Biodiversity and biosafety of Kyrgyzstan: problems and tasks

Y. Abdurasulov
International Institute of Mountains, Bishkek, Kyrgyzstan

Биоразнообразие и биобезопасность Кыргызстана: проблемы и задачи

Ы. Абдурасулов
Международный Институт Гор, Бишкек, Кыргызстан

В статье изложены некоторые аспекты сохранения генетических ресурсов на международном уровнях. Приводится краткая информация об уникальных генетических ресурсах Кыргызстана, в частности о некоторых абсолютных эндемиках. Анализируются существующие проблемы в сфере сохранения и рационального использования генетических ресурсов Кыргызстана, в том числе проблемы биоразнообразия и биобезопасности республики на фоне все более интенсифицирующейся современной биотехнологии.

The more and more amplifying pressure of the modern anthropogenic factor on natural environment, forces mankinds to engage in search preventive of adequate measures on protection of an environment, otherwise to planet can threaten ecological accidents having unpredictable consequences. Protection and rational use of genetic resources, which are the integral component of global ecological system, last years, begin to get the special importance. This problem becomes sharper, when the modern biotechnology basing modern methods of generic and cell engineering has taken possession of a technique of creation (designing) of completely new genetic systems (beginning from submolecular up to organism of a level) for the account of genoms alive organisms, and also to synthesize by an artificial way (chemical methods), which were not in an alive nature and opportunity of their release on natural environment. Certainly, it is on the one hand expands horizons of cognition of process of mankind and allows to create more productive kinds of microorganisms, plants and animals (generically modified organisms (GMO), but, on the other hand, perplex and puts before mankind new complex tasks and problems connected to a biodiversity and biosafety. How is leading themselves new generic of system (on molecular, cell, fabric, organism, population and biocoenose levels) in natural environment, process of their influence and integration in natural genetic systems and their consequences at local and global ecological levels and opportunity of realization of controllable monitoring by mankind and many other remain unpredictable riddles. Though, from the point of view of sensible logic, apriorno it is possible to assume, that these influences will be essential and far unsafe. In this connection in agenda on XXI the century accepted at a Conference UNA on an environment and development (UNSED) in June, 1992 in Rio de Janeiro, was particularly provided necessity of maintenance "of ecologically safe regulation of biotechnologies". At a conference the potential opportunities on formation of partnership, especially, between the countries with a wide experience both knowledge were emphasized in the field of biotechnology and countries having huge biological (so also genetic) resources (Kyrgyzstan) here concerns, but not having of sufficient

Abdurasulov Y. A biodiversity and biosafety of Kyrgyzstan: problems and tasks. // Changes of Environment at the Turn of the Millennium. Proceedings of International Internet Conference. Tbilisi-Moscow, 2006, p. 111-119. www.cetm.narod.ru/abdurasulov.pdf

development both export potential in the field of biotechnology and financial, material, organizational and personnel resources necessary for maintenance, that these resources served to interests of their steady development. In the chapter 16 of the order of day on XXI the century also was emphasized, that the society as a whole can take the maximal benefits from use of biotechnology only in the event that it is developed and is applied by a rational and expedient image. Creation, use and release in environment alive changed organisms, received on the basis of modern generic engineering and biotechnology, can result in adverse consequences for preservation of steady use of a biological variety. In this connection in agenda was spoken about necessity of a safety during development, application, of an exchange and transfer of biotechnology on the basis of the international agreement on principles of an estimation and regulation is brave. About it also is spoken in the Convention on a biological variety (KBR). KBR calls the Parties: «To establish or to support means of regulation, of the control or restriction is brave, connected with use and release alive changed organisms, growing out biotechnology, which can have harmful ecological consequences capable to affect on preservation and steady use of a biological variety, with the account also dangers to health of the man » (clause 8g). Further in the Convention is stated: « To consider necessity and conditions of acceptance of measures, probably, in the form of the protocol, switching, in particular, preliminary proved consent on development of the appropriate procedures in the field of safe transfer, use and application anyone alive changed organisms, growing out biotechnology and capable to render adverse influence on preservation and steady use of a biological variety » (item 3 of clause 19). With the purposes of maintenance of biological safety on an appeal of time the development Cartagena of the protocol in 1997 was completed and was accepted in January, 2000 and as a matter of fact became the answer to this appeal, inverted to the parties. In November, 2000 is accepted: « the Initial strategy on rendering assistance to the countries in preparation for coming into force Cartagena of the protocol on biosafety » According to a principle of acceptance of safety measures contained basically 15 Rio-de-Janeiro of the declaration on an environment and development, is spoken, that the purpose of the Protocol consists in: «...Assistance of maintenance of an appropriate level of protection in the field of safe transfer, processing and use alive changed organisms, growing out application of modern biotechnology and capable to render adverse influence on preservation and steady use of a biological variety, with the account also is brave for health of the man and with paying of the special attention to the transport moving ». Here too was especially emphasized, that for achievement of this purpose for the Parties has the important meaning cooperation with the purpose of maintenance of potential in the field of biosafety with less developed countries and countries with transitive economy. In the advanced countries the national modes ensuring biosafety, in less developed countries and countries with transitive economy, because of insufficiency of resources are created, these actions are in a starting phase, and just now begin creation of own national frame systems of biosafety. Accepted in November, 2000 Cartagena the strategy is begun from experimental activity in 18 countries of the world on creation of conditions promoting biosafety and development of regional cooperation and it is successfully completed Cartagena the protocol was open for signing on the basis of a principle free will and by December, 2001 is signed more than 100 countries of the world. Now UNEP in frameworks « of Initial strategy on rendering assistance to the countries in preparation for coming into force Cartagena of the protocol on biosafety » carries out two complexes of measures:

1) The global project on creation of national frame systems of biosafety, with which will be covered up to 100 countries;
2) The demonstration projects on rendering support in introduction of national frame systems of biosafety.

It speaks that more than in 100 countries of the world the development of national frame systems of biosafety is begun which will make in aggregate basis of the Global project on biosafety. Development of such national frame system on biosafety in Kyrgyzstan also is begun. Problems of a biodiversity and the biosafety have received the development after a conference UNA on an environment and development in 1992 in Rio de Janeiro (Brazil) on Global summit on steady development in Johannesburg in 2002 (UAR) and on Bishkek Global mountain sum

mit in 2002 (Kyrgyzstan) and on last summit on a biodiversity and biosafety in December, 2003 in Montreal (Canada).

Kyrgyzstan is natural laboratory, where in small territory all horizontal zones of a planet practically are submitted, beginning from semi-desert, finishing the subalpine zone and zone eternal frozen- Arctic and Antarctic zones, behind exception only of tropical and large deserted zones. The country has unique flora and fauna. Kyrgyzstan occupying only 0,13 % of all land of a planet, is submitted by a huge biodiversity - 1 % of all biodiversity of a planet, that, in comparative aspect, considerably exceeds the middleworld level (fig. 1). In territory of Kyrgyzstan more than 12300 kinds of animals organisms live, including 83 kinds of mammals, 368 kinds of birds, 33 kinds of reptiles, 4 kinds of amphibians, 75 kinds of fishes, all vertebrates 567 kinds, 10290 kinds of insects, 1282 kinds of worms, 168 kinds of mollusks, growing 7723 kinds of plants, including 3786 kinds of maximum plants (from which about 1600 kinds have economic and useful value, including: 450 fodder, 300 honey, 200 medicinal, 62 essential volatile oil and 50 food kinds), 3676 kinds of the lowest plants and 261 kinds of microorganisms (viruses, bacteria and elementary). In Kyrgyzstan on 1thou. sq. km. It is necessary 6,47 kinds of worms(middleworld level 0,07, i.e. excess in Kyrgyzstan in 92,4 times!), 0,85 kinds of mollusks (0,09, excess in 9,4 times), 51,72 kinds of insects (13,41, excess in 3,8 times), 0,38 kinds of fishes (0,04, excess in 9,5 times), 0,02 kinds of amphibians (0,02, are at one level) 0,44 kinds of mammals (0,03, excess in 14,7 times!), 1,86 kinds of birds (0,06, excess in 31 times!), 0,15 kinds of reptiles (0,05, excess in 3 times), 18,57 kinds of the lowest plants (0,14, excess in 132,6 times!), 19,12 kinds of maximum plants (1,67, excess in 11,4 times) and 1,32 kinds of microorganisms (0,01, excess in 132 times!).

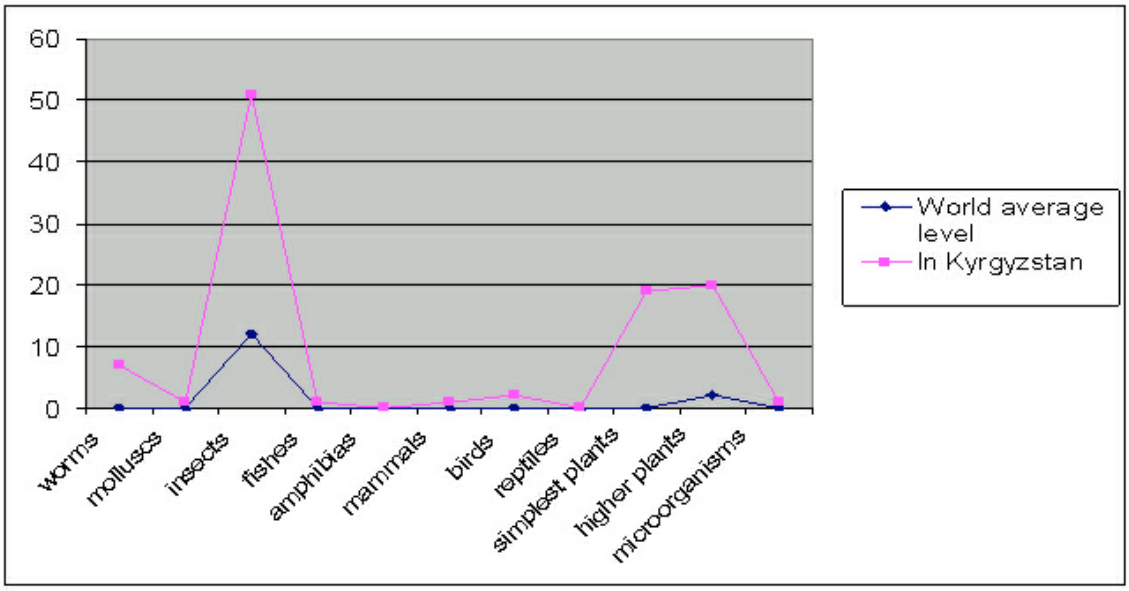

Figure 1.

As the concentration of kinds, especially, worms, mammals, birds is visible, in Kyrgyzstan, than plants and microorganisms from world average of a level is much higher, that speaks about a high biological variety and rich genetic resource of plants and animals. Here it is necessary to take into account, that a significant part of vegetative and animal kinds of Kyrgyzstan yet are not found and are not investigated, even from among the registered kinds, while many, far completely yet are not investigated (the biological features, adaptive, reproductive, productive and other features) are unknown their number, areal of distribution,, that does not allow to near the

village conduct system work on their account, preservation extended to the minimal threshold number to reproduction, and, certainly, preservation of their genetic resources.

Among flora and fauna of Kyrgyzstan it is a lot of valuable, rare and endemic (that is meeting only in territory of Kyrgyzstan) kinds (Table 1). The number of endemics among vegetative organisms in a total kind makes 233 kinds or 3 % of total (7723 kinds) growing in Kyrgyzstan of plants. The number of animals – endemics reach significant sizes - 2964 kinds or 24,1 % from total of animal kinds of organisms (more 12300 of kinds), that is each fourth kind is endemic, that speaks about high uniqueness of a biodiversity and about their high genetic value in the world fund of genetic resources, as these kinds are more anywhere in the world do not meet. The basic kinds of endemic animals of Kyrgyzstan are submitted mollusks, insects, worms and fishes. From mammals to endemic kinds concern surok Menzbira, relictive gopher, red Tien Shan and silvery polevki, red pishuha. To endemics Tien-Shan and Pamiro-Alaya 4 kinds of reptiles concern also.

Kyrgyzstan also has a plenty of rare and disappearing kinds vegetative and animals organisms, brought in the National, Regional and World Red books. List of kinds which are taking place under threat of disappearance, includes 122 kinds of animals and 71 kinds of plants, that makes approximately 1 % kind of riches of Kyrgyzstan. 71 kinds of plants and 67 kinds of animals are included in the Red book of Kyrgyzstan. Today in the country in a menacing condition there are 54 kinds of plants, 77 kinds of animals, 3 kinds of plants and 8 kinds of animals practically have disappeared!

In the Red book of the International Union of protection of a nature also are brought snow bars, surok Menzbira, red wolf, djeiran and mountain goose. The special alarm is caused by a condition of populations of kinds of earthwater, snakes, large hoofs, predatory mammals and many kinds of birds.

Besides, the last years, in conditions common economic stagnation and total deficiency of all basic kinds of resources (financial, material, power, organizational, qualified human and other kinds) barbarous attitude to natural resources of the country strongly has amplified. The huge wood files are cut down (during last 50 years 50 % of wood files are lost, thus natural restoration process practically has stopped, and the artificial restoration of essential updating can not make), 70 % of pasturable resources of the country degraded (is especial, sharply increased in last years down of landslips having more often tragical outcome and a material input estimated hundreds millions of catfishes, estimated hundreds millions, degradation and erodation of pastures, today quantity of sites, where are most probable down of landslips on republic makes 4000, the productivity of pastures for last 60-70 years has decreased on 65 - 70 %, as a result of intensive use for a long time, more than 10 million sheep and absolute absence of any efforts on their restoration and improvement, especially, last years, have resulted in their menacing condition, One of national riches of the country - pasturable resources. They say recently opinion that because of sharp reduction of number sheep, the pasturable resources have a rest and are restored, do not correspond to the validity. In pasturable files have begun to dominate of weed vegetation and to supersede fodder plants, as a whole considerably reducing a qualitative condition fodder value of pastures. The cases, which have more and more become frequent per last years, of spontaneous fires on the large areas of pastures burnt casual people - wild "«tourists" and "«hunters" who have appeared in mountains, put also irreplaceable losses to a biodiversity, destroying all vegetative cover, including woody part and significant part of animals organisms. Besides the farmers and inhabitants of the village occupied items, because of dearness moving of cattle and danger in the remote pastures (steel by often cases of a robbery and murder of the people), practically have ceased to use the remote years summer, winter and autumn-spring pastures and excessively intensively began to use near the village of a pasture. In result near the village of a pasture completely degraded an essential loss first of all to their biodiversity also is put again and there are they today in a depressing condition.), many kinds of medicinal plants and wild animals by an illegal way are destroyed and are taken out, the soil cover erodaded and is destroyed (today on the official data more than 200 thousand ga of ground in an agricultural industrial revolution are not used, hence, collapses and are lost unique genoms of

Table 1. Aggregate number of kinds and endemics in Kyrgyzstan

Taxons	**Number of kinds**	**Endemics**
Flora		
The lowest plants:		
Mushrooms	1936	26
Seaweed	850	3
Lichens	495	4
Maximum plants	3786	200
Fauna		
Vertebraless		
Type:		
Elementary	101	-
Sponges	3	-
Intestinal	1	-
Flat worms	448	32
Nematods	664	54
Kolchaty worms	30	8
Molluscs	168	94
Arthropoda	10290	2760
Vertebral		
Type chords		
Class:		
Fish	75	12
Amphibians	4	2
Reptiles	33	2
Bird	368	-
Mammals	78	-

microorganisms and virus particles which are taking place in a soil cover and ensuring its fertility. The drawing of damage to natural environment, puts irreparable damage to genetic resources of the country, after loss, they are extremely difficult for restoring, do not give in to restoration more precisely. The special alarm is caused more and more recently typing rates with activity numerous legal, halflegal both illegal tourist domestic and foreign firms attracting on a hunt of rare kinds of animals, solvent people from foreign countries. The interest of the foreign hunters - tourists is distributed basically to reception of trophies of such rare kinds of animals, as Siberian mountain goat, archar the Mark Polo, kosulya Siberian. So, in 1991 is extracted archar the Mark Polo by the size of 61 inches (155см), in 2001 in March « the new world record » was extracted! (from a lexicon of travel companies and it they declare with high pride) - 67 inches (171 см). And all this occurs on a background, recently, more and more becoming frequent tragical outcomes of the foreign and domestic hunters on archars in high-mountainous range of majestic and mysterious mountain systems Tian-Shan and Pamiro-Alaya. The idle time people trust thus popular belief, come up to now from depth of centuries with genetic memory of the people, and not only highlyvalue, but also especially protecting "«oikumeny" and it is wise in a low voice in self-belief and the self-calm makes: "Kayberendin kaaryna kaldy" (has deserved a damnation archar), and thus not forgetting asks of God, by all means, about alms and well-being to itself and all. Because of an illegal barbarous hunt and as trophy export snow bars its number was very sharply reduced. The project « Snow bars» sold under aegis Harder Torsten from Germany on preservation of number snow bars in Kyrgyzstan, has received wide popularity both deserves the highest estimation and serves an example of the careful attitude to natural resources and natural environment, installs hope, that nice- bars will be kept and is copied. Objects of a foreign hunt also are wild boar, wolf, ular, pheasant, surok and kekilik. Monitoring on the part of the local population and communities, bodies of state management both appropriate ministries and departments remain weakest and insufficient. Most pitiable consists that more often people on a duty obliged to protect natural resources, become the poachers or patronize of the poachers. About it eloquently speak the more and more increased facts stated on pages of MASS-MEDIA and public disassemblies about crimes on the part of the people, natural resources, responsible for preservation, of the country. Low ecological education of the population and public, total deficiency of resources and absence of spheres of employment, total corruption, absence of modern legislative base and normative-legal documents, state policy and program in sphere of a biodiversity and the biosafety in aggregate create sufficiently serious situation in sphere of protection and rational use of natural resources of Kyrgyzstan. Some laws, accepted per last years: the laws « About biosphere territories of Kyrgyz Republic », « About protection and use of flora of Kyrgyz Republic », « the Wood code of Kyrgyz Republic », « About fauna of Kyrgyz Republic », have separate elements concerning a biodiversity, but they by a special image are not devoted and can not to the full capture all problems connected to a biodiversity and biosafety. Thus, Kyrgyzstan has no basis suppose of the basic approaches and national modes appropriate to the international standards, ensuring preservation of a biodiversity and biosafety of the country.

Absence of state policy and programs, legislative base and system purposeful works on protection and rational use of genetic resources on the part of the state, local population and communities, NPO, in connection with insufficiency of the information, absence of the focused and effective assistance on the part of various international organizations, funds and countries of the donors (except for small grant of means PROON and some other structural divisions UNA, World Bank, the Programs of the European Union "Tacis", German and Swiss governments) even more have aggravated a situation in the given sphere. Though, under aegis and financial maintenance as grant of means the World Bank, Asian Bank of Reconstruction and Development and German government, at a coordinating role of the foreign experts and wide participation of the local experts and scientific from many spheres developed the rather serious Projects having enormous volume of the primary information data: the national plan of protection of an environment (1996г), Project of strategy and plan of actions on preservation of a biodiversity (1998г)., National plan and strategy of actions on development of mountain regions (2001г)..

However, these projects were not realized and are not lead up to logic end and have remained only on a paper and probability that they now will be financed practically is not present, a lot of time has passed from time of end of development of the Projects sufficient. For the expired period of time and the appropriate governmental structures of republic have not shown due activity in search and attraction of means for realization of the developed projects. Is logically asked, then what for and with what purpose they were developed, the means are spent. Here again there is an impression, that they were initiated for the tax and analysis of the information, for development of tactics and strategy of actions concerning natural and other kinds of resources of Kyrgyzstan (and not only Kyrgyzstan) and as the effective political tool on acceptance of the political decisions in subsequent. The similar situations are observed both in other spheres and with other less developed countries. In spite of, on existing serious blanks and problems in sphere of a biodiversity and the biosafety, Kyrgyzstan are undertaken significant constructive efforts on nature protection activity, which under the right have deduced the country in leading positions among the countries of all world community in sphere of protection and rational use of natural resources.

Last years, because of common crisis, scientific researches on inventory, preservation and rational use of available genetic resources of the country also are poorly conducted. In this connection the account, protection, preservation - creation of a genetic databank and rational use of genetic resources of the country, are strategic and priority tasks not only for Kyrgyzstan, but also for all world community, as the unique genetic resources, are the integral component complete world of genofund.

It is necessary here to add that when is spoken about genetic resources, mean not only generative crates and osobi on organism's level, from the point of view of modern biotechnology, the fragments of molecules DNK, RNK, mitochondri, plazmid of bacterial crates and virus particles concern anyone somatic crate, to genetic resources, which protection require special - specific approaches. Besides the modern biotechnological methods basing on generic and crate engineering allow first, to carry out unlimited manipulation with the hereditary information at any level, and, secondly, to create completely new kinds of organisms, which were not in natural environment, that is to interfere in natural formative or evolutionary process, which results are fraught with unpredictable consequences, not only from the point of view of a nature and ecology, but also from the point of view of human ethics. In these conditions, preservation natural generic of resources and their protection, which can be subject to destruction is artificial created of generic resources, has the extremely important meaning. More detailed inventory unique in the essence of a biodiversity of Kyrgyzstan, its deeper study, rational use extended reproduction them genoms in artificial laboratory conditions and natural protected territories, preservation of their genetic resources as creation of a National genetic databank, which in aggregate should be generated in figurative state and National policy of Kyrgyzstan in XXI century - century a majorant of natural environment of inhabitant of the man, which will have the invaluably high price, is national and state of the important task.

The modern methods of generic engineering and biotechnology allow not only understanding thin essence of an alive matter in laboratory conditions only in cognition aspect, but also having an instant practical exit. Today's the biotechnology has given completely new concepts and terms: « generically modified » or "transgeneric" organism and product ». What they mean? It means, that in a natural set of genes organism with the help of methods of generic engineering is entered to another gene biologically perfectly remote of taxsonom units or artificial way created, etc. of genetic structures, not existing in a nature. Thus, the biological isolation between anyone taxons, has ceased to be a barrier in reproduction of chimerical genetic systems on submolecular, molecular, chromosome, cell, fabric and on organisms' levels and are created generic systems and kinds of organisms by the programmed properties and received from such kinds of organisms products. For example, the generically modified potatoes contains a gene snowdrop, besides in a gene of a potatoes the gene of a bacterial crate developing fatal poison for Colorado bug «is "built", in a gene of an ordinary tomato the gene a fish «is "planted"("«put") which at any transportation does not lose a packaging, the rice - basic product of a feed in many less de

veloped countries - specially for the local population is modified: In it now are available vitamin A and iron, that relieves of the heavy forms of illnesses, which have caused parents of the modified rice, are created transgeneric cows with a gene of the man responsible for synthesis insulin, which produce in milk insulin of the man replacing human insulin, instead of injection to the man pork or cow insulin, are created transgeneric sheep with a gene of growth of the man - samototropin, having by intensive growth and raised alive weight, the plants with the built - in genes of virus particles are created which can replace to the man vaccination against infectious diseases, further this list of miracles - innovations can be continued. More than 120 kinds of transgeneric plants - corn, tomatoes, cucumber, potatoes, rice, cotton, pepper, melon, pumpkin, soya, string bean and others today are created. Transgeneric organisms have set of qualities, useful to the man, - resistance to many kinds of illnesses, good adaptation to severe constraints of environment by more increased efficiency in comparison with the natural forms and other qualities and their number with each year are ever more increased. In the advanced countries there is a manufacture of products generically modified organisms ever more, behind which even the own name "food Frankshtein" was fixed and they basically are exported to less developed countries, where there is a huge deficiency of food resources. The largest manufacturers of products transgeneric organisms and their productions - foodstuff are by USA, Japan, Germany, France, China, India and other countries. Volume of annual sales of the products received from genetically modified organisms, in the world today makes of 20 billions American dollars. For the market of selling of the generically modified products (GMP) in the world there are present interstate "«wars", in which even the chiefs of the states take part. The last year the President of USA is extremely active to make one's way through GMP in the countries of the European Union. The consequences of application GMP remain while up to the end not found out, there are spontaneous assumptions and individual data on negative influences GMP on human organism, as reduction of immune properties increased of conceragation, allergation and mutagetion and others. In this connection the advanced countries made GMP export to the countries of the third world, though volume consumed GMP in the world today is low and makes approximately 1 % from general weight consumed by mankind of products, while 99 % of food there is a natural origin. But the tendency of increase of manufacture GMP with each year more and more types rates. Hence, in view of unpredictable consequences of transgeneric organisms and their it is necessary to undertake derivative - generically modified products, preventive of action. On the carried out researches individual NPO in Kyrgyzstan significant quantity GMP, however, under their statements of the strictly purposeful state control behind their delivery too is delivered is not made. The actions GMP on organism of the man too, naturally, are not traced. In Kyrgyzstan also last years are delivered significant quantity seeds of the generically modified plants (water-melon, cabbage, tomato, pepper, cucumber, potatoes, sugar beet and others) from USA, Holland, Germany, China and from other countries, behind which, however, any kind of monitoring too is not conducted. Though, their influence on a biodiversity and biosafety of the country, will be doubtless, and which collecting during even the short time, in the near future can be given rather essential « of irreversible character effect ». Summarizing, as a whole stated, it is possible to conclude:

1. Kyrgyzstan has a huge and unique biodiversity and significant genetic resources;
2. In result of more and more amplifying anthropogenous pressure on natural environment, some unique kinds of plants and animal organisms of the country have disappeared, significant quantity of kinds are under threat of disappearance and if not to undertake preventive of a measure on their preservation and duplication of their number, shortly process can get irreversible character and have serious consequences, as infringement of an equilibrium ecological condition and not only in Kyrgyzstan, but also as a whole in the Central-Asian region, and, besides as irrevocable loss of valuable genotypes, as parts of world genefund;
3. The generically modified products, more and more actively penetrating into republic, (GMP) and generically changed organisms (GIO) without the appropriate system monitoring can represent the certain danger to health of the population and biodiversity of the country (condition of their genetic resources);

4. To accept at a state level most serious and immediate measures on the accelerated and intensive development in Kyrgyzstan of modern biotechnology basing modern methods of generic and cell engineering (and first of all to generate state policy in sphere of biotechnology, to create material base, as modern laboratories on generic and cell engineering at universities special biotechnological centres, to develop a microbiological industry, to prepare the staff at the foreign biotechnological centres, to create a National databank of genetic resources of the country and others), ensuring fundamental basis of biosafety of the country;

5. With the purposes of maintenance of biosafety of Kyrgyzstan it is necessary to develop purposeful state policy and national mode appropriate to the international standards, in sphere of biosafety, i.e. to create legislative base, normative-legal documents and precise mechanisms of their realization, to strengthen state and general monitoring behind a biodiversity of the country - one of National properties not only Kyrgyzstan, but also all mankind and world community.

REFERENCES

Environment of the Kyrgyz Republic. Publication. Ministry of Environment and Emergency of the KR. Bishkek, 2001.

Information booklet, State Department on Tourizm and Youth Policy of the KR, 2003.

Cartagena protocol. - UNEP Publication, 2002.

Law of the KR “About Wildlife” 2004.