

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

KYRGYZSTAN





**NATIONAL REPORT
on
THE STATE OF PLANT GENETIC
RESOURCES for
FOOD and AGRICULTURE in
KYRGYZSTAN**

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Bishkek - 2008

Note by FAO

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ACRONYMS AND ABBREVIATIONS

AYT	Advance Yield Trail
Bioversity International	International Plant Genetic Resources Institute (IPGRI)
BGAS	Botanical Garden named after Gareev
CBD	Convention on Biological Diversity
DBPGR	Data Base of Plant Genetic Resources of Kyrgyz Republic
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
EIT	Elite Yield Trail
FAO	Food and Agriculture Organization of UN
GPA	Global Plan of Action
ICARDA	International Center for on Agricultural Researches in Dry Areas
IBMF	Institute of Biology & Montane Forests
NordGen	Nordic Genetic Resource Center
OJSC “MIS”	Open Joint-stock Company “MIS”
OCSE	Organization for Collaboration and Security in Europe
KAU	Kyrgyz Agrarian University
KAS	Kyrgyz National Academy of Sciences
KNU	Kyrgyz National University
KRILP	Kyrgyz Research Institute of Livestock & Pastures
KRIF	Kyrgyz Research Institute of Farming
MAWR	Ministry of Agricultural, Water Management and Processing Industry
MEKR	Ministry of Education and Science
PGR	Plant Genetic Resources
PGRFA	Plant Genetic Resources for Food and Agriculture
SIDA	Swedish International Development and Cooperation Agency
SCTCV	State Commission on Testing of Crop Varieties
TACIS	Technical Assistance to CIS countries
UN	United Nations
USDA	United States Department of Agriculture, USA
VIR	All-Russian Plant-Production Institute, Russian Federation
WB	Word Bank

INTRODUCTION



1. General description of the country

Rich diversity of biological resources – species, ecosystem and landscapes were concentrated in Kyrgyzstan. Kyrgyzstan is natural laboratory where all horizontal belts of the planet starting from semi-deserts and ending sub-alpine zones and a zone of Arctic and Antarctic were presented in small territory only with exception of tropical and huge desert zone. The country has unique flora and fauna. Occupying only 0,13% of all lands of the planet Kyrgyzstan presents huge biodiversity – 1% of biodiversity of the planet that comparatively exceeds the average world level. In the territory of Kyrgyzstan one can find more than 12 300 species of animal organisms, 7 723 plant species, including 3 780 species of higher plants (of which 1600 gain agronomic and economic value that includes 450 forage plants, 300 honey bearing plants, 200 medicinal plants, 62 ether-oil plants, and 50 food species), 3 676 of lower plants and 261 species of microorganisms (viruses, bacteria, elementary organisms). Such diversity of species presents rich gene pool, ensuring provision of relatively sustainable flora in the environment where continental climate and utilization of its resources subject to sharp changes. It also presents potential resources for development of high-yielding and resistance cultural varieties, decorative, medicinal, aromatic and industrial plants.

One can meet a lot of valuable, rare and endemic species among flora and fauna of Kyrgyzstan. Endemic plants among vegetative organisms make up 233 species in total or 3% of total plant species growing in Kyrgyzstan. According to Red Book of Kyrgyzstan published in 2007, there are more than 600 species of wild plants growing in Kyrgyzstan that imply 200 species of endemic plants and 200 species of medicinal plants. In the country 83 rare species of higher plants have been registered. Out of this 16 species higher plants have been included in the list of disappearing species, 9 species critically disappearing i.e. on the verge of disappearing and 3 species in the list of lost. The main reason of disappearance of species in the flora and fauna relates to destruction of their natural habitats caused by expanding economic anthropogenic activities.

The given National report reviews current state of genetic resources for food and agriculture in Kyrgyzstan Republic including the state of biodiversity; *in situ* and *ex situ* conservation of PGR; agro-biodiversity, national programs, international collaboration, legal and legislative acts, significance of PGR in food security, constraints and priorities. Kyrgyzstan Republic is one of five new independent states in Central Asia. Population of Kyrgyzstan makes up 5.2 million. Territory of Kyrgyzstan constitutes 199.9 thousand square kilometre 5.5% of which is occupied by forests, 4.4% - water and 53.3% by agricultural lands. Kyrgyzstan is a country of highlands. Average elevation of its territory makes up 2 750 m above seal level, maximum elevation is 7 439 m and the minimum is 401 m. Kyrgyzstan Republic is located in north-east of Central Asian countries from three sides: from the north, from the West and the south the republic borders on republics of the Commonwealth of Independent States - Kazakhstan, Uzbekistan, Tajikistan, and from the east and a southeast with the Chinese National Republic. It occupies internal and partially North and west part of Tyan-Shan Mountains as well as Turkistan – Alay mountains in latitude 39°12' and 43°15' North and in longitude 69°16' and 80°18' East. Climate in the territory of Kyrgyzstan is continental characterized by cold winter and hot summer with great local deviations depending on altitude.

Due to southern position of Kyrgyzstan a difference in day length in the summer and in the winter is insignificant compared to rather northern areas, actually - duration of the longest day reaches 15 hours, and the shortest 9 hours.

Climate of lowland regions is transitive from subtropical to climate of moderate zone. High temperature of warm year period and drought in these regions is observed in late summer, but winter-spring precipitation creates the impression of subtropical climate. However, winter is considerably colder than subtropical areas though Kyrgyzstan locates in the same latitude where Black Sea, Italy and Spain are. Mountainous zone of Kyrgyzstan has a climate of moderate belt. Mountainous character of the territory necessitates unequal distribution of the population of the country. Mountain relief and territorial distinctions of regions of the country have made significant influence on management of the country's economic system.

MAP 1
Kyrgyzstan



These factors serve as a basis for specialization of regions of the country. Plain areas followed by hollow lands including foothills, less-mountainous, moderate-mountainous and lowlands have been mostly brought under cultivation in the country. Hence, there is a specialization in the field of agriculture and a mining industry in the country. Plain soils in Kyrgyzstan constitute only 11% of total territory of the Republic 6% of which can be used for irrigated agriculture. Therefore large portion of agricultural production targets development of migratory animal husbandry. In this connection special attention is paid to pastures in the country.

Agriculture is considered an important sector in the economy of Kyrgyzstan and contributes to 29% of gross domestic products (GDP) with 1.5% growth rate.

Total value of exported of agricultural products, food and produces of processing industry has made up 201.2 million US\$ that constitutes 136% of the 2006 level.

Import of agricultural products, food and produces of processing industry has increased by 50,4% in 2007 compared to 2006.

The government of Kyrgyzstan Republic provides support to only poor farmers and peasants through provision of seeds of agricultural crops, facilities, credits and grants.

Agriculture has great reserve for sustainable development of the economy and for achieving food security.

Recent years, great attention was drawn to the increase of production of agricultural crops for food purpose like wheat, potato and vegetables. Farmer holdings started to cultivate non-traditional crops- bean, soybean, and groundnut.

There were established national parks, reserves and special protected areas with the purpose of preserving natural diversity of the republic.

Total area of especially protected territories of natural-reserve fund makes up 672.9 thousand ha or 3.3% of total territory of the republic, which is obviously insufficient.

By 2008 617 varieties (539 varieties of PGRFA) and hybrids of cultivated plants (91 species) 74 indigenous varieties as well as varieties of folk selection (varieties of apple, apricot, peach and grape) were registered in the list of State Variety Register of Kyrgyzstan (Table 1). Furthermore, a number of other varieties including flowers and ornamental plants are grown in households.

TABLE 1
Registered varieties and hybrids of cultivated plants

Year	Registered, quantity		
	Varieties and hybrids	Species	Local varieties
2004	537	99	93
2008	617	91	74

As Table 1 shows, compared to 2004 total number of varieties and hybrids of cultivated plants has increased, while content of species and local varieties has decreased. The increase in the number of varieties and hybrids has occurred due to introduction of varieties from different CIS countries and far abroad. Decrease in the number of species of cultivated plants has occurred due to irrational utilization of PGR, and of course due to lack of seed storage facilities and Gene Bank.

Forests of Kyrgyzstan – are main regulators of climate, water regime and protector of soil erosion. Total area of state forest fund of Kyrgyzstan constitutes 2 861.3 thousand ha of which lands covered with forests makes up 843 thousand ha. Thanks to afforestation 101.6 thousand ha lands became covered with forests. Woodlands make up 4.2% of total territory of the republic. State Agency for protection of environment and forestry is responsible for basic share of wood fund of the republic that makes up 89.9% (2 573.3 thousand ha). Majority of woodlands locates on the altitude ranging between 1 300-2 400 m above sea level.

Natural woodlands of Kyrgyzstan represent more than 120 species of trees and shrubs. Characteristic species for northern Kyrgyzstan are a fir-tree, a poplar, a willow, tugay wood species and sea-buckthorn. Southern Kyrgyzstan with rather dry areas protected from north winds represents juniper tree, nut trees, birch tree, apple tree, almond and pistachio woodlands. Unique and relict nut-tree woods found here have no analogous in the world by area, compactness and by genetic diversity of species and forms. At present state of these forest arouses alarm.

General ecological situation in the territory of Kyrgyzstan can be characterized as follows: The nature of Kyrgyzstan as highlands ecological system relates to especially vulnerable system sensible to natural and anthropogenic impact. By natural-climatic condition no more than 30% of total area of the republic is suitable for permanent residing, and only 20% refers to the zone with comfortable and relatively comfortable conditions where overwhelming majority of population of the republic lives. This territory practically subjects to impact of all anthropogenic activities. This circumstance has seriously worsened ecological situation in the republic, and in a number of regions such circumstance is characterized as crisis phenomena by a number of indicators threatening to proceed in irreversible processes.

In general, unfavourable ecological situation aggravates economic constraints forcing the population to use natural resources inefficiently (cutting forests, poaching, extensive utilization of arable lands, neglecting ameliorative and other actions) that in principle leads to exclusive circle, to greater deterioration of ecological situation. At the same time, unique landscape, pure water and fresh air not subjected to anthropogenic activities are still available in Kyrgyzstan that represent special commodity of international importance, the value of which will grow in due course.

Mountain relief of the republic causes presence of large areas of unproductive soils in the territory of Kyrgyzstan Republic. Ratio of soils by categories (in percentage of total area) is as follows:

- 45% - pastures;
- 44% - lake, glacier, mountain masses;
- 7% - cropping area.

According to "Soil map of Kyrgyzstan SSR" (A.M. Mamitov *et al*) soils in the territory of Kyrgyzstan are grouped as follows: soils of foothill slopes and foothills; soils of inter-mountain hollows; soils of hilly mountains; soils of mountain slopes within the limit of which dry-steppe soils and steppe-belt of low-mountains have been distinguished; soils of forest-meadow-steppe belt of medium mountains; soils of sub-alpine belt of high mountains; alpine belt soils; soils of high mountain wilderness. Great diversity of soil cover and various levels of soil fertility is characteristic for mountainous territories of Kyrgyzstan. According to records of land cadastre saline soils in the territory of the republic accounts 1 170.4 thousand ha, including weakly-salined soils-398.6 thousand ha, moderate-salined soils - 399.1 thousand ha, strongly-salined soils-301.1 thousand ha and solonchak-70.8 thousand ha. Along with soil salinization, the area of swampy soils is also growing due to devastated state of collector-drainage network. The area of alkaline soils makes up 469.0 thousand ha, including weakly-alkaline soils - 1 811.3 thousand ha, moderate-alkaline soils-87.8 ha, strongly-alkaline soils-149.0 thousand ha and solonets - 51.4 thousand ha. Stony soils accounts 3 808.5 thousand ha, including weakly-stony soils -



1 477.7 thousand ha, moderate-stony soils -1494.4 thousand ha and strongly-stony soils-836.4 thousand ha.

The main agricultural regions include Osh and Jalalabad provinces in Fergane valley, Chuy and Talas valleys in Issyk-Kul basin. Animal grazing and agriculture are main factors having influence on soil cover. Urbanization process in target territories, construction of transport systems, hydro-technical engineering constructions and mining enterprises destroy soil cover completely. Deterioration of state of utilized soil resources is also getting intensified due to on-going erosion process, salinization of soils and introduction of inadequate irrigation methods.

Support of CGIAR Centers like CIMMYT and ICARDA plays significant role in conservation of plant genetic resources both *in situ* and *ex situ* condition. By 2002-2005, national Gene Bank was established on the basis of KRIF through financial support of ICARDA for medium-term storage of accessions of agricultural crops being cultivated in the republic, and their wild relatives. Gene Bank is envisaged for conservation of 8 000 accessions representing different agricultural crops. Due to lack of relevant infrastructure the Gene Bank is not functioning within its full capacity. At present construction of Gene Bank for PGR has been commenced with support of SIDA project (Swiss Agency for Development). This Gene Bank is planned to be put into exploitation in 2009. The Gene Bank analogous of Nordic Gene Bank was designed to be built on the base of State Commission on Testing of Crop Varieties subordinated to Ministry of Agricultural, Water Management and Processing Industry of Kyrgyzstan Republic. It is also planned to improve facilities of *ex situ* conservation. Staff training on Nordic Gene Bank system has been included in future plans.

2. Agrarian sector

Recent years, significant progress has been made in the country in conduction of agrarian-land reforms. Annual growth of gross product in agricultural sector was ensured on average 6 percentages. By 2003 more than 90% of agricultural products were produced by private sector and contribution of households and farmer holdings has made up more than 44%.

More than 280 thousand farmer holdings, about 700 different associations including 462 cooperatives were established in 2008. All these actions enabled the country achieve self-sufficiency in various types of foodstuff that facilitated to solve the primary goals of food safety of the country at a level of the minimal norm of population requirements.

183 farmer holdings specialized in seed production, including 24 state farms, 7 joint-stock companies, 68 agricultural cooperatives, 84 peasant-farmer holdings are engaged in seed production of agricultural crops. 16 seed-growing farms are eligible to engage in primary seed production, which basically includes experimental-selection stations of research institutes.

The basic producers of agricultural commodities include small peasant and farmer holdings. Character of agribusiness management is improved and a financial responsibility for its outcomes is increasing.

Market mechanism of land utilization is developing, ownership to land was included in the constitution, adopted law on "Management of agricultural lands" envisages sale and purchase of land, and actions have been commenced on developing land registration system. New Land Code of Kyrgyzstan Republic facilitates resolution of disputes on land issues through courts and provides development of arbitration mechanism as an alternative method to solve land conflicts.

However, in the years when the republic was being established agriculture has experienced very difficult process of transition period seeking for new forms of agricultural management and ownership to property. Reform was carried out in the environment with lack of experience, legislative base and normative documents, especially at initial stage of reform process. Therefore certain mistakes were made during reform process of former kolkhozes and sovkhoses, especially related to unjustified term of reform that led to conflict situations and dissatisfactions among rural population when getting land and property share.

3. Food security

According to the Roman declaration accepted on November, 17, 1996, Kyrgyzstan as the member of the world community has undertaken obligations «to pursue a policy, aiming eradication of poverty and an inequality, maintenance of physical, economic access for all and any time to sufficient dietary and adequate high-quality foodstuffs, and also its use».

The government of the Kyrgyzstan Republic in cooperation with the European Economic Commission in the Kyrgyz Republic has developed and approved in 1999 the National Policy of Food Security of the Kyrgyz Republic

Though Kyrgyzstan has experienced a number of objective problems, today the country is self-sufficient in basic types of agricultural products, including meat, milk, vegetables and grain in certain extent.

At the same time poor quality of produced foodstuff, constant increase in demand for foodstuff by population and growing prices of foodstuffs, a low level of incomes, an insignificant level of export, increase in import of foodstuff complicate as a whole ensuring food security in the country at a level of consumption standards.

The republic is not completely self-sufficient in certain types of necessary products like sugar and vegetable oil.

The country is not able to compete with imported products even with such crops as bread wheat which is sown to a great area in the country. Partly because the country's wheat doesn't meet quality standards, more than half of wheat flour needed is imported from Kazakhstan.

Food security as one of priorities of the country may be achieved through production of crop products in a required amount; resolution of problems towards rational utilization of natural resources, introduction of high-yielding varieties and hybrids of agricultural crops resistant to diseases and pests, and through rational and efficiently utilization of PGRFA.

At the same time, even sufficient supply of foodstuffs is not a way out of situation if relevant actions are not taken towards poverty eradication and increase of bargain power of majority of country population.

4. Crop production

Production of different species of agricultural crops is prerogative of private sector to select giving consideration to profitability and income to be generated. In addition, the government considers this sector its strategic vision, proceeding from food security program, natural-climatic condition of the country and comparative advantages of agricultural crops.

Giving consideration to crop area under grain crops, farmer holdings are recommended to reduce crop area considerably for grain crops and suggested to apply high technology for grain production enabling gradually to increase crop productivity up to 3.5 ton/ha at initial stage and 5.0 ton/ ha in perspective. Such policy is expected to enable allocating only 500 thousand hectare for production of cereals and obtain a total of 2.5 million ton grain from crop production.

Given forecast can be achieved through application of complex measures including *utilization of genetic resources* to intensify grain production, especially in development of grain production and in supply of high-quality seeding materials, organic-chemical growth stimulators of agricultural crops etc.

The government is improving certification system and raising responsibility of laboratories for determination of seed quality. Private sector is receiving technical support for seed multiplication of perennial grasses intending to supply countries of Central Asia and Russia with seeds of perennial grasses.

Acceleration of development process is carried out through utilization of experiences and recommendations of donor organizations like World Bank (WB), Technical Assistance to CIS countries (TACIS) and SIDA involved in implementation of the projects on development of seed production.

TABLE 2

Structure of cultivated area, in %

Name of crop	1991	2000
Total	100	100
Total area under crops	43,5	55,9
Including wheat	15,1	41,7
Maize (for grain)	4,9	5,3
Sugar beet	0,06	2,8
Cotton	2,0	2,8
Tobacco	1,6	1,2
Oil crops	0,37	5,0
Potato	1,75	5,7
Vegetables	1,6	3,9
Melon crops	0,3	0,3
Forage crops, Total	47,1	22,2
Other crops	1,8	0,1



5. Practical value of selected crops in Kyrgyzstan

Among cereals cultivated in Kyrgyzstan winter wheat is paramount food crop, which occupies 55% of total crop area under cereals and provides more than half of total grain production. Crop breeders in the republic make efforts to develop plastic high-yielding crop varieties with high grain quality indicators.

Productivity of new winter wheat varieties developed and passed registration recent years fluctuates between 8.0 t/ha-10.0 t/ha grown in irrigated agriculture under appropriate cultivation technology. In Aksu and other variety testing stations productivity of winter wheat variety Tilek has been 9.85 t/ha, Adir - 9.6 t/ha and Almira - 9,65 t/ha. Spring type bread wheat variety Dank, Azibrosh, Zubkov, Khans, Petr and Jamin have yielded up to 7.5 t/ha in fall sowing and 5.0 t/ha in spring sowing.

However the potentials that new registered varieties possess are not used completely in production process to get high yield. Maximum crop yield in crop field of advanced farms doesn't outyield 2-3 t/ha due to not following production technology.

The basic grain-forage crops with which crop breeding activities are carried out include barley, triticale and maize. Grain, straw and green mass (leaf and stem) are used for production of high-nutritious concentrated fodder. Spring barley occupies the greatest area in the general structure of cropped area under cereals. It is mainly cultivated as a cover crop under rainfed agricultural condition in dry and warm valleys.

Oat and triticale though occupy small area – 5 thousand ha, crop breeders of Kyrgyzstan are carrying out research activities on them giving consideration to nutritious value of these crops. Crop breeders of "MIS" LTD in collaboration with CIMMYT and ICARDA scientists have developed 2 high-yielding triticale varieties adaptable to local condition. The variety "Alyosha" and "MISSIM" can be used for production of grain and silage as well. At present these varieties are grown by farmers in Chuy province.

Maize. Total area under maize constitutes 112 thousand ha, 34 thousand ha of which is used for production of maize grain. Contribution of maize in total grain produce makes up nearly 5%. In 1996 it contributed around 10% of total grain produce. Crop breeding activities target this crop too, which resulted in release of some maize hybrids including "Chuy 466TB", "Chuy 62TB", "Oktyabrskiy 70", "Ala Too" and "Manas", which are able to yield 12-13 t/ha grain and 50-60 t/ha silage mass.

Much attention is drawn to high-protein crops i.e. soybean in selection of leguminous crops.

Soybean is considered a good preceding crop for other agricultural crops. The released soybean varieties include "Amantiy" and "Akjol".

The most important industrial crops for cultivation in the republic are sugar beet and cotton. Sugar beet hybrids "Kyrgyzskiy poluhybrid 8" and "Kyrgyzskiy odnosemyanka 25" have been developed in 1980. Presently farmers grow sugar beet hybrids introduced from Russia and Germany. Sugar beet occupies nearly 3% of total crop area.

Cotton is only cultivated for production of cotton fibre. Contribution of cotton is 65-70% in total mass of various processed fibrous materials.

In Kyrgyzstan cotton varieties can yield up to 3.5 t/ha raw cotton under optimum condition of cultivation in irrigated agriculture. Cotton varieties developed by crop breeders of Kyrgyzstan ("Kyrgyzskiy 3" with fiber type of V, "Kyrgyzskiy 4", "Kyrgyzskiy 5") occupy 2.8% of cropped area.

Potato is cultivated in the republic basically for food. However due to lack of high quality potato seeds and registered varieties it is impossible to meet growing consumption demand for potato on account of local production. Potato seeds imported outside sometimes are found infected with dangerous viral diseases.

To secure obtaining high potato yield it is necessary to import high quality potato seeds outside the country every year as strong degeneration is observed in basic agricultural areas. Presently breeding activities are going on in Issyk-Kul experimentation station and in other farms for selection of the best varieties. However, though availability of favorable natural-climatic condition potato seed production was not developed here.

In view of environmental condition Kyrgyzstan may be divided into two parts- northern and southern parts for grape cultivation. Principal direction of grape production in northern Kyrgyzstan and in mountainous zone includes production of champagne (wine) grape varieties. In the southern Kyrgyzstan farmers grow table grape varieties suitable for storage and varieties for drying and for making raisins, sultana.

Tomato is basic vegetable crop. It is widely used not only as a fresh vegetable, but also in canning industry. Processed tomato products makes up 90% of total canned vegetable products produced in the republic.

Perennial grasses are of significant importance in development sustainable forage base for livestock production. They are cultivated in irrigated agriculture for forage production, used in improvement of agricultural lands and in establishment of cultivated meadows and pastures.

Alfalfa is basic leguminous forage crop. It is widely used in feeding animals in the form of green grass, dried hay, haylage, silage and is used as raw material for vitamin-rich grass meal. Grown in optimum condition in irrigated agriculture it may yield 100-120 t/ha green mass, and 20-30 t/ha dried hay, and 15-16 t/ha and 3.5-5.0 t/ha respectively under rainfed agriculture. Content of digestible protein makes up 15.9-19.7%. Alongside with its fodder importance, alfalfa also gains great agro-technical significance.

At present alfalfa is one of basic forage crop for cultivation in mountain and foothill regions. It is also of great agricultural importance as alfalfa improves soil structure and increases soil fertility. Along with leguminous crops, perennial graminaceous have also high value. Only cold-resistant types of perennial grasses, including awnless quackgrass, non-rhizomatous couch-grass and Siberian lyme-grass out of all grass types tested were found more suitable for cultivation here.

In addition to their value for utilization in forage production, grass cereals are also important component of cultivated pastures and meadows the area of which is expanding every year in the republic. Mixed sowing of leguminous crops with graminaceous including orchard grass, meadow fescue, pasture ryegrass, wheatgrass narrow-leafed, meadow timothy, quack-grass awnless etc. are considered more productive pairs for cultivation in principle natural-climatic regions of the republic.



THE STATE OF BIODIVERSITY

Thanks to complexity and contradictoriness of geographical environment the highest concentration of species is observed in the country. Two more species fall per unit of area here compared to on the average in the world and in Central Asia. From biodiversity viewpoint the impression on the value of the territory can be obtained through comparison of it with the world indicators. Comparatively, the small territory constituting only 0.13% of dry area of the globe presents considerably more representation of practically all systematic groups. Parameters of concentration of a specific diversity are especially expressive. For the majority of groups it is higher than on the average in the planet.

These parameters are higher than on the average in Central Asia, which proves high concentration of species in mountainous area. This area resembles natural botanical garden and zoo.

1.1 The main value of plant genetic resources in Kyrgyzstan

Flora of Kyrgyzstan is extremely rich and diverse. Plant cover of the territory includes representatives of bryophytes (*Bryophyta*), horse tail (equisetaceae family-*Equisetophyta*), lycopodiales (*Lycopodiophyta*), pteridophytes (*Pteridophyta*), gymnospermae (*Pinophyta*) and angiospermae (*Magnoliophyta*) plant families. Dominating composition of the flora are angiospermae among which representatives of dicotyledonous plants surpasses monocotyledonous 5 times by number of species.

Plant families richer in species include: composite family (*Asteraceae*) – 383 species, leguminous (*Fabaceae*) - 400 species, cereals (*Poaceae*) – 293 species, mustard (*Brassicaceae*) -198 species, *labiatae* (*Lamiaceae*) – 182 species, lily (*Liliaceae*) 141 species, rosaceae (*Rosaceae*) -138 species, pink (*Caryophyllaceae*) - 1 266 species, *ranunculaceae* (*Ranunculaceae*), figwort (*Scrophulariaceae*) – 101 species. The families with the largest number of species are – composite family, leguminous and cereals, represented by 1 300 species or one third of the flora of Kyrgyzstan.

Abundance in the composition of species of genera in the flora are: milk vetch (*Astragalus*), oxytropis (*Oxytropis*), French honeysuckle (*Hedysarum*), onion (*Allium*), *Eremurus*, tulip (*Tulipa*), ferula (*Ferula*), campion (*Silene*), sculicarp (*Scutellaria*), Jerusalem-sage (*Phlomis*), wormwood (*Artemisia*), *Cousinia*. All these species are characteristic in the flora of Central Asia.

The structure of endemics is significant and indicative. Endemic families in the flora of Kyrgyzstan are absent, but one can meet monotypic endemic and sub-endemic genera. Quantity of endemic species amounts to nearly 10%. (Ionov R.N., Lazikov G.A., 2007).

The richness and diversity of natural-geographical environment of the territory have caused diversity of vital plant forms (ecobiomorph). Grasses dominate in the flora of Kyrgyzstan covering more than 50% of the composition of the flora and being represented by 3 175 species including perennial grasses -2 270 species. One biennial is represented by 896 species, woods and shrubs-260 species, semi-shrubs -119 species and other biomorphs by 61 species. Basis of plant community constitutes more than 200 species of flowering plants. They form basic phyto-mass in all types of vegetation. Number of species makes up 83.

More than 200 species of medicinal plants were revealed in Kyrgyzstan. More valuable among them are: meadow rue (*Thalictrum foetidum*), aconits (*A.karacolicum*), elecampane, inula (*Inula grandis*), motherwort (*Leonurus turkestanicus*), thermophasis (*Thermopsis turkestanica*), Saint-Johns wort (*Hypericum perforatum*), colt's foot (*Tussilago farfara*), marjoran (*Origanum vulgare*), sea-buckthorn (*Hippophae rhamnoides*), ephedra (*Ephedra equisetina*), hellebore (*Veratrum lobelianum*).

Nature of Kyrgyzstan is rich in wild plants of economic importance. Such plants includes: polygonum (*Polygonum coriarium*), liquorice (*Glycyrrhiza glabra*), knotweed (various species) (*Polygonum*), barberry (*Berberis*), rhubarb (*Rheum wittrockii*), is-segek, cocksbur panic-grass (*Anabasis aphylla*), ferula (various species) (*Ferula*), spurge (*Euphorbia ferganica*), golden drop (various species) (*Onosma*), thyme (various species) (*Thymus*) etc.

Unique nut woods in southern Kyrgyzstan present special value. Highlighting great significance of nut forest tract as unique natural formation it should also be noted that along with other specific diversity one can observe here huge



diversity of fruit crop forms including that of apple, almond, pistachio, cherry-plum, pear etc, that allowed N.I.Vavilov in his time to attribute it one of center of origin of cultivated fruit trees. From this viewpoint the tract presents huge value as preserver of huge gene pool.

Wild fruit plants of Kyrgyzstan: wild relatives of cultivated plants representing the most valuable genetic material include: walnut (*Juglans regia, euregiae*), apple Sieversii (*Malus sieversii*), Kyrgyz apple (*M.kirghisorum*), cherry-plum sogdiana (*Prunus sogdiana* Vass.) (subspecies i.e. plum family - *P.sogdiana* ssp. *prunoidea*, arkit - *P.sogdiana* ssp. *arkytensis*, a.c. cone-like - *P.sogdiana* ssp. *conoidea*), French pear (*Pyrus communis*), Korshinski pear (*P.korshinskyi*), Regelian pear (*P.regelii*), Tyanshanskaya cherry (*Cerasus tianschanica*), Mahaleb cherry (*C.mahaleb*), barberry (*Berberis oblona*), almond ordinary (*Pistacea vera*), hawthorn jungarian (*Crataegus songorica*), hawthorn turkestanian (*C.turkestanica*).

All of them can become a valuable source for developing new high-yielding varieties of cultivated plants resistant to diseases and pests.

TABLE 3

Quantity of species and endemics in various systematic groups of Kyrgyzstan flora

Taxons	Number of species	Endemic
Water plants (<i>Algae</i>)	850	3
Lichen (<i>Lichenes</i>)	495	4
Bryophytes (<i>Bryophyta</i>)	183	
Higher plants (<i>Kormobionta</i>)	3 786	200

Second place by economic value is occupied by natural herbaceous ecosystem being used as pastures and meadowlands. All of them experienced long-term and strong influence of human activities and almost 70% of them is eroded. Decrease in grazing of remote pastures leads to rehabilitation of their vegetation cover. However rehabilitation occurs largely on account of weed species. Water ecosystem gains special value, first of all as a source of fresh water and recreation objects. Out of these resources Issyk-Kul possesses the most recreational resources not only in on a country scale but also in perspective - on a regional and a world scale. Unique nut woods in southern Kyrgyzstan present special value. Highlighting great significance of nut forest tract as unique natural formation it should also be noted that along with other specific diversity one can observe here huge diversity of forms of walnut, apple, almond, pistachio, cherry-plum, pear etc, that allowed N.I. Vavilov in his time to attribute it one of center of origin of cultivated fruit trees. From this viewpoint the tract presents huge value as preserver of huge gene pool.

Negative influence on a state of a natural gene pool of plants is made by intensive anthropogenic factors as a result of which number and diversity of gene pool is getting decreased and a lot of varieties face danger of disappearance.

1.2 Current state of plant genetic resources for food and agriculture in Kyrgyzstan

Tien-Shan is one of the world center of origin and secondary center of varietal diversity of cultivated plants, therefore mountain ecosystem is of especial importance in conservation of primary wild forms - primogenitors of cultivated plants and animals, as well as a number of plant species useful for plant breeding that especially includes fruit plants, nuts, berries and flowering- ornamental plants. Varietal diversity of traditional crops, especially that of stone fruits and nuts is also high.

The richness of vegetation and fauna of the republic is strategic resources of vital importance ensuring sustainable development of the country especially favourable environment for utilization of plant species for food, industrial and medical-sanitary, and ecologic-aesthetic purposes. The resource base of Kyrgyzstan consists of following important components: varieties of agricultural crops, genetic resources, promising for plant selection and biotechnology, diversity of plant genetic resources and their wild relatives.

The western Tien-Shan and southern Fergane province are component of ancient Central Asian botanical-geographical center of origin of cultivated plants (Vavilov, 1926; Djukhovski, 1974). There were formed specific population of hexaploid wheat (so-called *inflatum* and *compactum*), small-seeded forms of pea (*Pisum*) and chickpea (*Cicer*). Primary forms of white and yellow carrot (*Daucus*) varieties, onion and garlic (*Allium cepa* and *A.sativum*) alfalfa (*Medicago sativa*) were cultivated and formed here. Southern Kyrgyzstan is considered homeland of a number of fruit crops, thus formation of varietal diversity as a result of multi-cross hybridization of different species occurred here for apple (*Malus domestica*)

wild species *Malus sieversii*, *M. niedzwezyana*; for pear (*Pyrus domestica*) – wild species *Pyrus communis*, *P. asiatica*, *P. korschinskyi*. Some fruit including apricot (*Armeniaca vulgaris*), almond (*Amygdalus commynis*), pistachio (*Pistacia vera*), walnut (*Juglans regia*) have also been cultivated here and presently diversity of their forms is very high in the forests.

This region is well-known as a secondary center of varietal diversity of fruit crops including: apricot *Armeniaca vulgaris*, walnut *Juglans regia*, pistachio *Pistacia vera*, elaeagnus *Elacagnus*, almond *Amygdalus*, currant *Ribes*, grape *Vitis*, as well as flowering-ornamental plants: tulip *Tulipa*, *Iris*, onion *Allium*, primula *Primula* etc. Diversity of wild forms of cherry-plum (*Prunus sogdiana*, *P. Ferganica*), hawthorn (*Crataegus pontica*, *C. Saguinea*), sea-buckthorn (*Hippophaë rhamnoides*), elaeagnus (*Elaeagnus orientales*, *E. Angustifolia*), service tree (*Sorbus tianschanica*, *S. Persica*), cherry (*Cerasus erythrocarpa*, *C. verrucosa*, *C. Tjanschanica*), currant (*Ribes nigrum*, *R. janczewskii*, *R. Meyeri*) and raspberry (*Rubus idaeus*) is extremely great. All of them are valuable primary materials for selection and development of high-yielding varieties of cultivated plants resistant to diseases and pests. In Tien Shan were revealed 132 species of ancestry forms of wild relatives of cultivated plants. Diversity of wild relatives of cultivated plants – is a pledge of food safety of population.

Some local varieties and forms developed by local crop breeders prevailed over others in the history of crop breeding. Peasants and gardeners have lost a number of local forms, varieties and clones of agricultural crops due to lodging, susceptibility to diseases and pests. The principle reason of disappearance is introduction of high-yielding varieties and hybrids.

Existing gene pool of basic agricultural crops, fruit crops, medicinal and flowering-ornamental plants consists of 1 222 accessions of which 804 accessions represent cultivated variety samples and 318 wild accessions (2008).

1.3 Danger of disappearance of species

The list of species exposed to danger of disappearance includes 71 plant species that constitutes nearly 1% of total specific richness of Kyrgyzstan. Currently 71 plant species have been included in Red Book. Some species out of them, including tulip brilliant, (*Tulipa nitida*), ostrovskiy (*T. ostrowskiana*), rose (*T. rosea*), wild pomegranate (*Punica granatum*) are in danger of disappearance mainly due to destruction of their habitats caused by economic activities and directly destruction by human activities.

1.4 Priorities and needs

The basic limiting factors in reduction and disappearance of plant gene pool includes natural limited areas in mountainous environment suitable for existence of those or other communities, and small size of favourable areas. Their further reduction may lead to irreversible impoverishment in specific composition and further to degradation and disappearance of biological communities. Overgrazing has led to degradation of pastures. Chemical pollution and anthropogenic factors leads to danger of loss of unique species and varieties of cultivated plants and their relatives. In this connection, current support of FAO is in proper time. There is a need for corresponding support from the government of Kyrgyzstan and international organizations (Biodiversity International, CIMMYT, ICARDA, FAO etc) for enlightenment of population, detection of genetic erosion of *in situ* conservation to maintain biodiversity.

Rural population, farmers and representatives of legislative and governmental bodies should observe and fulfil first of all their civic duty on conservation of PGR. These bodies should be objective, transparent and professionally prepared and high managerial competence to protect interest of the country.

To ensure realization of these actions the country is in need of qualified specialists possessing professional knowledge and update methods in biology and agriculture (information technology, utilization of biotechnological methods in PGR, competence in foreign languages). Obligatory element for preservation of PGR is regular international expeditions with joint involvement of local and international experts.

The most important is establishment of National Gene Bank with medium-term conservation facilities.



THE STATE OF THE *IN SITU* MANAGEMENT

Genetic resources of plants should be taken under protection of the state since they are the basic supplier of valuable sources of plant donors for crop breeding. One of the basic ways of preservation of PGR is protection of territories on which wild relatives of cultural plants grow or it refers to *in situ* conservation.

Conservation of wild species of cultural plants in protected zones and territories assumes great value. Kyrgyzstan has inherited national system of *in situ* conservation from the former Soviet Union. There were established national parks and reserves, special natural protected areas with the purpose of preserving natural diversity in the republic. Total area especially protected territories of natural reserve fund of the republic makes up 3.9% of total area of the republic, which is evidently not sufficient. The basic problems of preservation of a biodiversity include on-going loss of habitats and absence of effective protection measures in the system of preserved territories.

At present there is rather multipurpose network of territories and objects forming especially - protected natural territories (EPNT) of republic. For today EPNT in Kyrgyzstan accounts 86 with total area of 777.3 thousand ha that makes 3.9 % of total territory of the republic.

However they don't cover major ecosystem and are not distributed in all bio-geographical divisions of the country.

By functional significance EPNT can be attributed to 4 categories adopted by the International Union of wildlife management:

- Reserve areas: includes 6 reservations with total area of 250.5 thousand ha;
- National and natural parks: 1 national and 5 natural parks with total territory of 72.2 thousand ha;
- Natural monuments: this category includes 19 monuments, which is protected since 1975;
- Objects for protection of biotypes and species: 71 protected area, occupying the territory of 319.9 thousand ha - more than half of total area of EPNT.

There were established three botanical gardens and nurseries where unique, relict, endemic species in need of protection are preserved.

2.1 Inventory, examination and priority directions

In 1930 collecting mission was organized to collect local forms and samples of wheat. The majority of the collected local varieties of spring wheat in the south of the republic (Uzgen and Kurshab provinces) includes local varieties like "Ak kayrak", "Kizil bugday", "Djaydari", "Tashika", "Chul", "Ak bash" and others which belonged to variety diversity of *Eritrospermum*, but the varieties of "Kyzyl-radi-bugday" and "Ak-radi-bugday" to *Eritroleucon*.

Specific diversity of spring wheat in Kyrgyzstan was represented by 6 wheat species. However, in recent years it was represented on the whole by two species: *Triticum aestivum* L., and *Triticum durum*.

After collection of local wheat forms from various agro-ecological zones the studies were started in 1940 to reveal the value of various ecotypes for utilization in practical selection.

At first the research activities were based on individual selection method out of local wheat forms. The first varieties of Kyrgyzstan selection namely "*Eritrospermum* 14" and "*Eritrospermum* 41" were released through application of this method and were submitted to SCTCV in 1941 followed by "*Salomonis* 551", "*Ferrugineum* 87" and "*Eritrospermum* 50" and others.

In the end of 40s research activities were started to develop high-yielding crop varieties adapted to various ecological zones through application of complex hybridization. The studies resulted in the release and recognition of the variety of "*Eritrospermum* 9" for cultivation in Issyk-Kul region.

In the years of 50s the studies on wheat breeding together with crop breeders I.P.Rijh, V.F.Lyubimov and with new galaxy of scientists from Russia and Ukraine - M.G.Tovstik, V.I.Maystrenko, V.Kantemirov and S.I.Batalov were continued.

They developed new winter wheat varieties "*Eritrospermum* 132" and "Osh (T-1)". These varieties were extensive type very susceptible to lodging and their productivity didn't exceed 2.5 t/ha. The variety "Osh 1" performed itself early



ripening and drought resistant. In 60s these varieties were replaced by new winter wheat varieties of intensive type like “Kyrgyzstan 3” developed under supervision of I.P.Rijh and recognized in 1960 for cultivation in Chuy and Tallas valleys; “Batkan red” (N.N.Batalyeva and I.Kantemirov) recognized in 1967 for cultivation in Issyk-Kul province; and Kyrgyzstan 16 (M.G. Tovstik) recognized in 1965 for cultivation in rainfed areas of Kyrgyzstan and other republics of Central Asia.

All varieties mentioned above were high-yielding and resistant to rust diseases. However, they were comparatively late-ripening and susceptible to covered smut diseases, performing itself only with acceptable grain quality and medium winter-hardiness. In recent years, all local varieties were forced out by “Bezostaya 1” variety. As is obvious from given information, valuable and unique gene pool possessing valuable agronomic significance for development of new crop varieties was lost. This is individual example on grain crops. Other agricultural crops and their relatives also face the same situation.

Presently the inventory, collection of genetic materials, establishment of database of plant genetic resources is undertaken on the base of KRIF. This diverse primary material is systematized by working groups for creation of database and catalogue. All genetic materials are actively used in crop breeding activities as a genetic source and donors for development of new crop varieties.

Inventory of genetic material of the department of selection and primary seed production of wheat, barley and maize of KRIF has been carried out. Inquiries were made to identify ancient varieties of cereals available at experimental stations of the Institute.

14 wheat varieties were received by State Commission on Testing of Crop Varieties.

Inventory of selection materials and collections of fruit crops maintained at selection departments of KRIF, at BGAS and IBMF was also carried out. Inventory also targeted medicinal plants growing in wild nature of Kyrgyzstan. Records on 103 medicinal plants representing 44 species were included in database. Vegetable and oil crops used in crop breeding process were also subjected to inventory.

Two pilot expeditions were organized in 2003 with financial support of GEF through UN Program on Environment that targeted two priority crops i.e. wild species of apple and walnut. During expedition to Kara-Almin forestry in Jalalabad province 23 forms of wild apple were approved of which 9 promising forms were selected. Apple is generally represented by wild species: Nedzevski apple, Kyrgyz apple and Siverse apple species. Apart from apple one can meet here wild pear Sogdiana.

In the course of expedition 15 forms of walnut were approved of which 6 forms were recommended for cultivation in farmer holdings located in southern Kyrgyzstan.

It should be noted that majority of intraspecific diversity of walnut was concentrated in Arslanbob, Mirzakhan, Kaba, Artik, Ortok and other nut-fruit tracts of Jalalabad and Osh provinces. During expedition 7 forms of endemic wild grape species of Uzun-Ahmad were also found. Apart from this, the expedition revealed 21 forms of cherry-plum which consists important component of forest ecosystem.

With financial support of National Institute of Public Health of USA field expeditions were held in the years of 2004-2007 in the republic that targeted medicinal plants. The expedition evaluated at what extent individual plant species in natural flora, their conservation and utilization in breeding activities was studied. The expedition also determined co-ordinates of species growing in various plant communities and on various altitudes with help of GPS. The expedition carried out on suggestion and financial support of Agricultural Department of USA and All Russian Institute of Plant Production named after N.I.Vavilov was attended scientists of Kyrgyz Research Institute of Livestock & Pastures. Collection of wild plants was conducted through August 5-22, 2006 that targeted three provinces of the republic and covered 54 collection points. 266 samples of cereals and leguminous crops were collected in the course of expedition. Collected samples included: two species of wild barley, 6 species of alfalfa, 13 species of meadow-grass, 1 wheatgrass, 2 bent-grasses, 1 onion, quack-grass awnless, ryegrass tall, lyme-grass, fescue, orchard-grass, sainfoin and vetch etc.

17 samples of cereals of local origin, which introduced from ICARDA Genebank include: two *egilopsis* varieties, 13 varieties of durum wheat and 2 varieties of bread wheat. Obtained samples and 33 bread wheat samples were sown to harvest sufficient amount of seed for storage in 2005 crop season. Multiplied seed is stored in plastic jars.

Currently apart from abovementioned accessions of various crops, a number of other crop accessions including 8 barley varieties, 37 varieties and 27 lines of dwarf wheat of Kyrgyzstan, a variety of winter rye, a variety of winter triticale, a variety of wintering oat, 2 soybean varieties, a chickpea variety, a variety of alfalfa and 143 variety samples of spring and winter barley from nurseries of EYT (Elite Yield Trail), AYT (Advance Yield Trail) and control nursery for irrigated and rainfed agriculture are also preserved. All these samples are of local origin. At present total samples maintained at the Kyrgyz Research Institute of Livestock & Pastures makes up 554 that includes 288 samples of different crops maintained in gene bank and 266 samples collected during the expedition.

The expedition conducted in 2006 with support of IPGRI/ICARDA has targeted the study of fruit crops and their wild relatives. Morphological description and varietal peculiarities of apple (*Malus* Mill.), apricot (*Prunus armeniaca*), grape (*Vitis vinifera*), pistachio (*Pistacia vera* L.), pear (*Pyrus* L.), plum (*Prunus* Mill.) were carried out in southern Kyrgyzstan.

Genetic resources of agricultural crops are maintained by different institutions including at storage house of selection materials of research institutes, in collection nurseries of higher educational institutes, seed producing farms, and in test fields of SCTCV. For example, "MIS" Joint-Stock Company owns, storage house for breeding materials and storage facilities that enables to support annually preservation of 2 000 germplasm accessions of cereals, 100 accessions of barley, registered and promising varieties and hybrids of oat, triticale, maize and sugar beet. These samples are maintained through re-planting them in every 3-4 year. 14 variety testing stations of the SCTCV located in all basic soil-climatic zones of the republics maintain collections that cover actually all agricultural crops. Total number of varieties and hybrids in these collections makes up 1 300 accessions. Through support of SIDA project SCTCV's headquarter was equipped with Russian information system that supports electron database on 576 varieties and 129 selection institutions. International organizations like CIMMYT and ICARDA play significant role in expansion and maintenance of collections and germplasm of the basic strategic crops. For instance, every year these centers send germplasms of various agricultural crops for testing and utilization in selection works on various directions. After the studies and release of new samples, promising lines and varieties are sent to these centers.

In this connection *in situ* conservation of genetic resources assumes priority not only at national level, but also at regional and international level. There is a need for coordination of activities on collection of genetic materials and organization of expeditions to center of origin of cultural plants. Activities on collection of local and wild samples of cereals and leguminous crops were started in 2000 with support of ICARDA and IPGRI. There is a need for conduction of purposeful and systematic activities on collection of cultural plant species and their wild relatives, as well as maintenance of collected materials under *in situ* management with support of the government and international organizations. This question is one of priorities of the National Program.

2.2 On-farm management & improvement of PGRFA

Last years farmers started to more widely use local varieties, as well as introduced varieties and hybrids of agricultural crops. This was possible thanks to support of international donors and investors. Seed stock in farmer holdings is supported with assistance of IPGRI, CIMMYT and ICARDA. There were established pilot farms for production of high quality seed materials of cereals. For instance, crop breeding-seed production department of grain crops eligible to run primary seed production was established on the basis of "MIS" Joint-Stock Company. In Kemin district there was established a farmer holding for production of virus-free planting stock of potato. Local population in Ton and Jeti-Oguz districts of Issyk-Kul province was involved in conservation of fruit crops (apple and pear) in their households being cultivated in that region during all period of horticulture. For instance, there was established Agricultural Advisory Service with support of the World Bank. Its function includes training of farmers, agronomists on cultivation of agricultural crops. At present farmers grow local varieties and hybrids recognized in that region, which gain agronomic-valuable traits and adaptable to local environmental condition. As such, farmer holding "Umut" located in the south of the republic (Ala-Bukin district) grow potato varieties and hybrids of Netherlands origin. This farm provides local population with its produce, as well as is engaged in multiplication of the produce for distribution to other farmers. Certain activities are going on for improvement of seed planting stock of potato in *in vitro* condition. This work is undertaken by scientists of Agrarian University of Kyrgyzstan in collaboration with farmers of Kemin district. The process of crop diversification is shown a great interest by farmers.

Bean - a new crop for Kyrgyzstan, represented by various subtypes is grown in Tallas province with support of Yurkish investors. Now there is a need for registration of farmer holdings where valuable plant forms and samples are grown. To fulfill this task support is needed from international organizations to organize inventory, collection and conservation of local crop varieties and plant species. It is necessary to adopt National Program implying conservation strategy, financial and staff resources for more purposeful preservation of agricultural crops.



2.3 Post-disaster regeneration of crop production sector

Clear climate changes are observed in Kyrgyzstan last years. Drought in spring-summer period, frosts, and the most important, damages of agricultural crops caused by harmful diseases and pests are periodically observed in Kyrgyzstan. These limiting factors lead to disappearance of valuable plant genotypes and varieties. As such for instance, severe infection of yellow rust of bread wheat (*Puccinia striiformis*) was observed in Kyrgyzstan in 2002. Damage of crop area under bread wheat varieties ranged between 50-100%. Bread wheat varieties "Kizil Dan", "Dostuk" and "Lutecence 42" were discarded from production and their recognition were abolished.

Thanks to efforts of crop breeders the seeds of these varieties were maintained. By 1980-1990 forage triticale variety "Bolot" was cultivated in Issyk-Kul province. This variety was very popular among farmers for a series of agronomic traits and high feeding advantages. But after agrarian reforms carried out in the country agricultural lands were delivered to private ownership. Accordingly, structure of cultivated area was also subjected to changes and a number of crops including triticale were taken out from crop rotation. For today this variety was completely disappeared. In this connection, support of international organizations (CIMMYT and ICARDA) is highly appreciated. After severe infection of yellow rust spread in 2002 a target oriented Program was adopted with support of CIMMYT and ICARDA on improvement of germplasm of grain crops for resistance to biotic and abiotic stresses of environment. Therefore more than 200 accessions of wheat and barley resistant to biotic factors of environment were received with support of these centers. Irreplaceable role of CIMMYT and ICARDA should be noted in enrichment of gene pool of cereals and leguminous crops. At present research activities on development of new varieties of cereals resistant to rust diseases and harmful pests are carried out. A number of promising lines and high-yielding varieties of wheat, triticale, barley and soybean were obtained.

Due to economical and social constraints the state of orchards and vineyards has also strongly deteriorated. Fruit crop varieties delivered to farmers earlier have lost their varietal traits and become degraded due to poor care taken to them.

Utilization of plant genetic resources basically aims improvement and development of valuable genotypes and varieties resistant to abiotic and biotic environmental factors with high technological quality of agricultural produce and adapted to certain ecological zone of Kyrgyzstan. The varieties released should be competitive and focus on commodity market.

Therefore urgent priorities of the country include improvement and expansion of germplasm set, collection and conservation PGR and their wild relatives possessing agronomic-valuable features. Genetic improvement for enrichment of collection and accessions is carried out through purposeful collection and utilization of genetic resources. Concentration of collections and samples is conducted according to adopted selection program remaining in force till 2010. According the program, crop breeding activities envisage provision and application of high-yielding varieties and hybrids of agricultural crops adapted to various natural-climatic conditions. The given program details parameters of the models of new varieties and hybrids of agricultural crops. Crop breeding activities focus on basic agricultural crops and concentrated in the following scientific institutions: KRIF, KRILP, BG, Issyk-Kul Experimental Breeding Station, Naryn Experimental Station, KAU.

Bread wheat was designated as priority crop. Crop breeding activities are carried out on following crops: barley, Maize, triticale, potato, sugar beet, cotton, apple, tomato, forage crops.

This program was adopted in 1991. During this period agrarian policy and agrarian science were subjected to certain changes in view of today's requirements and shortage of agricultural machinery and staff resources. Selection activities and seed production works for some crops (grape, perennial grasses, oat) were practically discontinued. Selection works and seed production activities on wheat and barley were extended to develop facultative and spring type varieties.

The principle limiting actions of this program include lack of facilities and specialists. In this connection, there is an urgent need for analysis of priority directions of the Republic and on this basis renewal and intensification of selection works supported with the program for providing facilities, human resources and involvement of private sector. To achieve this goal there is a need for Target Program on selection works with utilization of PGR and database on priority directions and crops. In this connection, support at all levels (national, regional and international) is necessary.

2.4 Improvement of *in situ* conservation of PGR: priorities and needs

The basic limiting factor in improvement of *in situ* conservation of PGR is lack of facilities and specialists. Improvement of *in situ* conservation of PGR requires government support for optimization of legislative acts to support ESPECIALLY PROTECTED NATURAL TERRITORIES network, and attracting projects. Legislation of Kyrgyzstan on nature protection is

currently undergoing reforms and reorganization to be adaptable to new economic relations. The law on protection of flora is at ratification stage.

Some normative and legal acts include: Law on "Protection of Nature" (1991), Law on "Especially protected natural territories" (1994), Law on "Plant quarantine" (1996), "Joining of the Republic of Kyrgyzstan to Convention on Biological Diversity". (1996);

Decisions of the Government on "Approval of National Plan of the Republic of Kyrgyzstan on protection of environment" (№43 dated 26.09.1996), on "Approval of Regulation on state ecological examination of the Republic of Kyrgyzstan".

The law on Protection of Environment" (Laws of the KR dated February, 4, 2002 N 22, June, 11, 2003 N 101)

It is necessary, that Kyrgyzstan signs the International Treaty on Plant Genetic Resources for Food and Agriculture (IT PGRFA)

It is important to increase public awareness and enlightenment of local population, and support of international organizations.

THE STATE OF THE *EX SITU* MANAGEMENT



3.1 The state of *ex situ* collections

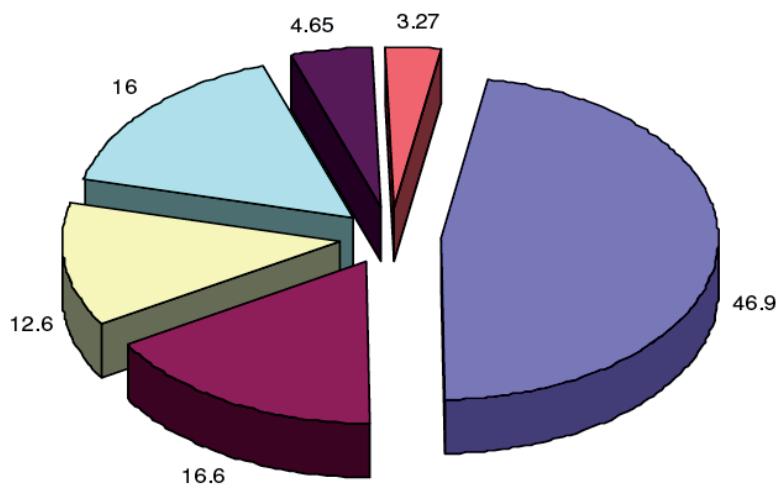
KRIF, BG and IBMF maintain collections of cereals, leguminous crops, fruit crops, forage crops, industrial crops, vegetable crops, melon crops, potato and medicinal plants that grow in wild nature of Kyrgyzstan.

The collection includes a total of **1 527** accessions. These accessions are regenerated in each 2-3 years. The collection represents wild relatives of genus *Hordeum* 2 species; *Aegilops* 3 species; onion 7; nuts 20 and grape 1.

At present basic accessions of agricultural crops are maintained at experimental stations of SCTCV, at KRIF, BG, KRILP, IBMF, KAU and seed production farms of "MIS" Joint-Stock Company (Diagram). During the last decade the situation has changed. Recent years number of accessions maintained at KRIF has decreased, especially that of cereals, while in the beginning of 2000 basic gene pool was concentrated at KRIF of Kyrgyzstan.

DIAGRAM 1

Basic accessions of agricultural crops



- Kyrgyz Research Institute of Farming (KRIF)
- Kyrgyz Research Institute of Livestock & Pastures (KRILP)
- Botanical Garden named after Gareev (BGAS)
- State Commission on Testing of Crop Varieties (SCTCV)
- Institute of Biology & Montane Forests (IBMF)
- Kyrgyz Agrarian University (KAU)

This is due to lack of land resources and staff recruitments and agricultural machinery. The most important is that crop selection rotation activities are undertaken near the capital where agricultural lands subject constantly to capture. In the Academy of Sciences collections are maintained as herbaria.

Responsible institutions lack facilities for *ex situ* conservation of existing collections. Such situation makes Kyrgyz scientists and specialist to worry about the fate of existing valuable accessions, which are in danger of disappearance. Seeds that are stored in *ex situ* condition in warehouses and special rooms lose their germination ability and perform poor germination rate due to inadequate facilities. Some storehouses even have no facilities for conduction of fumigation and disinfection activities. In such situation storehouses expose to attack of pests and rodents. Therefore majority of selection and collection materials is in catastrophic state. This is connected with objective and subjective

reasons. Therefore the country needs National Program on state level conservation and regeneration of basic and selection collections maintained under *ex situ* conservation. Establishment of National Botanical Garden is a matter of urgency of the country. At the same time the country lacks adequate facilities for proper organization of field trials, proper registration of germplasms, varieties and planting materials. In this connection, there is a need for regional and international programs targeting these issues. Starting from 1995 certain actions have been taken to involve international projects through CGIAR, and state programs targeting improvement and multiplication of accessions maintained under *ex situ* conservation. The essential part of these projects targets multiplication of genetic materials of cereals and leguminous crops. There is a need for supporting projects on documentation and registration of genetic resources as well as their regeneration. Corresponding coordination of these activities and management by certain center is also necessary. Documentation and registration of database would provide an opportunity for identification of accessions, and possibility of ensuring financial, technical and human resources.

3.2 Gene bank

In 2003 by suggestion of managers of ICARDA-CAC (regional office in Tashkent) it was decided for the first time to establish Gene Bank in Kyrgyzstan for medium-term storage of valuable accessions of agricultural crops cultivated in the republic, as well as their wild relatives. For this purpose a special premise and supporting rooms were designated at Kyrgyzstan REA for establishment of Gene Bank and for preparation of materials for maintenance. Some equipments including thermostat for seed germination, office furniture and equipments, special plastic jars for seed storage and shelves were provided by ICARDA-CAC.

Special constructions works were carried out to facilitate arrangement of Gene Bank. Gene Bank consists of 5 rooms: a room for storage of seeds, a room for drying seeds, a room for selection of materials, laboratory room and documentation office. The Gene Bank was designed for conservation of 8 000 accessions. But currently it doesn't function due to lack of water, electricity and relevant infrastructure.

It should be noted that current state of populations of 157 endemic and rare plants was analyzed by the Institute of Biology & Montane Forests with grant support of International Scientific-Technical Center in the framework of the project on "Conservation and utilization of germplasm of wild flora of Kyrgyzstan for solution of genetic-selection and economic problems", and gene bank of germplasm was established at the same institute. Nowadays the Government of Sweden has allocated grants for construction and equipping National Gene Bank similar to Nordic GB on the basis of State Commission on Testing of Crop Varieties under the Ministry of Agricultural, Water Management and Processing Industry of KR. According to the given project this institution will be put into exploitation in 2009 after training of selected specialists. According to agreement on the given project Kyrgyzstan undertakes an obligation on maintenance of operational costs of Gene Bank.

Implementation of these actions is expected to increase efficiency and accelerate activities and studies on prevention of losses and destruction of cultivated species and their wild relatives.

3.3 Main priorities and needs

Responsible institutions lack facilities for *ex situ* conservation of existing collections. Such situation makes Kyrgyz scientists and specialist to worry about the fate of existing valuable accessions, which are in danger of disappearance. Seeds that are stored in *ex situ* condition in warehouses and special rooms lose their germination ability and perform poor germination rate due to inadequate facilities. Some storehouses even have no facilities for conduction of fumigation and disinfection activities. In such situation storehouses expose to attack of pests and rodents. Therefore majority of selection and collection materials is in catastrophic state. This is connected with objective and subjective reasons. Therefore the country needs National Program on state level conservation and regeneration of basic and selection collections maintained under *ex situ* conservation. Establishment of National Botanical Garden is a matter of urgency of the country. At the same time the country lacks adequate facilities for proper organization of field trials, proper registration of germplasms, varieties and planting materials. In this connection, there is a need for regional and international projects targeting these issues

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supporting projects on documentation and registration of genetic resources as well as their regeneration. Corresponding coordination of these activities and management by certain center is also necessary. Documentation and registration of database would provide an opportunity for identification of accessions, and possibility of ensuring financial, technical and human resources.



THE STATE OF USE

4.1 Distribution of PGR

In Kyrgyzstan crop breeders carry out research works basically on following crops: wheat, barley, maize, forage crops, fruit crops, vegetables, potato and sugar beet. The basic selection works has been concentrated in KRIF. Last years selection works are also carried out by private agricultural companies. Crop breeders working actively have access to germplasms and accessions of agricultural crops. In the past collection materials used to be received from All Russian Institute of Plant Production named after N.I.Vavilov (VIR). At present crop breeders stopped getting accessions from VIR due to lack of financial resources and because of economic constraints. At present, germplasm are obtained from international centers like CIMMYT, ICARDA, Bioversity International and other foundations.

In the past there was an organized mechanism of registration and delivery of samples through selection center. Samples used to be sent to VIR and other interested institutions with relevant information on name of variety, line or hybrid; origin, basic agronomic traits and biological indicators.

Now sample dispatching to VIR was stopped. Dispatching samples of promising lines and varieties is undertaken in the framework of international collaboration. As such, for instance by 2006-2007 promising lines and varieties of wheat, barley and triticale (5 varieties) were sent to ICARDA and CIMMYT. Thus, utilization of PGR is getting intensified. According to Material Transfer Agreement (MTA) selection materials are exchanged with neighbouring republics.

4.2 Utilization of PGR in crop breeding

Crop breeding activities focused on basic agricultural crops were concentrated in KRIF, KRILP, BGAS and in experimental-selection stations. Last years certain crop breeding activities are undertaken at private seed production farms too.

Utilization of plant genetic resources basically aims improvement and development of valuable genotypes and varieties resistant to abiotic and biotic environmental factors with high technological quality of agricultural produce and adapted to certain ecological zone of Kyrgyzstan. The varieties released should be competitive and focus on commodity market.

Therefore urgent priorities of the country include improvement and expansion of germplasm set, collection and conservation PGR and their wild relatives possessing agronomic-valuable features. Genetic improvement for enrichment of collection and accessions is carried out through purposeful collection and utilization of genetic resources. Concentration of collections and samples is conducted according to adopted selection program remaining in force till 2010. According the program, crop breeding activities envisage provision and application of high-yielding varieties and hybrids of agricultural crops adapted to various natural-climatic conditions. The given program details parameters of the models of new varieties and hybrids of agricultural crops.

Crop breeding activities focus on basic agricultural crops and concentrated in the following scientific institutions: KRIF, KRILP, BGAS, Issyk-Kul Breeding Station, Naryn Experimental Station, and KAU.

Bread wheat was designated as priority crop by the National Breeding Program. Crop breeding activities are carried out on following crops: barley, maize, triticale, potato, sugar beet, cotton, apple, tomato, forage crops.

This program was adopted in 1991. During this period agrarian policy and agrarian science were subjected certain changes in view of today's requirements and shortage of agricultural machinery and staff resources. Selection activities and seed production works for some crops (grape, perennial grasses, oat) were practically discontinued. Selection works and seed production activities on wheat and barley were extended to develop facultative and spring type varieties.

At present the program is being restored on selection of alfalfa and sainfoin at KRILP with support of SIDA project. Unique collection of germplasms (more than 40) was introduced from USA, France, Canada, Tajikistan and Sweden. Activities were also started on identification and selection of promising lines among local bean varieties, and target crossing with resources resistant to viral diseases is undertaken with support of the project experts.

4.3 Seed production of agricultural crops

Activities towards establishing seed production farms in Kyrgyzstan were started in 1974 when general conception on development of seed production branch of agriculture was formulated that envisages moving towards seed production on industrial basis.

Since 1991 all seed production farms in the republic have collapsed and they have practically stopped functioning due to not being able to find commodity markets for seed.

Starting from 1995 production of seed by seed production farms has been started afresh and there were established 46 large seed growing farms each of them owning on the average more than 1,5 thousand ha arable lands. All of them were occupied with practically seed production of cereals, those functioning in southern region provided cotton growers with cotton seed completely. But seed production of other agricultural crops has sharply decreased, due to lack of commodity markets for seed both in the republic and in abroad as well.

Last years the process has started on establishment of new seed production farms – agricultural cooperatives and individual farmer holdings, records of which are provided in Table 3.

In particular, seed of cereals, basically production of wheat seed has reached up to 40 thousand ton annually that makes up one third of total demand. This amount has increased in accordance with demand for seed within the republic.

Production of hybrid maize seed is getting drastically decreased due to reduction in the number of large-scale farms, livestock production farms, lack of field equipments and harvesting machinery and illicit introduction of seeds from the next China.

TABLE 3

The structure of seed production enterprises (quantity)

Year	All seed production farms	Including			
		Public farms	Agricultural cooperatives	Associations joint-stock companies	Peasant/farmer holdings
1995	46	14	23	9	6
1996	84	28	19	31	12
1997	119	57	17	33	30
1998	147	66	18	33	47
1999	175	75	19	34	47
2000	175	75	19	34	49
2001	174	65	23	37	57
2002	184	62	26	39	68
2007	207	58	38	43	78
2008	183	45	42	48	48

It should be noted that significant reduction in quantity of seeds of perennial grasses-alfalfa and sainfoin produced by seed production farms caused by agrarian reforms carried out in the republic, loss of traditional export commodity markets was replaced by the tendency of increasing crop area under seed production of given crop last years.

Restoration of seed production of leguminous crops (soybean) has started since 2003 to increase the production. It is also envisaged to increase production of other leguminous crops-peas in future.

Annual production of sugar beet seed is at the level of 300-400 ton that completely meets the need of the republic. Production of sugar beet seed practically was not conducted in 2008 owing to reduction in crop area of given crop by producers of agricultural crops in Kyrgyzstan and consequently due to absence of demand for seeds of given crop.

Seed production of oil crops was started in 1995 and their production has increased in 2002 because of import of seeds of high-quality varieties of safflower, sunflower, and spring rape, commodity seed of which has not been arranged in the Republic.

Within the program rendering assistance to poor strata of the population of Kyrgyzstan in the framework of the "The Project on Auxiliary Services" original planting stock of potato was introduced from Holland and its production in seed production farm has increased by 3.5 fold in 2006 compared to previous years.

Potato seeds are introduced in the republic in the framework of the projects being implemented by international donor organizations since special program on seed production for given important food crop in Kyrgyzstan doesn't exist.



Seed production of vegetable-melon crops practically is not conducted by seed production farms as the republic imports significant volume of them from foreign countries, basically from Holland.

The Republic is not self-sufficient in production of necessary types of products like sugar and vegetable oil.

At present, cereals constitute the most important segment of the agrarian economy of Kyrgyzstan. From a national food security point of view, wheat is in first place in the agricultural sector and farmers rely on it for their basic food needs. But wheat flour and grain are still imported from neighbouring countries as the country is not self-sufficient in wheat and wheat products.

THE STATE OF THE NATIONAL PROGRAMMES, TRAINING & LEGISLATION



5.1 National programs

The Republic of Kyrgyzstan has not adopted yet a national program on conservation and utilization of PGR. Adoption of National Program would be of great importance. Such program would enable purposeful and planned collection of plant genetic resources; their maintenance according to international standards; their evaluation and investigation; documentation, coordination of *in situ* activities and *ex situ* management, improvement of conservation methods, training etc.

The analogous program was adopted on biodiversity. The National Plan of Strategy and Action relatively on conservation of biodiversity adopted on May 28 1977 is one of the first national plan in Central Asian region aiming strengthening conservation of biodiversity, as well providing information, social-economic and legal background for sustainable utilization of PGR in the interest of people.

- It is necessary to establish National Board on genetic resources represented by all institutions involved in utilization and conservation of genetic resources for coordination of given activities in the republic;
- Intensification of construction of National Gene Bank on the basis of State Commission on Strain Testing (SCST) under the SIDA project under supervision of newly established National Board on PGR for to consolidation and optimization the use of allocated resources. Functioning of the given Bank would enable to solve constraints on conservation of unique plant genotypes available in arsenal of crop breeders;
- Formulation of national program on PGR
- Determine standards and improve facilities for conservation of PGR that also includes elaboration of effective conservation methods, *in vitro* inclusively
- Carry out inventory of PGR based on joint efforts towards restoration of collections, identification and removal of unnecessary duplications;
- Documentation of PGR material
- Work out strategy on conservation and sustainable utilization of PGR
- Increase knowledge on PGR at national and institutional levels.
- Determine branch institutions of PGR network

5.2 Education and training

Training of experts in Kyrgyzstan is carried out at multistage level, starting from MsD up to postgraduate courses.

Target specialists (on crop breeding, PGR, biotechnology etc) pass short-term or long-term training courses both in near and far abroad. A lot of specialists have passed training courses in Mexico, Turkey, Almaty, Germany etc with support of CIMMYT and in Aleppo, Tashkent, India, Italy and other countries with support of ICARDA, IPGRI and SIDA (Sweden).

It is necessary to apply regular approach to improvement of professional skills on PGR and language competences. Regular training of technical staff should be ensured. All these activities should be undertaken on local, regional and international levels.

5.3 Basic legislative acts on PGR

- Code of Kyrgyzstan Republic on Administrative Responsibility, N 114 Dated on August 4, 1998. (as of 20/11/2008)
- Code of Land of Kyrgyzstan Republic, N 45, June 2 1999. (as of 26/02/2007)
- Code of Forestry of Kyrgyz Republic, N 66, July 8, 1999 (as of 02/07/2007)
- Code of Water of Kyrgyzstan Republic, # 8, January 12, 2005
- Law of Krgyzstan Republic , N 48, June 9 1999 "On Biospheric Territories of Kyrgyzstan Republic"
- Law of Krgyzstan Republic , N 46, June 2 1999 "On Introduction of Land Code of Kyrgyzstan Republic" (as of 11/05/2002)
- Law of Kyrgyzstan Republic N 1422-Xii, January 14, 1994 "On Water" (As Of26/09/1995)
- Law of Krgyzstan Republic , N 12, January 25, 1999 "On Chemicalization And Law of Krgyzstan Republic , N1561-Xii, May 28, 1994 "On Especially Protected Natural Territoroes" Plant Protection (as of 28/06/2003)
- Law of Kyrgyzstan Republic N51, 12 June 1999 "On Protection of Atmospheric Air" (as of 24/06/2003)
- Law of Kyrgyzstan Republic N53, 20 June 2001 "On Protection and Utilization of Flora" (As of 26/02/2007)
- Law of Kyrgyzstan Republic N53, 16 June 1999 "On Protection of Environment" (as of 06/08/2005)
- Law of Kyrgyzstan Republic N48, 9 June 1999 "On Biospheric Territories in Kyrgyzstan Republic"
- Law of Kyrgyzstan Republic N46, June 2 1999 "On Introduction of Land Code of Kyrgyzstan" (as of 11/05/2002)
- Law of Kyrgyzstan Republic N 4, January 11, 2001 "On Management of Agricultural Lands" (as of 12/06/2007)
- Law of Kyrgyzstan Republic N 54, June 16, 1999 "On Ecological Examination" (as of 26/02/2007)
- Law of Kyrgyzstan Republic N 26, June 27, 1996 "On Plant Quarantine" (as of 02/06/1998)
- Law of Kyrgyzstan Republic N 47, June 3, 1999 "On Farmer Holding" (as of 16/10/2002)
- Law of Kyrgyzstan Republic N 79, June 13, 1998 "On Legal Protection of Selection Achievements" (as of 08/08/2006)
- Law of Kyrgyzstan Republic N 38, June 19, 1997 "On Seed" (as of 08/01/2007)
- Law of Kyrgyzstan Republic N 200, August 11, 2008 "On Rate of Payment For Using Natural Objects of Flora and Fauna In Kyrgyzstan Republic"
- Decision of the Government of Kyrgyzstan N115, March 1, 1999 "On Monitoring of Agricultural Lands"
- Decision of the Government of Kyrgyzstan N145, April 11, 2008 "On Conduction of National Inventory of Forest of the Republic of Kyrgyzstan"
- Decree of the President of Kyrgyzstan Republic N331, June 28, 2006 "On Introduction of Moratorium on Felling, Processing and Sale of Especially Valuable Woods Growing in Forests of Kyrgyzstan Republic" (as of 22/11/2006)
- Decree of the President of Kyrgyzstan Republic N506, November 23, 2007 "On Conception of Ecological Security of Kyrgyzstan Republic"

5.4 Information system

At present time PGRFA is one of priority directions in food safety of the country though Kyrgyzstan Republic experience social-economic constraints. This is proved by adopted laws, decisions and conception on the matter. All these documents adopted by the government clearly specifies that conservation of PGR is key issue in solution of food programs. Actions stipulated by these documents are implemented.

However it is necessary to carry out:

1. Regular work with population, peasant/farmer holdings and seed production farms as well as with scientists and specialists about importance of conservation of PGRFA to gain achievements in food safety of the country and in marketing of agricultural products.
2. Periodical popular TV emissions and radio broadcasting and enlightenment through mass-media.
3. Produce scientific-popular booklets and articles.
4. Organize workshops and visit to farmer holdings and seed production farms ensuring participation of National coordinator, scientists and specialists both at local and regional level.
5. Arrange interesting meetings with schoolboys, students with display of slides and presentations.
6. Involve young generation among advanced students in expeditions, science and in training courses.
7. Involve crop breeders in compulsory training courses on documentation of primary records in computer. For this purpose it is necessary to get computers and involve tem in computer training courses.
8. Implementation of these actions requires time and financial support. Some research institutes have received

support in due time from international organizations (ICARDA, Bioversity International, CIMMYT, SIDA).

9. Despite of purposeful support of these organizations, the experience has showed that coordinated actions of relevant departments and the goon of Agrarian Science till 20110, as well as to State Program of scientific maintenance of agriculture of KR till 2010.
10. For more effective and rational work in this plan we hope for support of the international and regional organizations for realization of our projects and programs.



THE STATE OF REGIONAL AND INTERNATIONAL COLLABORATION

6.1 International relations

The international cooperation is carried out with such organizations like FAO, CIMMYT, ICARDA, CIP, ICRISAT, SIDA, Bioversity International, ICTC and others. The scientists have established direct relations with CIS countries and far abroad (CAC countries, Turkey, Russia, Germany, India and others).

6.2 International programs and agreements

Target actions have been implementing since 1996 on improvement of PGR at national, regional and international level. Research works are carried out on basic agricultural crops. The work is conducted under international programs, which implies: test of new samples and germplasms of agricultural crops; evaluation for resistance to biotic and abiotic environmental factors; biofortification of cereals; diversification of basic crops; ecological trials of promising forms, varieties and hybrids; zero tillage technology; integrated plant protection technology and others. The international program on utilization of PGR was commenced in Kyrgyzstan in 2002 with support of ICARDA/IPGRI, which also included project on "Supporting Regional Gene Banks".

The studies and evaluation of germplasms for resistance to rust diseases and pests are carried out with support of CIMMYT-ICARDA. Promising varieties of basic crops of Kyrgyzstan are carried out widely.

The project on "Supporting Seed Industry of Kyrgyzstan" financed by SIDA is implemented actively. The main purpose of the project includes development of seed industry of Kyrgyzstan and provision of high-quality seeds of improved varieties accessible to farmers. In the framework of the project institutional and regulatory database of the given branch of agriculture has been rationalized and reformed. One of the most important goal of the project includes establish operational standards on certification, varietal and quality control responding to requirements of OECD, ISTA and UPOV. One of the component of the program targets training of staff in the field of crop selection and genetic resources conducted by Kyrgyz Agrarian University (KAU) and Sweden Agrarian University (SAU)

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

After collapse of former Soviet Union and consequently disintegration of germplasm exchange system through VIR Kyrgyzstan scientists started looking for other sources and since 1996 they have access to international PGR thanks to close collaboration established with international centers like CIMMYT and ICARDA. Access to PGR relies on direct contracts signed with institutes and universities. The contract is implemented through mutual exchange and utilization of genetic resources as source of agronomic-valuable traits. The work is conducted on improvement and adaptation of variety samples for each concrete ecological zone. For instance during last 10 years more than 3000 accessions of cereals and leguminous crops (food legumes) have been received from these centers. Collaborative activities have resulted in development of new varieties of wheat, barley, triticale and soybean. Access to PGR is undertaken through Contract on exchange of germplasms, varieties and hybrids relying on Material Transfer Agreement (MTA).

The Convention on Biodiversity was signed in 1992 in Rio de Janeiro at the Conference of UN. Kyrgyzstan Republic has joined the Convention in 1996 (Law of KR, July 26, 1996).

The Convention on Biodiversity aims preservation of biological diversity, sustainable utilization of biodiversity, equitable sharing of benefits arising from utilization of genetic resources, including through providing necessary condition for easy access to genetic resources, and transfer of corresponding technology in view of protection of authors' copyrights.

Access to PGR is getting improved last 10 years. The increase is observed in quantity of germplasms and varieties supplied. Crop breeders receive specific nurseries (rust diseases nurseries CWA-RTN, yield nurseries (YET-IRR; YET-SA; FAWWON; CLB etc). Sometimes breeders face constraints when receiving nurseries, especially when they are dispatched through airlines (customs obstacles, quarantine certificate and other objective and subjective reasons).

Wide range of crop varieties and lines of wheat, barley and other introduced varieties and hybrids of fruit crops, vegetables and potato received by breeders is sufficient for maintenance of food safety of the country (except sugar beet and vegetable oil). Existing problems include: farmers have no wide access to quality seed and planting stock due to high prices; lack of appropriate agricultural equipments and machinery; scarcity of irrigation water and other factors. In this connection, the process of integration and forming cooperatives of farmer holdings is going on.

In duly development of seed production of agricultural crops the issues of industrial activities and marketing will be transferred to private sector. In this connection, long-term plan foresees reducing contribution of state seed production farms down to 10-20%, which will only be responsible for organization of primary selection- seed production works, seed production in nurseries, multiplication of super elite (stock) seed and elite (stock) seed, and delivering the remaining activities to private seed production farms. There is a need for organization of marketing of seeds of agricultural crops produced in the country and assist in establishment of farmer holdings to be engaged in seed production of agricultural crops.



CONTRIBUTION OF PGRFA MANAGEMENT IN MAINTENANCE OF FOOD SECURITY AND SUSTAINABLE DEVELOPMENT

Food security as one of main priorities of the country can be achieved through sufficient production of agricultural products. At the same time even sufficient production of foodstuffs may not serve solving undernourishment if efforts are not made in the country towards poverty eradication and increasing bargaining power of majority of the country population. National Policy of Food Security of the Republic of Kyrgyzstan was worked out in cooperation with European Economical Commission and ratified by the Government of Kyrgyzstan in 1999.

Though a number of objective problems the country experiences, today Kyrgyzstan is self-sufficient with basic agricultural products including meat, milk, vegetables and grain in certain extent.

TABLE 8

Supply of basic foodstuff on account of private production in Kyrgyzstan Republic in 2007

	Wheat for bakery products	Fresh potato	Vegetables and melon crops	Fresh fruit and berries	Sugar	Vegetable oil
Consumption level, kg/year/per person	184,8	96,0	147,6	36,0	21,6	6
Demand, ton	964 194	500 880	770 103	187 830	112 698	31 305
Production, ton	708 877	1 373 780	908 947	195 397	17 000	17 587
Costs (seed, natural and technological losses, animal feed etc), ton	245 100	435 500	30 000	10 000	138 400	57 813
Volume of domestic market (without export and import), ton	463 777	938 280	878 947	185 397	17 000	17 587
Sufficiency coefficient, %	48,1	187,3	114,1	98,7	15,1	56,2

(Records of National Statistical Committee of KR for actual consumption by population of 5217,5 thousand)

STAKEHOLDERS PARTICIPATING IN THE ESTABLISHMENT OF THE NATIONAL INFORMATION SHARING MECHANISM ON GPA IMPLEMENTATION



1.

Name of organization	Botanical Garden named after Gareev (BGAS)
Subordination	Kyrgyz National Academy of Sciences
Address	1, Ahunbaev, Bishkek
Tel	(+996-312)51-73-55
E-mail	bigardenscience@mail.ru
Field of activity	Botanical garden;Breeder;Seed producer;Seed supplier;Research;Extensionist
Priority plants	Medicinal, oily, fruit and fruit-berry plants
Number of accessions in the collection	192

2.

Name of organization	State Commission on Testing of Crop Varieties (SCTCV)
Subordination	Ministry of Agricultural, Water Management and Processing Industry
Address	24 Taalai str., 720016, Bishkek
Tel	(+996-312)49-43-14
Fax	(+996 312) 499377
E-mail	gossort@infotel.kg
Field of activity	Research;Extensionist;Genebank (short term collections)
Priority plants	All crops which are priority for Tajikistan
Number of accessions in the collection	244

3.

Name of organization	Institute of Biology & Montane Forests (IBMF)
Subordination	Ministry of Education and Science
Address	265, Chui ave., 720024, Bishkek
Tel	(996-312)679082, 242519
Fax	(+996-312)679082, 657943
E-mail	mycotasp@mail.ru, institute@lesic.elcat.kg
Field of activity	Botanical garden;Breeder;Educational;Research;Genebank (short term collections)
Priority plants	Fruits and nuts
Number of accessions in the collection	71

4.

Name of organization	Kyrgyz Agrarian University (KAU)
Subordination	Ministry of Education and Science
Address	68, Mederov, 720005, Bishkek
Tel	(+996-312) 54-52-10
E-mail	asanaly61@mail.ru
Field of activity	Botanical garden;Breeder;Educational;Research;Genebank (short term collections)
Priority plants	Cereals, legumes, vegetables and potato
Number of accessions in the collection	50

5.

Name of organization	Kyrgyz Research Institute of Livestock & Pastures (KRILP)
Subordination	Ministry of Agricultural, Water Management and Processing Industry
Address	12, Dorojnaya, v. Komsomolskaya, Sokuluk district
Tel	(+312-996) 65-83-92
E-mail	K.Samsaliev@rambler.ru
Field of activity	Breeder;Seed producer;Seed supplier;Research;Genebank (short term collections)
Priority plants	Forage crops and food legumes
Number of accessions in the collection	254

6.

Name of organization	Kyrgyz Research Institute of Farming (KRIF)
Subordination	Ministry of Agricultural, Water Management and Processing Industry
Address	Timur Frunze Street 73/1, 720027, Bishkek
Tel	+996 312 647 154
Fax	+996 312 647 907
E-mail	krif@mail.kg
Field of activity	Breeder;Seed producer;Seed supplier;Research;Extensionist;Genebank (medium term collections)
Priority plants	All PGRFA which are priority for Tajikistan, including: Agricultural crops, their wild relatives, medicinal, aromatic and oil-bearing plants
Number of accessions in the collection	716

STAKEHOLDERS AND THEIR COLLECTIONS



Stakeholders	Name of collections	No. of accessions	No. of accessions distributed at least once
Kyrgyz Research Institute of Farming (KRIF)	Fruit crops genepool	74	30
	Legumes collection	28	6
	Collection of Strawberry	147	12
	Collection of Cereals	424	16
	Collection of vegetables and potato	43	
Kyrgyz Research Institute of Livestock & Pastures (KRILP)	Legumes collection	123	25
	Collection of forage crops	37	6
	Lucerne collection	94	14
Botanical Garden named after Gareev (BGAS)	Living genepool	95	55
	Fruit collection	97	38
State Commission on Testing of Crop Varieties (SCTCV)	Collection of Crop Varieties	244	
Institute of Biology & Montane Forests (IBMF)	Collection of perennial plants	71	6
Kyrgyz Agrarian University (KAU)	Botanic collection	50	
	Total:	1 527	208

EX SITU GENEPOOL OF KYRGYZSTAN

Name of taxon	Name of crop	No of acc.	SHs
<i>Achillea</i> sp.	Yarrow	2	BGAS
<i>Aconitum lycoctonum</i>	Monkshood	1	BGAS
<i>Agropyron desertorum</i>	Wheat-grass	6	KRILP
<i>Allium cepa</i>	Bulb onion	5	SCTCV
<i>Allium</i> sp.	Onion	22	KRIF
<i>Allium</i> sp.	Onion	4	BGAS
<i>Amaranthus retroflexus</i>	Amaranth	1	BGAS
<i>Anethum graveolens</i>	Dill	3	SCTCV
<i>Apium graveolens</i>	Celery	2	SCTCV
<i>Armeniaca vulgaris</i>	Apricot	9	BGAS
<i>Artemisia absinthium</i>	Estragon	2	BGAS
<i>Artemisia vulgaris</i>	Estragon	2	BGAS
<i>Avena sativa</i>	Oat	6	KRIF
<i>Avena sativa</i>	Oat	3	KAU
<i>Beta vulgaris</i>	Beet	25	SCTCV
<i>Bidens tripartita</i>	Three-lobed Beggarticks	1	BGAS
<i>Brassica napus</i>	Rape	5	SCTCV
<i>Brassica napus</i>	Rape	1	KAU
<i>Brassica oleracea</i> var. <i>capitata</i>	Cabbage	2	KRIF
<i>Brassica oleracea</i> var. <i>capitata</i>	Cabbage	21	SCTCV
<i>Brassica oleracea</i> var. <i>capitata</i>	Cabbage	4	KAU
<i>Brassica pekinensis</i>	Cabbage	1	SCTCV
<i>Brassica rapa</i>	Turnip	2	SCTCV
<i>Brassica rapa</i>	Turnip	2	SCTCV
<i>Bromus inermis</i>	Brome	5	KRILP
<i>Capsella bursa-pastoris</i>	Blindweed	1	BGAS
<i>Capsicum annuum</i>	Pepper	8	SCTCV
<i>Carum carvi</i>	Caraway	1	BGAS
<i>Cicer arietinum</i>	Chick-pea	2	KRIF
<i>Cicer arietinum</i>	Chick-pea	28	KRILP
<i>Cichorium intybus</i>	Chicory	2	BGAS
<i>Citrullus lanatus</i>	Watermelon	12	SCTCV
<i>Conium maculatum</i>	Hemlock	1	BGAS
<i>Crataegus songarica</i>	Hawthorn	6	BGAS
<i>Crocus</i> sp.	Crocus	3	BGAS
<i>Cucumis melo</i>	Melon	7	SCTCV
<i>Cucumis sativus</i>	Cucumber	19	SCTCV
<i>Cucurbita pepo</i> var. <i>giraumontia</i>	Pumpkin	5	SCTCV
<i>Cucurbita</i> sp.	Pumpkin	4	SCTCV

Name of taxon	Name of crop	No of acc.	SHs
<i>Dactylis glomerata</i>	Cocksfoot	2	KRILP
<i>Dactylis glomerata</i>	Cocksfoot	6	KRILP
<i>Dactylis glomerata</i>	Cocksfoot	1	KAU
<i>Datura stramonium</i>	Stramonium	1	BGAS
<i>Daucus carota</i>	Carrot	9	SCTCV
<i>Elymus trachycaulus</i>	Lyme grass	2	KRILP
<i>Epilobium hirsutum</i>	Blooming sally	2	BGAS
<i>Equisetum arvense</i>	Horsetail	1	BGAS
<i>Fagopyrum esculentum</i>	Buckwheat	3	SCTCV
<i>Festuca pratensis</i>	Fescue	2	KRILP
<i>Festuca pratensis</i>	Fescue	1	SCTCV
<i>Fragaria</i> sp.	Strawberry	147	KRIF
<i>Fragaria vesca</i>	Strawberry	2	BGAS
<i>Fragaria vesca</i>	Strawberry	5	BGAS
<i>Galium verum</i>	Bedstraw	4	BGAS
<i>Glycine max</i>	Soy-bean	40	KRILP
<i>Glycine max</i>	Soy-bean	2	KAU
<i>Glycyrrhiza uralensis</i>	Liquorice	3	BGAS
<i>Helichrysum arenarium</i>	Sandy everlasting	2	BGAS
<i>Hordeum bulbosum</i>	Barley	1	KRIF
<i>Hordeum</i> sp.	Barley	2	KRIF
<i>Hordeum vulgare</i>	Barley	24	KRIF
<i>Hordeum vulgare</i>	Barley	5	KAU
<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	Barley	21	KRIF
<i>Hyoscyamus niger</i>	Henbane	2	BGAS
<i>Hypericum perforatum</i>	Hypericum	2	BGAS
<i>Hypericum perforatum</i>	St. John's-Wort	1	BGAS
<i>Inula helenium</i>	Elecampane	2	BGAS
<i>Juglans regia</i>	Walnut	8	BGAS
<i>Juglans regia</i>	Walnut	34	IBMF
<i>Juglans regia</i>	Walnut	3	KAU
<i>Juniperus sabina</i>	Juniper	2	BGAS
<i>Kochia prostrata</i>	Kochia	2	KRILP
<i>Lactuca sativa</i>	Lettuce	5	SCTCV
<i>Lens culinaris</i>	Lentil	27	KRILP
<i>Lolium perenne</i>	Rye-grass	4	KRIF
<i>Lycopersicon esculentum</i>	Tomato	9	KRIF
<i>Lycopersicon esculentum</i>	Tomato	23	SCTCV
<i>Malus domestica</i>	Apple	62	KRIF
<i>Malus domestica</i>	Apple	3	KAU
<i>Malus kirghisorum</i>	Apple	8	BGAS
<i>Malus kirghisorum</i>	Apple	7	IBMF
<i>Malus niedzwetzkyana</i>	Apple	6	KRIF
<i>Malus niedzwetzkyana</i>	Apple	12	BGAS
<i>Malus niedzwetzkyana</i>	Apple	2	IBMF
<i>Malus</i> sp.	Apple	6	KRIF
<i>Malus</i> sp.	Apple	6	BGAS



Name of taxon	Name of crop	No of acc.	SHs
<i>Malus sylvestris</i>	Apple	5	IBMF
<i>Malva neglecta</i>	Mallow	2	BGAS
<i>Medicago caerulea</i>	Alfalfa	4	KRILP
<i>Medicago caerulea</i>	Alfalfa	1	KAU
<i>Medicago hemicycla</i>	Alfalfa	2	KRILP
<i>Medicago hemicycla</i>	Alfalfa	2	KAU
<i>Medicago sativa</i>	Alfalfa	44	KRILP
<i>Medicago sativa</i>	Alfalfa	25	SCTCV
<i>Medicago sativa</i>	Alfalfa	2	SCTCV
<i>Medicago sativa</i>	Alfalfa	1	KAU
<i>Medicago trautvetteri</i>	Alfalfa	1	KRILP
<i>Medicago x varia</i>	Alfalfa	43	KRILP
<i>Melilotus officinalis</i>	Sweet clover	3	BGAS
<i>Melilotus officinalis</i>	Sweet clover	1	KAU
<i>Melissa officinalis</i>	Common-balm	1	BGAS
<i>Nepeta pannonica</i>	Catmint	1	BGAS
<i>Onobrychis viciifolia</i>	Safoin	6	KRILP
<i>Onobrychis viciifolia</i>	Safoin	4	KRILP
<i>Onobrychis viciifolia</i>	Safoin	3	KAU
<i>Origanum vulgare</i>	Marjoram	1	BGAS
<i>Padus racemosa</i>	Black cherry	2	BGAS
<i>Persica vulgaris</i>	Peach	2	BGAS
<i>Persica vulgaris</i>	Peach	2	IBMF
<i>Petroselinum crispum</i>	Parsley	2	SCTCV
<i>Pistacia vera</i>	Pistachio	7	IBMF
<i>Pisum sativum</i>	Pea	20	KRIF
<i>Pisum sativum</i>	Гопox	3	SCTCV
<i>Plantago lanceolata</i>	Ribwort	1	BGAS
<i>Plantago lanceolata</i>	Ribwort	1	KAU
<i>Plantago major</i>	Ribwort	1	BGAS
<i>Poa pratensis</i>	Meadow grass	7	KRILP
<i>Polygonum aviculare</i>	Knotweed	1	BGAS
<i>Potentilla reptans</i>	Cinquefoil	2	BGAS
<i>Prunus avium</i>	Sweet cherry	3	BGAS
<i>Prunus avium</i>	Sweet cherry	2	IBMF
<i>Prunus cerasifera</i>	Prunus	3	BGAS
<i>Prunus cerasifera</i>	Prunus	2	IBMF
<i>Prunus cerasifera</i>	Prunus	1	KAU
<i>Prunus sogdiana</i>	Plum	7	BGAS
<i>Pyrus communis</i>	Pear	12	BGAS
<i>Raphanus sativus</i>	Radish	5	SCTCV
<i>Rhamnus cathartica</i>	Buckthorn	1	BGAS
<i>Rosa canina</i>	Brier	2	BGAS
<i>Rosa canina</i>	Brier	1	IBMF
<i>Rosa canina</i>	Brier	1	KAU
<i>Rubus caesius</i>	Kaspberry	1	BGAS
<i>Rubus caesius</i>	Kaspberry	1	IBMF

Name of taxon	Name of crop	No of acc.	SHs
<i>Rubus idaeus</i>	Raspberry	2	BGAS
<i>Salvia sclarea</i>	Salvia	2	BGAS
<i>Salvia</i> sp.	Salvia	4	BGAS
<i>Sanguisorba officinalis</i>	Burnet	1	BGAS
<i>Sanguisorba</i> sp.	Burnet	2	BGAS
<i>Secale cereale</i>	Rye	3	KRILP
<i>Secale cereale</i>	Rye	2	KAU
<i>Sedum ewersii</i>	Orpine	2	BGAS
<i>Solanum tuberosum</i>	Potato	10	KRIF
<i>Sorghum bicolor</i>	Sorghum	1	SCTCV
<i>Sorghum</i> sp.	Sorghum	2	KRILP
<i>Sorghum sudanense</i>	Sorghum	1	SCTCV
<i>Tanacetum vulgare</i>	Tansy	2	BGAS
<i>Taraxacum officinale</i> group	Dandelion	2	BGAS
<i>Thermopsis lanceolata</i>	Golden Banner	1	BGAS
<i>Thymus marschallianus</i>	Thyme	2	BGAS
<i>Trifolium pratense</i>	Clover	2	KRILP
<i>Trifolium pratense</i>	Clover	4	BGAS
<i>Triticum aestivum</i>	Bread wheat	237	KRIF
<i>Triticum aestivum</i> subsp. <i>aestivum</i>	Bread wheat	1	KRIF
<i>Triticum aestivum</i> subsp. <i>aestivum</i>	Bread wheat	1	KAU
<i>Triticum aestivum</i> var. <i>erythrosperrum</i>	Bread wheat	8	KRIF
<i>Triticum aestivum</i> var. <i>ferrugineum</i>	Bread wheat	2	KRIF
<i>Triticum aestivum</i> var. <i>lutescens</i>	Bread wheat	6	KRIF
<i>Triticum aestivum</i> var. <i>milturum</i>	Bread wheat	6	KRIF
<i>Triticum aestivum</i> var. <i>nigraristatum</i>	Bread wheat	1	KRIF
<i>Triticum aestivum</i> var. <i>proninciale</i>	Bread wheat	1	KRIF
<i>Triticum aestivum</i> var. <i>velutinum</i>	Bread wheat	1	KRIF
<i>Triticum durum</i>	Durum wheat	33	KRIF
<i>Triticum durum</i>	Durum wheat	1	KAU
<i>Triticum durum</i> var. <i>leucomelan</i>	Durum wheat	8	KRIF
<i>Triticum durum</i> var. <i>leucurum</i>	Durum wheat	3	KRIF
<i>Triticum durum</i> var. <i>melanopus</i>	Durum wheat	3	KRIF
<i>Tulipa greigii</i>	Tulip	1	BGAS
<i>Tulipa kolpakowskiana</i>	Tulip	1	BGAS
<i>Tulipa ostrowskiana</i>	Tulip	1	BGAS
<i>Tulipa</i> sp.	Tulip	1	BGAS
<i>Tussilago farfara</i>	Coltsfoot	1	BGAS
<i>Urtica dioica</i>	Nettle	2	BGAS
<i>Valeriana officinalis</i>	Valerian	1	BGAS
<i>Veratrum lobelianum</i>	Hellebore	1	BGAS
<i>Vicia cracca</i>	Vetch	3	BGAS
<i>Vicia cracca</i>	Vetch	1	KAU
<i>Vicia faba</i>	Horse bean	6	KRIF
<i>Vicia faba</i>	Faba bean	13	KRILP
<i>Vicia faba</i>	Horse bean	3	BGAS
<i>Vicia faba</i>	Faba bean	4	KAU



Name of taxon	Name of crop	No of acc.	SHs
<i>Vicia</i> sp.	Vetch	3	KRILP
<i>Viola suavis</i>	Viola	5	BGAS
<i>Vitis vinifera</i> subsp. <i>sylvestris</i>	Grapevine	2	BGAS
<i>Vitis vinifera</i> subsp. <i>sylvestris</i>	Grapevine	43	SCTCV
<i>Vitis vinifera</i> subsp. <i>sylvestris</i>	Grapevine	8	IBMF
<i>Vitis vinifera</i> subsp. <i>sylvestris</i>	Grapevine	6	KAU
<i>X Triticosecale</i> sp.	Triticale	7	KRIF
<i>Xanthium strumarium</i>	Clotbur	1	BGAS
<i>Zea mays</i>	Maize	49	KRIF
<i>Zea mays</i>	Maize	2	KAU

ANNEX 4

INFORMATION SYSTEMS USED TO STORE, MANAGE OR ANALYZE DATA ON *EX SITU* COLLECTIONS, HOLDING ORGANIZATIONS AND NO. OF RECORDS IN THESE SYSTEMS



Stakeholder	Name of information system	Name of <i>ex situ</i> collection	No. of accessions covered
Kyrgyz Research Institute of Farming	Data Base of Plant Genetic Resources of Kyrgyz Republic	Legumes Collection	28
		Cereals Collection	424
		Strawberry Collection	147
		Vegetables and Potato Collection	43
		Fruit crops genepool	74
Kyrgyz Research Institute of Livestock & Pastures	Data Base on Forage plants	Legumes Collection	123
		Forage Crops Collection	37
		Lucerne Collection	94
State Commission on Testing of Crop Varieties	Data Base of Plant Genetic Resources of Kyrgyz Republic	Collection of Crop Varieties	244

LIST OF ACCESSIONS COLLECTED DURING AN INTERNATIONAL EXPEDITION ON STUDY OF FORAGE PLANTS IN ISSIK-KUL REGION OF KYRGYZSTAN IN THE 2006 (BY PARTICIPATING OF KYRGYZ RESEARCH INSTITUTE OF LIVESTOCK & PASTURES)

Name of collected taxon	Number of collected accessions
<i>Agropyron cristatum</i>	4
<i>Agrostis gigantea</i>	24
<i>Allium</i> sp.	7
<i>Avenula pubescens</i>	5
<i>Bromus inermis</i>	9
<i>Dactylis glomerata</i>	12
<i>Elymus dahuricus</i>	7
<i>Elytrigia repens</i>	7
<i>Elymus</i> sp.	8
<i>Festuca</i> sp.	7
<i>Festuca pratensis</i>	11
<i>Festuca rubra</i>	5
<i>Festuca valesiaca</i> subsp. <i>valesiaca</i>	10
<i>Hedysarum</i> sp.	3
<i>Hordeum bogdanii</i>	1
<i>Hordeum brevisubulatum</i>	2
<i>Koeleria macrantha</i>	2
<i>Lathyrus pratensis</i>	2
<i>Lathyrus tuberosus</i>	1
<i>Medicago sativa</i> subsp. <i>falcata</i>	5
<i>Melilotus officinalis</i>	4
<i>Onobrychis viciifolia</i>	4
<i>Phleum phleoides</i>	9
<i>Phleum alpinum</i>	1
<i>Poa alpina</i>	1
<i>Poa palustris</i>	2
<i>Poa pratensis</i>	38
<i>Poa tibetica</i>	2
<i>Poa versicolor</i>	13
<i>Poa</i> sp.	10
<i>Puccinellia</i> sp.	6

Name of collected taxon	Number of collected accessions
<i>Trifolium fragiferum</i>	1
<i>Trifolium pratense</i>	8
<i>Trifolium repens</i>	2
<i>Trisetum sibiricum</i>	2
<i>Trisetum spicatum</i>	2
<i>Vicia</i> sp.	4



CROP PRODUCTION IN KYRGYZ REPUBLIC (2005-2006)

Crops (ton)	2005	2006
Kyrgyz Republic (Total)	1 118 215	1 133 573
Total cereals and legumes	633 044	633 768
Winter wheat	279 353	261 095
Spring wheat	146 496	151 106
Winter barley	16 006	11 415
Spring barley	86 220	94 544
Pulses	24 611	35 885
Oats	1 404	912
Maize	72 604	72 045
Millet	99	92
Buckwheat	378	203
Rice	5 868	6 347
Sorgum	5	124
Industrial crops (Total)	147 691	143 366
Cotton	45 561	45 743
Sugar beet	14 522	13 643
Tobacco	5 554	5 607
Oil crops (Sun flower)	59 181	58 912
Oil crops (others)	22 339	18 995
Other industrial crops	534	466
Potato, vegetable and Cucurbitacea (Total)	121 349	127 461
Potato	76 064	81 150
Vegetable	40 647	41 181
Cucurbitaceas (melon, pumpkin etc)	4 526	5 054
Others	112	76
Forage crops (Total)	216 131	228 978
Maize for silage	6 252	6 328
Perennial forages (1 year) (mainly lucerne and esparcette)	10 396	9 590
Perennial forages (+1 year) (mainly lucerne and esparcette)	181 322	186 672
Other forage crops	18 161	26 388

ANNEX 7

MAIN AGRICULTURE ZONES OF THE KYRGYZ REPUBLIC



Altitude, above sea level, m	Average sum of active temperatures above 10 degree C	Average quantity of precipitations, mm/year	Duration frost free period, days	Main agriculture crops
Chui oblast, agriculture land: 373 134 hectares				
500-2 600	750-3 500	230-1 000	49-180	Cereals, sugar beet, vegetables, oil crops, melons, berries and fruits
Batken, Jalal-Abad, Osh oblasts and agriculture land: 391056 hectares				
100-300	900-4 550	200-800	85-210	Cereals, rice, maize, cotton, oil crops, vegetables, melons, perennial grasses legumes
Issyk-Kul oblast, agriculture land: 187169 hectares				
1 750-2 400	700-2 200	180-800	100-185	Cereals, pulses, oil crops, potatoes, vegetables, perennial grasses legumes, berries and fruits

NO. OF RECORDS IN KYRGYZSTAN DATA BASE OF NATIONAL INFORMATION SHARING MECHANISM ON GPA IMPLEMENTATION

Name of tables	No. of records
Organizations	36
Experts	87
Projects	83
Cultivars	545
Areas	8
Information systems	2
Publications	146
Agreements	2
<i>Ex situ</i> germplasm holdings (question 5.2)	351
<i>Ex situ</i> germplasm holdings (5.4)	190
Cultivars description (13.7)	539

