of industrial crops with different number of accessions grown *in situ*. These species are: Sunflower, *Helianthus annuus* L., Soybean, *Glycine max* L., Sugar beet, *Beta vulgaris* var. *altissima* DC, Tobacco, *Nicotiana tabacum* L., Rapeseed, *Brassica* sp., Broomcorn, *Sorghum bicolor* (L.) Moench., Oil pumpkin, *Cucurbita pepo* L., Hop, *Humulus lupulus* L., Hemp, *Cannabis sativa* L., and Castorbean, *Ricinus communis* L.

The great part of industrial plants grown *in situ* at different scientific institutes is registered domestic cultivars (sugar beet – 60, rapeseed – 9, soybean 21, sunflower – 47, Castorbean - 4, Hemp - 31, and Flax - 17. Only in tobacco, both, domestic cultivars (16) and old domestic populations (6 oriental, 7 half-oriental) are in use.

2.3 Forage crops

Family *Fabaceae*, which includes many important forage crops in Serbian flora, comprises 34 genera, out of the most interesting are *Trifolium* with 50 species, *Vicia* with 27, *Medicago* with 11 i *Lotus* with 4 species. In Serbia, family *Poaceae* is represented by 70 genera, out of the following are the most important as forages *Poa* (17 species), *Phleum* (8), *Festuca* (21), *Lolium* (5), *Agrostis* (6), *Dactylis* (3) i *Bromus* (14 species).

Many of mentioned species are characterized by high number of intra-species taxa, such as subspecies, varieties and forms.

Within collections of fodder crop accessions grown *in situ* dominate new domestic varieties, which could be divided into three groups:

- **Perennial legumes:** Alfalfa *Medicago sativa* L. (21 landraces), Esparcet *Onobrychis viciaefolia* Scop. (2), Wight clover *Trifolium repens* L. (1), Red clover *Trifolium pratense* L. (6), Bird's foot trefoil *Lotus corniculatus* L. (4). Total number of landraces of perennial legumes is 32 Ukupno sorti višegodišnjih leguminoza 32 sorte.
- **Perennial grasses:** Oat-grass *Arrhenatherum elatius* L. (3 landraces), Cocksfoot *Dactylis glomerata* L. (1), Tall fescue *Festuca arundinacea* Schreb. 1, Meadow *Festuca pratensis* Huds. 1, Red fescue *Festuca rubra* L. 1, Italian ryegrass *Lolium multiflorum* Lam. (2), Perennial ryegrass *Lolium perenne* L. (2), Timothy *Phleum pratense* L. (1). Total number of landraces of perennial grasses is 12.
- **Other forage species:** Alpia *Phalaris canariensis* L. (1 landraces), Field pea *Pisum sativum* L. (11), Fodder beet *Beta vulgaris* L. (3), Setaria *Setaria italica* (3), Sorghum *Sorghum bicolor* L. (5), Sudan grass *Sorghum sudanense* (2), Field bean *Vicia faba* L. (2), Hungarian vetch *Vicia pannonica* Crantz. (1), Common vetch *Vicia sativa* L. (4), Fodder-vetch *Vicia villosa* Roth. (2). Total number of landraces in this group is 34.

First created landraces (cultivars) mostly originated from indigenous populations. Nowadays, after more than 50 years, all these landraces don't have any commercial significance, and some are excluded from the list of landraces. Among them the most famous and most distributed were K-1 and M-2 landraces of Alfalfa (*Medicago sativa* L.)², K-17 of Red clover (*Trifolium pratense* L.) and K-6 i K-7 of Cocksfoot *Dactylis glomerata* L.

Wild population of forage crops could be still found *in situ* in the mountain regions, such as Mt. Rtanj, Kopaonik and Goc. On those localities, the seeds werw collected, but with owners of meadows and pastures no agreement on conservation of the wild forage populations was established. The following populations werw collected from mentioned sites: *Medicago falcata*, *Trifolium pratense*, *Trifolium repens*, *Trifolium medium*, *Lotus corniculatus*, *Dactylis glomerata*, *Festuca pratensis*, *Fesuca arundinasea*, *Lilium perenne*.

2.4 Vegetables

In Serbia around 30 species are commercially grown, although there is potential for use of about 150 species (Grić, 1980). Vegetables are usually grown in gardens.

In Serbian institutes it is *in situ* maintained the genetic identity of the total of 174 domestic varieties of 26 vegetable species (Table 3).

TABLE 3
Number of domestic varieties of vegetables grown *in situ*

	Varieties	Local name	Landraces
1	Tomato	paradajz	18
2	Pepper	paprika	23
3	Eggplant	plavi patlidzan	2
4	Peas	grasak	12
5	Cauliflower	karfiol	10
6	Broccoli	brokoli	1
7	Cabbage	kupus	19
8	Savoy cabbage	kelj	9
9	Onion	crni luk	20
10	Garlic	beli luk	10
11	Leek	praziluk	5
12	Watermelon	lubenica	5
13	Dry beans	pasulj	6
14	Snap beans	boranija	5
15	Cucumber	krastavac	13
16	Melon	dinja	9
17	Lettuce	salata	24
18	Small radish	rotkvice	7
19	Radish	rotkva	4
20	Parsley	persun	6
21	Spinach	spanac	4
22	Celery	celer	7
23	Carrot	mrkva	13
24	Parsnip	pastrnak	1
25	Red beet	cvekla	3
26	Kohlrabi	keleraba	9
	Total		245

During last years an inventory of domestic, traditional vegetable populations in different regions of the country was intensified. This mainly refers to species from families *Alliaceae*, *Brassicaceae*, *Solanaceae*, *Fabaceae*, *Cucurbitaceae* and *Apiaceae*.

Alliaceae

There are regions such as Banat, Bačka, Negotinska Krajina, Pomoravlje, Zapadnomoravski Region, Aleksinački Okrug, southern Serbia, and Metohija, where valuable domestic populations of onions can still be found. Domestic populations of leek are found in the south of the country, which is also where commercial leek growing takes place.

Brassicaceae

Several populations from the follow villages (areas) could be emphasized: village Čurug, Deronje, and Futog. Cabbage from Futog is the oldest population and presently it is the standard in the official variety trials. It is intended for fresh use and pickling.

Solanaceae

Old local cultivars of pepper and tomato are grown in the vegetable-growing regions especially in in Banat, Bačka, Podrinje, Posavina, Pomoravlje, Eastern Serbia, Negotinska Krajina, Aleksinački Okrug, southern Serbia, and Metohija. Pepper populations differ primarily on the basis of fruit shape and type of use: bell pepper, pepper for pickling, elongated pepper, pepperoni, industrial pepper. Old tomato cultivars and populations are still grown in gardens and farmsteads due to their specific characteristics, most notably their fruit quality and shape. Old local cultivars were very recognized in the past but it are rarely now (to exclude beef-heart type).



Fabaceae

Tetovac and Gradistanac, domestic ecotypes of common bean are nowadays referred to as market class of beans from Serbia. They are companion cropped with corn. Gradistanac originated from the region along the Danube River in eastern Serbia. Domestic populations of lentil are grown in eastern Serbia (Homolje, Stara Planina, Suva Planina), southwestern Serbia (around the Studenica Monastery), western Serbia (around Pozega), and Backa region. Faba bean landraces can be found in the mountains (Vasić *et al.*, 2006). Landraces with coloured seeds predominate in western and south western Serbia, along the Drina and Sava rivers. Beans with white seed coats arrived in Vojvodina from Kosova and Metohija, beans with colored seed coats from Bosnia and Croatia.

Cucurbitaceae

There are *Cucurbitaceae* family genetic resources and these are maintained mostly as old domestic population and ecotypes of the following species: *Cucurbita maxima*, *Cucurbita pepo*, *Cucurbita moshata*, *Cucumis melo*. Old domestic population and ecotypes of species *Citrullus lanatus* and *Cucumis sativus* are already scarce. The reason for genetic erosion was introduction of new varieties and hybrids into production, which points out the necessity of collecting the existing accessories in expeditions as soon as possible.

The data base of wild, indigenous species of vegetables which were and still are used as food, was formed.

Wild vegetable species with relatively high level of diversity and genetic variability could be found in Serbia (Table 4).

TABLE 4

Wild vegetable species in Serbia

	vrsta – latinsko ime	porodica	narodno ime
zeleni listovi			
1	<i>Alchemilla vulgaris</i>	<i>Rosaceae</i>	virak
2	<i>Allium</i> spp.	<i>Alliaceae</i>	lukovi, divlji
3	<i>Atriplex</i> spp.	<i>Chenopodiaceae</i>	pepeljuga
4	<i>Chenopodium bonus-henricus</i>	<i>Chenopodiaceae</i>	brašnjava loboda
5	<i>Cichorium intybus</i>	<i>Asteraceae</i>	cikorija, vodopija
6	<i>Glechoma hederacea</i>	<i>Lamiaceae</i>	dobričica
7	<i>Lactuca scariola</i>	<i>Asteraceae</i>	ločika, salata
8	<i>Lamium album</i>	<i>Lamiaceae</i>	mrtva kopriva
9	<i>Linum usitatissimum</i>	<i>Linaceae</i>	lan
10	<i>Lupinus</i> spp.	<i>Fabaceae</i>	vučiji bob
11	<i>Nasturtium officinale</i>	<i>Brassicaceae</i>	potočarka
12	<i>Oxalis acetosella</i>	<i>Oxalidaceae</i>	žečja soca
13	<i>Rumex acetosa</i>	<i>Polygonaceae</i>	veliki kiseljak
14	<i>Rumex acetosella</i>	<i>Polygonaceae</i>	mala kiselica
15	<i>Rumex alpinus</i>	<i>Polygonaceae</i>	planinsko zelje
16	<i>Rumex crispus</i>	<i>Polygonaceae</i>	kovrdžava kiselica
17	<i>Rumex obtusifolius</i>	<i>Polygonaceae</i>	konjsko zelje
18	<i>Taraxacum officinale</i>	<i>Asteraceae</i>	maslačak
19	<i>Urtica dioica</i>	<i>Urticaceae</i>	kopriva, žara
20	<i>Urtica urens</i>	<i>Urticaceae</i>	kopriva, žara
21	<i>Valerianella locusta</i>	<i>Valerianaceae</i>	motovilac
stablo, delovi stabla			
1	<i>Allium</i> spp.	<i>Alliaceae</i>	lukovi, divlji
2	<i>Asparagus officinalis</i>	<i>Asparagaceae</i>	vilina metla, špargla
3	<i>Brassica napus</i>	<i>Brassicaceae</i>	vrzina repica
4	<i>Brassica oleifera</i>	<i>Brassicaceae</i>	divlji kupus
5	<i>Cichorium intybus</i>	<i>Asteraceae</i>	cikorija, vodopija
6	<i>Daucus carota</i>	<i>Apiaceae</i>	šargarepa, divlja

	vrsta – latinsko ime	porodica	narodno ime
cvet, cvasti			
1	<i>Carlina acaulis</i>	Asteraceae	vilino sito
2	<i>Fagopirum esculentum</i>	Polygonaceae	heljda
3	<i>Glyceria maxima</i>	Poaceae	sirotinjska trava

2.5 Medicinal and aromatic plants (MAP)

In Serbia, 420 plant species are officially registered as MAP (10.75% of the total flora), while 279 are to be found in Serbian markets. Medicinal plants of Serbia encompass 89 families, of which the following should be quoted: *Lamiaceae* (41 species), *Asteraceae* (40), *Apiaceae* (20), *Ranunculaceae* (19), *Scrophulariaceae* (17), *Malvaceae* (15), *Rosaceae* (15), *Brassicaceae* (10), *Polygonaceae* (10), etc.

In Serbia are commonly grown domestic cultivars of MAPs. The total number domestic or improved cultivar is 89. The most important MAP are listed in the Table 5, while the other MAP represented with only one or two cultivars are the follow: *Achillea millefolium* L. *Acorus calamus* L. *Agrimonia eupatoria* L. *Althaea officinalis* L. *Anethum graveolens* L. *Angelica archangelica* L. *Artemisia absinthium* L. *Artemisia dracunculoides* L. *Borago officinalis* L. *Calendula officinalis* L. *Chrysanthemum cinerariaefolium* L. *Cochlearia armoracia* L. *Cynara scolimus* L. *Datura innoxia* Mill. *Digitalis lanata* Ehrh. *Glycyrrhiza glabra* L. *Gypsophylla paniculata* L. *Hyssopus officinalis* L. *Lavandula angustifolia* Mill. *Leonurus cardiaca* L. *Levisticum officinale* Koch. *Mentha spicata* L. *Oenothera biennis* L. *Origanum vulgare* L. *Papaver somniferum* L. *Pimpinella anisum* L. *Ricinus communis* L. *Ruta graveolens* L. *Salvia officinalis* L. *Salvia sclarea* L. *Satureja hortensis* L. *Satureja montana* L. *Sideritis scardica* L. *Sylubium marianum* (L.) Gaertn. *Sinapis alba* L. *Trigonella foenum graecum* L. *Urtica dioica* L. *Verbascum densiflorum* Bert.

TABLE 5

Domestic or improved MAP cultivars in Serbia

Species	No. of cultivars
<i>Foeniculum vulgare</i> Mill.	5
<i>Coriandrum sativum</i> L.	5
<i>Mentha x piperita</i> L.	5
<i>Carum carvi</i> L.	4
<i>Majorana hortensis</i> Moench.	4
<i>Ocimum basilicum</i> L.	4
<i>Thymus vulgaris</i> L.	4
<i>Valeriana officinalis</i> L.	3
<i>Malva silvestris</i> L.	3
<i>Melissa officinalis</i> L.	3
<i>Chamomila recutita</i> (L.) Rausch.	3

Each year the Commission of the Institute for Nature protection of Serbia consider new quota for MAP grown *in situ*, according to the available data of the status of these natural populations. Meadows and in forests are the main resources of indigenous medicinal and aromatic plants.

2.6 Fruits and grape

In situ conservation of genetic resources in fruits and grapes has a very important place in Serbia. The coordinator for *in situ* conservation of fruit species is the Agronomical Institute / Faculty of Cacak. Other important stakeholders of *in situ* conservation are: Faculty of Agriculture Novi Sad, Faculty of Agriculture Belgrade, and Institute PKB-Agroekonomik Belgrade.

The *in situ* collection consists of 471 samples of apple, pear, plum, apricot, peach, cherry, sour cherry, walnut, hazel, and raspberry. As an example, in Table 6 135 accessions conserved *in situ* of *Prunus* genus are presented. Plums are considered one of Serbia's most traditional fruits. The fact that there are about 42.5 million plum trees in Serbia is the

best single indicator of how popular plums are. There are nine basic types of plums grown in Serbia: Stanley, Madžarka, Pozegaca, Čačak Beauty, Čačak Best, Čačak Rich, Dženerika, Ringlov and Trnovača.

Main varieties of peaches include Spring Gold, Spring Lady, Red Heaven, and the Serbian Vineyard Peach. Out of all these varieties, the Serbian Vineyard Peach is the most popular. The fruit is small, but highly flavorful. Serbian Vineyard Peaches are popular in the country's fresh produce markets. Due to their intense peach flavor, they are highly valued for use in jams, preserves, and other processed peach products.

TABLE 6

In situ* conservation of species of genus *Prunus

Species	Agronomical Institute / Faculty of Cacak	Faculty of Agriculture Novi Sad	Faculty of Agriculture Belgrade	Institute PKB-Agroekonomik Belgrade	Total
<i>Prunus persica</i>	8	12	5	12	37
<i>P. armeniaca</i>	4	5	3	3	15
<i>P. domestica</i>	11	2	6	7	26
<i>P. cerasus</i>	5	3	3	0	11
<i>P. avium</i>	4	5	4	3	16
<i>P. amygdalus</i>	0	2	0	0	2
<i>P. cerasifera</i>	13	0	10	5	28
Total	45	29	31	30	135

Most blackberries in Serbia are still grown on small farms according to traditional techniques of cultivation. The main varieties of blackberry grown in Serbia include Thornfree, Cacak Thornfree, and Black Satin.

The owners of conserved trees together with coordinators associates take care about the samples, and the data accession (vegetation description, characterization, and previous evaluation). In this way, mainly old, indigenous species are conserved.

Documentation system and databases are not compatible among themselves. Only at the Agricultural Faculty in Novi Sad there is a complete database in electronic form where data is entered according to IPGRI descriptors.

The most valuable collections of domestic cultivars of *Vitis* are located at Faculty of Agriculture Belgrade and Novi Sad (Sremski Karlovci) and Center for wine growing and wine making Niš.

2.7 Forest

Most of forest tree species are growing in natural forests, managing by their owners or users. There are 287 approved basic material for production of forest reproductive material, 112 of conifers and 175 deciduous, as presented in Table 7 and Table 8.

TABLE 7

Number of approved basic material for production of forest reproductive material of conifers

Tree species	Number of approved basic material	Area covered (ha)
Fir (<i>Abies alba</i> Mill.)	21	295.76
Spruce (<i>Picea abies</i> (L.) Karst.)	25	275.56
Austrian pine (<i>Pinus nigra</i> Arn)	13	72.01
Scots pine (<i>Pinus sylvestris</i> L)	11	68.49
Serbian spruce (<i>Picea omorika</i> Pancic Purkyne)	6	14.18
Douglas fir (<i>Pseudotsuga menziessi</i> Franco)	7	13.34
Other conifers	40	1.31
Total conifers	112	740.65



TABLE 8
Number of approved basic material for production of forest reproductive material of deciduous

Tree species	Number of approved basic material	Area covered (ha)
Pedunculate oak (<i>Quercus robur</i> L.)	17	775.60
Sessile oak (<i>Quercus petraea</i> Liebl.)	9	53.22
Beech (<i>Fagus moesiaca</i> (Maly) Czezcott)	14	75.05
Black locust (<i>Robinia pseudoacacia</i> L.)	8	31.75
Sykomore (<i>Acer pseudoplatanus</i> L.)	10	5.48
Other deciduous	117	143.91
Total deciduous	175	1 085.01

All seed stands, seed orchards and clones are registered in the Register of approved basic material, managed by Ministry of Agriculture, Forestry and Water Management – Directorate for Forestry as the official body. Basic informations about the location, altitude and altitudinal range, size, owners – users, parent rocks and type of soil, as well as the data about the seed crop, are in the Register. Designated authorities performe field inspection of the aproved basic material every year in the sense of health and production control.

Up to now, 9 varieties from genus *Populus* and 4 varieties from genus *Salix* were registrated officialy. There are old, autochthonous tree species within the *Populus* genus: *Populus alba*, *Populus nigra* and *Populus tremula*. Within the *Salix* genus, there are app. 10 old autochthonous species. About 10 clones of *Populus* sp. are growing in the artificially raised plantations with purpose of wood volume production.

2.8 Wild plants

In situ conservation of wild plants is carried out in the protected areas. The protected area in Serbia occupies 547 723 ha or about 6% of the total area of the Republic. They are: national parks, nature parks and other protected areas, general and special reserves and protected areas of cultural-historical value. A great part of these natural resources consists of forests and forest sites. There are 478 protected areas, with 5 national parks (Fruska gora – 25 393 ha, Djerdap – 63 608 ha, Tara – 19 175 ha, Kopaonik – 11 810 ha, Sar-planina – 39 000 ha).

THE STATE OF *EX SITU* MANAGEMENT

The decision on the development of the National Plant Genebank was brought in 1988. The construction of plant genebank started in 1990. Unfortunately, due to the breakdown of old Yugoslavia and enormous financial difficulties, it has not been completed. The aim of the formation of national plant genebank was to ensure equal treatment, conservation and utilization to all the genetic resources in the state, as well as to ensure the adequate national policy in this field.

The project of establishment of plant genebank was realized through two parts: "Development of plant genebank", "Collecting of genetic resources for the needs of plant genebank". In the realization of the second part of project, 26 scientific research institutions of agriculture participated.

In *ex situ* national collection, the greatest number of accessions represents old varieties and populations, while there are less old commercial cultivars and special genetic resources. For the national collection it can be generally reported that it does not reflect the state in natural ecosystems. The most represented species are the economically most significant cultivated species (maize, wheat, sunflower, barley). However, from the aspect of genetic variability for our region, many species were not paid sufficient attention to (medicinal and aromatic plants, textile plants, some vegetable species, and a series of wild relatives of the species).

Collected material is today maintained at the Maize Research Institute "Zemun Polje" in Belgrade. Seed samples are kept in a cold chamber with controlled conditions at +4°C and approximately 50% relative humidity. A part of accessions has critical germination ability and must be regenerated. From 1996, most of accessions were regenerated only ones or twice. A part of material is documented on the electronic data base including passport, characterisation and evaluation data. Internationally recommended descriptor lists (IBPRG/IPGRI) were followed wherever it was possible. Nevertheless, National Plant Genebank does not have enough financial sources to carry on with the characterisation, evaluation and documentation of samples

3.1 Cereals and maize

According to estimation, a total of 5 888 accessions are grown *ex situ*. This number includes 2 938 accessions of National Plant Collection (NPC) which contains 323 accessions in soft wheat, 116 accessions in durum wheat, 117 accessions in barley, 180 accessions in oat, 18 accessions in rye, and 2 184 accessions in maize (Table 9).

TABLE 9

Number of accessions of cereals and maize grown *ex situ*

		Wheat	Barley	Oats	Rye	Maize
Instituts	Lanraces and traditional cultivars	70	30	15	10	2 500
	Relatives	200	100	20	5	0
Genebank		439	117	180	18	2 184
Total	5 888	709	247	215	33	4 684

The most important relatives of cereals collected and grown *ex situ* in Serbia are the follows: wheat population named Grblja or Grbljanka (presumable *Triticum turgidum*) (Petrović and Dimitrijević, 2005), and a very close wheat relative *Aegilops* genus (Dimitrijević *et al.*, 2001), Petrović and Dimitrijević, 2005) with species *A. ovata*, *A. triaristata*, *A. kotschy*, *A. biuncialis*, *A. cilindrica*.



3.2 Industrial crops

Sunflower

In the Institute for field crops and vegetables there is about 5 000 genotypes of various origin, which are used in breeding programs. These number includes cultivated species and their wild relatives, whereas part of collection is made of annual, and the other from perennial species. The collection of wild species was established due to seed collecting in expeditions performed in period 1980-1991 by national and American experts.

Sugar beet

In Serbia, there are two institutions dealing with sugar beet breeding: »Selekcija«, Department for sugar beet Aleksinac and Institute for field crops and vegetables, department for sugar beet, Novi Sad. In these centers smaller or larger collections of sugar beet exist aiming to serve as basic breeding material for creation of new genotypes. Since both institutions function at market principles, these collections are mostly autonomous and limited for use only by the host institution only.

Soybean

Institute for field crops and vegetables have collection of 800 genotypes of soybean (*Glycine max* (L.) Merr). As result of cooperation with VIR Gene Bank, data base of Novi Sad soybean collection is available at the web: <http://vir.nw.ru>.

Rape seed

Institute for field crops and vegetables, Novi Sad is the only institution dealing with rape seed breeding. Collection consists of 60 accessions, out of there is neither any wild relatives of *Brassicaceae*, nor samples of local populations from the other countries. Characterization of accessions has been partially performed.

Castor oil plant

In collection of the Institute for field crops and vegetables Novi Sad there are 69 cultivars originated from 23 countries. For all accessions passport data exist and characterization was completed.

Sorghum

Collection of the Institute for field crops and vegetables Novi Sad contains 450 genotypes of sorghum. It is important to stress that larger part of the collection consists of autochthonous domestic populations. Organized expeditions for seed collecting haven't been performed, yet it is about *ad hoc* collectioning from farmers and producers. The most of accessions originated from countries which produced sorghum, such as USA, Mexico, Argentina, Turkey, Hungary, Russia. Qualitative and quantitative traits of accessions were described in details (Berenji, 1990; Radovic *et al.*, 1997).

Cannabis

Of the highest interest are registered European cultivars, out of Meijer (1995) listed the total of 39 originated from 10 European countries. Europe. Most of these genotypes is kept and maintained in collection of Institute for field crops and vegetables, comprising 39 genotypes (Berenji, *et al.*, 1997). In Gene Bank of VIR there is 34 accessions of cannabis originated from region of ex Yugoslavia (Lemeshev *et al.*, 1994).

3.3 Forage crops

In national collection there is total of 283 accessions of perennial forage species, 159 accessions of perennial legumes and 124 accessions of perennial grasses (Table 10) The majority of accessions belong to lucerne (71). Collection is mostly made of local populations.

TABLE 10
Existing collection in Gene Bank

Perennial legumes		Perennial grasses	
Species	No of samples	Species	No of samples
<i>Medicago sativa</i>	71	<i>Agrostis stolonifera</i>	34
<i>Trifolium patense</i>	24	<i>Agrostis gigantea</i>	15
<i>Trifolium repens</i>	53	<i>Agrostis capilaris</i>	35
<i>Trifolium hybridum</i>	6	<i>Lolium perenne</i>	10
<i>Trifolium montanum</i>	4	<i>Lolium multiflorum</i>	4
<i>Lotus corniculatus</i>	1	<i>Dactylis glomerata</i>	12
		<i>Festuca arundinacea</i>	5
		<i>Festuca pratensis</i>	3
		<i>Festuca rubra</i>	2
		<i>Phleum pratense</i>	4

Several projects relating collecting and evaluation of perennial forage grasses and legumes was performed. Researchers from Institute for forage crops, Krusevac, collected 194 accessions as follows: 26 of *Festuca pratensis*, 25 of *Arrhenatherum elatius*, 5 of tall fescue, 21 of *Dactylis*, 10 of *Alopecurus pratensis*, 5 of *Phleum pratense*, 17 of lucerne, 22 of red clover, 17 of *Lotus corniculatus*, 5 of *Medicago falcata*, 6 of *Trifolium montanum*, 7 of white clover, 5 of *Trifolium pannonicum*, etc. Most of accessions are autochthonous populations, whereas 58 represent domestic landraces. Evaluation of accessions is being performed.

3.4 Vegetables

The largest number of vegetable accessions *ex situ* is saved in the National collection (733). Number of accessions per species and other information about this collection is given in the Table 11.

TABLE 11
National collection of vegetables

Species	No of samples	Passport data	Preliminary characterization	Preliminary evaluation
<i>Allium cepa</i>	29	-	-	29
<i>Allium sativum</i>	50	1	-	49
<i>Allium porum</i>	6	-	-	6
<i>Brassica o.v. capitata</i>	14	10	4	-
<i>Brassica o.v. acephala</i>	24	14	10	-
<i>Rudice</i>	11	-	11	-
<i>Brassica o.v. botrytis</i>	2	2	-	-
<i>Brassica o.v. italica</i>	1	1	-	-
<i>Capsicum annum</i>	90	-	-	90
<i>Lyc.esculentum</i>	41	5	9	27
<i>Lactuca sativa</i>	66	2	64	-
<i>Phaseolus vulgaris</i>	290	154	-	136
<i>Cucurbita sp.</i>	15	-	-	15
<i>Citrus aedilus</i>	9	4	5	-



Species	No of samples	Passport data	Preliminary characterization	Preliminary evaluation
<i>Cucumis melo</i>	12	-	12	-
<i>Solanum tuberosum</i>	13	6	-	7
<i>Pisum sativum</i>	60	30	30	7
Total	733			

Smaller collections of vegetables could be found in the follow institutions:

- Institute of Field and Vegetable Crops, Novi Sad
- Institute for Vegetable Crops, Smederevska Palanka
- Center for Agricultural and Technological Research, Zajecar
- Faculty of Agriculture, University of Belgrade in Zemun
- Faculty of Natural Sciences, Institute for biology and ecology, Novi Sad
- Faculty of Agriculture, University of Pristina in Kosovska Mitrovica, Zubin potok

In these institutions there is total of 245 accessions of old cultivars and domestic landraces maintaining *ex situ*, including: tomato (18), pepper (23), eggplant (2), peas (12), cauliflower (10), broccoli (1), cabbage (19), savoy cabbage (9), onion (20), garlic (10), leek (5), watermelon (5), dry beans (6), snap beans (5), cucumber (13), lettuce (24), melon (9), small radish (7), radish (4), parsley (6), spinach (4), celery (7), carrot (13), parsnip (1), red beet (3) and kohlrabi (9).

3.5 Medicinal and aromatic plants (MAP)

A number of stakeholders is involved in *ex situ* conservation of MAP genetic resources: Department for Plant Genetic Resources of the Ministry of Agriculture Forestry and Water Management (National Gene Bank), two state institutes dealing with MAP (Institute for Medicinal Plant Research "Dr Josif Pančić" in Belgrade and Institute of Field and Vegetable Crops, Department for Medicinal Plants, Bački Petrovac), faculties of agriculture, Pharmacy, Forestry and Biology of the Universities of Belgrade and University of Novi Sad, non-governmental organizations and the private sector.

The total number of MAP accessions in the national gene bank comprises 389, belonging to about 220 species. The most of species are represented by one or two accessions, with an exception of basil with 17 accessions. All accessions have the passport data (EURISCO), whereas some of them are well characterized.

Several hundreds of different genotypes (cultivars and populations) of more than 230 MAP species have been collected and/or maintained in collections of other stakeholders. *Ex situ* collections of MAPs includes plants at the fields, seed collections and *in vitro* cultures. For example, collection of the Institute of Medicinal Plant Research in Belgrade comprises 51 indigenous species of 23 families and of 43 cultivated MAP species of 11 families. In collection of the Institute for hops, sorghum and medicinal plants in Bački Petrovac, there is 480 accessions of 202 MAP species of 38 families. It should be noticed that collections of annual plants are renewed each year, whereas those of perennials depending on state of collection. Part of collections is permanently regenerated for commercial seed production, but unfortunately all necessary documentation for most of accessions is missing.

3.6 Fruits and grape

The total number of genotypes maintained in Serbia for *Prunus* species is about 2 400, having in mind that number of duplicates exists due to synonyms. There is no information for pomme fruit (*Maloideae*), but number of autochthonous cultivars conserved *ex situ* is higher than 150. In case of pear, the most valuable collection of autochthonous cultivars comprises 70 genotypes and is situated in Novi Sad. Collections of walnut exist in Novi Sad and Cacak.

Ex situ are conserved accessions of sour cherry, sweet cherry, peach, walnut, apricot, hazel, dewberry, currants and some others are maintained in collections of faculty of Agriculture Novi Sad and Institute for fruit production in Cacak.

The reachest collections of grape exist in Faculty of Agriculture Belgrade and Faculty of Agriculture Novi Sad (Sremski Karlovci), which is one of the biggest Balkans collections with 434 genotypes, and Centre for grape production in Nis.

3.7 Forest

There are two registered seed orchards approved as basic material for production of forest reproductive material and several in the experimental phase. There are documentation about foundation of these seed orchards, with the area distribution and the scheme of the trees in the orchards, are in the archive in the Directorate for Forestry.

Registered seed orchards:

- Pedunculate oak (*Quercus robur* L.), size 7.00 ha;
- Serbian spruce (*Picea omorika* (Pancic) Purkyne), size 2.70 ha.

Seed orchards, as well as the seed stands, are inspected every year, seeds are collected and certified.



THE STATE OF USE

Utilization of collection of indigenous plant cultivars in National Gene Bank for the time being is small. The storage conditions of the collection maintained at the Maize Research Institute do not comply with all internationally recommended standards. An urgent need to build up a storage facility will be satisfied during 2009 by the opening of new plant genebank in Belgrade. Support of international community will be necessary for improving infrastructure and some equipment.

It was determined that active collections of scientific-research institutions in Serbia consist of about 25 000 accessions. They are mainly the cultivated plant species. The collections and accessions were treated in institutions at different levels. Some of scientific-research institutions were closed during last decade due to economic problems. In such institutions, handling and utilization were inadequate for many years, and this resulted in the disappearance of entire collections. The other research institutions use their active collections mostly for improvement of germplasm and for different types of breeding programs. As result of breeding efforts, over 2 000 cultivars were officially registered in Serbia.

It is known that the Serbian accessions are presented in many foreign gene banks and agricultural institutions (Beltsville, USA; and VIR, Russia; Gatesleben, Germany, and ICARDA, Syria). It is important to note that generally we have no data about use of Serbian accessions or plant material collected in Serbia from from the foreign users.

So far, many indigenous plants still have not been collected from the nature. The most of medicinal and aromatic plants grows spontaneously in meadows, sometimes forming very abundant groups and in the forests. They are widespread in very diverse ecological conditions, occurring at different altitudes and on various forms of relief, soil type, climate, etc. They may serve in the future as a "natural gene bank" of various populations suitable for further cultivation and breeding programs.

THE STATE OF NATIONAL PROGRAM, TRAINING AND LEGISLATION



5.1 National program

On the relevant proposal of the Ministry of Agriculture, Forestry and Water Management, Government of the Republic of Serbia, at the session held on August 18, 2005, adopted "Strategy of the agricultural development of Serbia". This strategy under the part 7, "Rural development" contains chapter 1.1. "Genetic resources".

"National Program for conservation and sustainable use of plant genetic resources for food and agriculture" is in process of preparation, and planned as an integral part of the "National Agricultural program 2009-2011", as well as obtaining of financial support. This program is in its final stage and it is said about the importance to bring legislation in line with EU Directives; to adapt the existing national database of international standards (FAO, IPGRI); to establish the National Genebank, to support the work of the study of agrobiodiversity (collection, identification, characterization, documentation, conservation of old varieties, wild relatives, endemic species, etc.), to support the exchange of genetic materials, access and benefit sharing, training of staff, public awareness raising, promoting international cooperation, development of combined traditional farm systems and agricultural production based on autochthonous varieties of plants, protection of traditional knowledge and cultural heritage, development of rural tourism, production of local products with protected geographic origin, etc.

5.2 Education and training

Training in the field of plant genetic resources will be made to the agricultural faculties of the respective courses. In Serbia 13 scientific institutes that are engaged in research in the field of plant genetic resources and plant breeding. The largest and most famous are: Institute of Field and Vegetable Crops, Novi Sad, Maize Research Institute "Zemun Polje", Belgrade, Institute of Vegetable Crops, Smederevska Palanka, Fruit Research Institute, Cacak, etc.

In our conditions, *in situ* conservation seems to be the most difficult form of genetic resources conservation. Government of the Republic of Serbia helps education of farmers in aim to improve their knowledge of *in situ* conservation. There are several national training programs of stakeholders financed by the Government and performed jointly with scientists from different Serbian Institutes. These programs are focused on the on-farm work, protection of habitats, sample collecting, regeneration and multiplication of accessions. The special challenge for the coming decade is education and training in biotechnology at the state institutions and at the private enterprises, what is presently related with financial problems.

5.3 Legislation

5.3.1 International Conventions

The Convention on Biological Diversity (CBD) was ratified in 2004. Other ratified international conventions are: Agenda 21 – Rio declaration, United Nations 1992; Bern Convention 1982 Council regulation No 338/97 1996; CITES Convention 1973, ratified in 2001. FAO International Treaty for Plant Genetic Resources for Food and Agriculture is signed in 2002, and the ratification is planned 2009-2010.

5.3.2 National laws

Environmental protection is regulated by: the Law on environment protection („Official gazette of Republic of Serbia“, No. 135/04, January 29, 2004, 66/91, 83/92, 53/93, 67/93, 48/94, 44/95, other laws and 53/95 and 135/2004, other laws), Law on ratification of Convention on Biological Diversity (“Official Gazette FRY“, No.: 11/2001 on November 17, 2001), Resolution of policy of environmental protection (1993), Resolution of policy of biodiversity maintenance (1994), Law on national parks (1993), Law of protection of natural rarities (1993) and Regulation of control of utilization and turnover of wild flora and fauna (1993, 1996, 1999), Conclusion on the adoption of an action plan for the implementation of national sustainable development strategy for the period 2009-2017 („Official gazette of Republic of Serbia“, No. 22/09, March 30, 2009).

All rare species were categorized into the IUCN groups. The exploitation of medicinal and aromatic plants of certain CITES categories (critically endangered, endangered, vulnerable and locally rare species) is strictly forbidden. Act of the minister – delineation of the regions of provenances, („Official gazette of Republic of Serbia“, No. 91/2008) - for oaks, for other tree species will be adopted in the first half of 2009.

The seed, planting material and forestry sector is regulated by: the Seed Law („Official gazette of Republic of Serbia“, No. 45/05, May 31, 2005), the Law on planting material of fruit, grapevine and hops („Official gazette of Republic of Serbia“, No. 18/05, February, 2005), Law on Forest Reproductive Material („Official gazette of the Republic of Serbia“, No. 135/2004, 5/2005), based on the Council Directive 1999/105/EC on the Marketing of Forest Reproductive Material in the International Trade. Forest reproductive material is regulated by the “Regulation laying down the rules for the approval of basic material and control of production of forest reproductive material” (Official gazette of Republic of Serbia“, No. 76/2005, 105/2005).

Plant protection is regulated by: the Law on plant protection (Official Gazette FRY, No.: 24/98), Rule on offering services in the field of plant protection (Official Gazette FRY No.: 42/99), Rule on methods for pesticide testing (Official Gazette FRY No. 11/99), Rule on health testing of plant consignments moving across the state border (Official Gazette FRY No.: 12/99), Rule book on health testing of crops and object for production of seed, seedling and planting material, and health testing of seed, seedling, and planting material (Official Gazette RS No.: 59/06).

Genetically Modified Organisms (GMO) issues are regulated by: the Law of Genetically Modified Organisms, adopted by the former Parliament of the Federal Republic of Yugoslavia in May 2001 (“Official Gazette of FR Yugoslavia” No. 21/2001 of May 8, 2001). Law represents general framework for work and use of GMOs, while detailed conditions for work and use of GMOs are defined through Regulations done in accordance with Directive 2001/18/EC:

- Regulations on Contained use of Genetically Modified Organisms (“Official Gazette of FR Yugoslavia” No. 62/2002 of 15.11.2002),
- Regulations on Deliberate Release of Genetically Modified Organisms and Products Derived from Genetically Modified Organisms into the Environment (“Official Gazette of FR Yugoslavia” No. 62/2002 of 15.11.2002),
- Regulations on Placing Genetically Modified Organisms and Product Derived from Genetically Modified Organisms on the Market (“Official Gazette of FR Yugoslavia” No. 62/2002 of 15.11.2002),
- Regulations on the Content and Data of the Register of Genetically Modified Organisms and Products Derived from Genetically Modified Organisms (“Official Gazette of FR Yugoslavia” No. 66/2002 of 6.12.2002),
- Regulations on labeling of agricultural and food products obtained from GMO (Official Gazette, FRY, No. 6/2003).

Some areas left uncovered by Law on GMOs: transboundary movements of GMOs, labeling, public participation, traceability, monitoring of GMOs and GMO products.

Ministry of Agriculture, Forestry and Water management is in charge for implementation of the requirements of the Law on GMO and relevant Regulations. Law on GMO regulates conditions for contained use, deliberate release into the environment and placing on the market of GMOs and products derived from GMOs, as well as measures for prevention and removal of undesired effects during contained use, deliberate release, placing on the market, production and transport of GMOs and products derived from GMOs. Law is harmonized with EC Directives 90/220/EC on deliberate release of GMO into the environment as amended by Directive 2001/18/EC and 90/219/EC on contained use of GM microorganisms, risk assessment and control measures in connection with the biosafety during contained use, deliberate release, placing on the market and import of GMOs. Ministry of Agriculture, Forestry and Water management is responsible also for the implementation of Cartagena Protocol, as well.

Ministry of Agriculture, Forestry and Water Management have prepared new Law on GMO, harmonized with the actual EU legislative and Cartagena Protocol on Biosafety. Government of the Republic of Serbia has adopted the Draft law on GMO and in December 2008 Proposal of the Law on GMO was sent to the Parliament for final adoption. New Regulations have to be written after the adoption of the new Law on GMOs by the Parliament. Some of these Regulations are required by CPB, and some are necessary to adjust Serbian biosafety system to the one existing in EU.

For objective and competent analysis of facts concerning to GMOs i.e. analysis of applications for work with GMO, National Biosafety Committee (NBC) was formed in 2001. NBC is a working body made of 18 representatives of scientific research institutions from different areas (microbiologist, molecular biologist, population geneticists, ecologist, breeders, veterinarians, agronomists, toxicologists, nutritionists, aerologists etc.), with the task to do risk assessment and to take care of biosafety during the work with GMO. NBC gives an opinion on proposed work with GMOs based on results of risk assessment and delivers it to the competent authority. The opinions and recommendations of NBC are based on available scientific information, precautionary principle and case-by-case study. The final decision is made by Minister in the Ministry of Agriculture. There are no representatives of state administration in NBC, so the expert's opinion given by NBC is independent.

Border phytosanitary and veterinary inspections are involved in GMO inspection surveillance, as well as internal agricultural inspection. Border inspection controls imported shipments – they monitor import documentation and sample plant shipments. Samples taken on the border are sent to authorized laboratories for analysis. Internal agricultural inspection monitors crops on the whole territory of the Republic of Serbia.

Intellectual property Rights (IPR), including plant breeder rights (plant variety protection) are regulated by: the Law on protecting agricultural and forest plant cultivars (Official Gazette, FRY, No. 28/2000) adopted on 2000 on former Federal Parliament of FR Yugoslavia). This law is not conformed with UPOV (The International Union for the Protection of New Varieties of Plants) 1991 Convention. The new draft of Law on Protection of Plant Breeder's Rights conformed with the 1991 Act of the UPOV Convention had been prepared, and examined on the conformity with the Convention on the Twenty-Fifth Extraordinary Session of UPOV Council, held on April 11, 2008. The Council of UPOV issued positive decision of the conformity of the draft Law with UPOV 1991 Convention. The draft of PBR Law would provide the protection to all plant species "by an effective sui generis system" as required also in an Article 27(3) of the TRIPS Agreement. Republic of Serbia elect to protect plant varieties through plant breeder's rights systems follow the basic framework of the UPOV Convention and has expressed strong intent to join the UPOV. According to that intention in May 2009, the draft of the Law will be sent to the Parliament of the Republic of Serbia for adoption.



THE STATE OF REGIONAL AND INTERNATIONAL COLLABORATION

Regional and international collaboration in PGR is based on several programs such as SEEDNet and ECP/GR.

SEEDNet (South East European Development Network on Plant Genetic Resources) programme was established in 2004. The programme is financially assisted by SIDA (Swedish International Development Cooperation Agency) and CBM (Centrum for biologisk mangfald) is the executing agency. The aim of the SEEDNet programme is to contribute to the establishment and strengthening of national programmes on PGR in order to secure the conservation of PGR in the region, to promote a sustainable utilisation of PGR, and to strengthen collaboration, networking and linkages among various stakeholders at both national and regional levels through pooling of resources and use of comparative advantages available in the various institutions and countries.

Serbia also take part in European Forest Genetic Resources Programme. The last, third phase of this programme is in progress, and it will be ended in 2009. In November 2008. Serbia become a member of the OECD Scheme for forest reproductive material in the international market.

There are other kinds of cooperation between research institutes which are dealing with PGR on regional and international level and that cooperation is going on through different projects and has a long tradition.

For example, serbian institutions that are working on genetic resources of field and vegetable crops, share information with a number of European centres. Institute for fruit growing Cacak has a cooperation with institutions from the United States in vineyard peach breeding programs.

An example of twinning project in forest GR could be "Strengthening of the Skills and Infrastructure in Forest Protection and the Regeneration in Serbia", financed from "Bratislava – Belgrade" found. In the Project framework a new database for forest reproductive material was created and published.

Many research works of Serbian scientists in the field Pgr are the result of international cooperation and presented and published in important scientific conferences in the world.

ACCESS TO PLANT GENETIC RESOURCES FOR FOOD AND AGRICULTURE, SHARING OF BENEFITS ARISING OUT THEIR USE, FARMERS' RIGHTS

Access to genetic resources from National collection is still not defined by special regulation. After adoption of new Law on Food Safety is expected that Genebank will be established, and access to genetic resources and propositions of benefit sharing of use of PGR soon will be precisely defined with a new regulations.

Access to genetic resources from Serbian research institutions is regulated by specific regulations of these institutions. Foreign exchange develops mostly between plant breeding institutions on the bilateral basis. However, the most frequent form of exchange is the personal exchange of selected material by breeders. Such an exchange lacks centralized record keeping and control.



