Modern Biotechnology and Plant Genetic Resources of Turkey: Using the Environmental Law

Haluk Emiroğlu*

Abstract

While we talk about environmental pollution, generally various industrial wastes which pollute nature in terms of water and soil occur to our mind. Significant menace of these kinds of wastes to natural resources caused to draw attention on environmental protection studies. In recent years, some new products obtained by modifying their genetic structure with biotechnological methods (genetically modified organisms-GMO), especially new plant species obtained different varieties by transferring gene (transgenic varieties) has given a new dimension to the environmental pollution. Discussions about this type of pollution, which is vital and permanent, increase day by day.

There are thousands of species in Turkey where has a very important place in the world in terms of biodiversity thanks to its geography and ecology, and great part of these species are unique to Turkey. While particularly wild plant species have important potential for improvement of new plant varieties, protection of genetic resources in Turkey seems to be necessary in terms of food requirement for human being in future.

Biodiversity of Turkey is tried to protect principally with environmental law and with legal regulations, international relations, and educational and political practices. However, today, where uses of new biotechnological products are under consideration, it is clear that envi-

* Ph.D., Faculty of Law, Bilkent University.

ronmental protection studies should be handled in the framework of environmental law with perspective that emphasizes precautionary principal.

Key Words: Biotechnology, environment, environmental law, GMO, precautionary principal, transgenic plants.

1. Introduction

Dangerous dimensions of pressure of rapid technological development on nature caused problems derived from interaction of societies with environment. These problems, of which societies try to solve to secure their future, form an entity and there is a link among its elements. In this respect, while all problems about environment are handled in the framework of their interaction with each other, an environment problematic can be talked about. Environment problematic derives from human-nature relations, in other words, from change of environment by people in direction of their interests[1].

At present, technological developments provide both profiting from natural sources more easily and productively and causing problems like rapid disappear and lose of their characteristics due to their extensive use. Biodiversity is damaged depend on extensive use of carrying capacity[2]. In general term, biodiversity, which includes all organism diversity in a certain region, form fundamental natural sources and future of human being is dependent significantly to biodiversity. Biodiversity concept can be examined in two categories as genetic and ecologic diversity. Genetic diversity is the diversity of hereditary information that is required for specie to adopt the environment conditions. Organisms, which have not this diversity, are disappeared while they cannot adopt changeable environment conditions. Ecological diversity, which includes different ecosystems in a certain region, contains all organisms in natural borders[3]. Some writers have reported three basic problems for sustainability of biological diversity: disappear of species, disappear of varieties and destruction of natural fields[4].

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1 Keleş, R., Hamamcı, C., Çevrebilim, Ankara 1993, p. 14

2 Ertürk, H., Çevre Bilimlerine Giriş, Uludağ Üniversitesi Güçlendirme Vakfı Yayınları, Bursa 1996, p. 50.

3 Kence, A., Biyolojik Çeşitlilik ve Çevre Üzerine, Türkiye Çevre Sorunları Vakfı Yayınları, Ankara 1991, p. 235.

4 Keleş, R., Hamamcı, C. 1993, p. 62.

Culture varieties include lower genetic diversity than its wild relatives. Wild species are gene deposits, which are important resources that have wide genetic base for the removal of problems that can occur in future and for giving plants new characteristics. Thus, protection of all plant material that will form future gene resources has been considered as the most important duty of present people[5].

Especially in terms of biodiversity, Turkey has an important place in the world because of its geographical structure and different ecological conditions. There are many species in its nature and significant part of these species is unique to Turkey[6]. Biodiversity in Turkey decrease increasingly because of the reasons as opening of new agricultural fields, increase in industrial and settlement fields, collecting from nature, and environmental pollution[7].

Environmental pollution includes various wastes that pollute the nature in terms of air, water and soil. Especially, industrial wastes has become an important position that threatens significantly natural resources and studies about environment protection has become first matter of the world[8]. In recent years, application of modern biotechnological methods has brought a new dimension to environmental pollution. In general term, biotechnology is a term based on the principal of the modification of organism's genetic structures by profiting other organisms[9]. With this technique, genetic structure of all kinds of plant, animal and organism can be modified in which direction you want[10]. It is highly likely that biotechnology will play much more consequence role in the 21st century than it did in the 20th century[11]. A lot of benefits are

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5 Özgen, M., Adak, S., Karagöz, A., Ulukan, H., Bitkisel Gen Kaynaklarının Korunma ve Kullanımı, Türkiye Ziraat Mühendisliği 4. Teknik Kongresi, 9-13 Ocak 1995 Ankara, Ziraat Bankası Kültür Yayınları No.26, Ankara 1995, p. 310.

6 Kışlaoğlu, M., Berkes, F., Biyolojik Çeşitlilik, Türkiye Çevre Vakfı Yayınları, Ankara 1992, pp. 12-14.

7 Şehirali, S., Özgen, M., Bitkisel Gen Kaynakları, Ankara Üniversitesi Ziraat Fakültesi Yayınları, Ankara 1988, p. 40-41.

8 Haktanır, K., Arcak, S., Çevre Kirliliği, Ankara Üniversitesi Ziraat Fakültesi Yayınları, Ankara 1998, p. 34-37.

9 Bruhn, C. M., Consumer Concerns and Educational Strategies: Focus on Biotechnology, Food Technology, 46 (3), 1992, p. 80.

10 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., Bitkisel gen kaynaklarının korunma ve kullanımında yeni yaklaşımlar. Türkiye Ziraat Mühendisliği 5. Teknik Kongresi, 17-21 Ocak, Ankara, Ziraat Bankası Kültür Yayınları, Ankara, 2000, p. 274-275.

11 Cantor, R.C., Biotechnology in the 21st century. TIBTECH, 2000, 18 (192), p. 6-7.

expected from the use of modern biotechnology methods in agriculture. Especially, plants are potentially marvelous expression systems for the production of desirable gene products[12]. The genetic modification of plants potentially offers very important improvements to agricultural practices[13]. It is estimated that the world population, currently approximately six billion, will rise to approximately eight billion by the year 2020[14]. It is suggested that advances in the genetic engineering of crops may have potential in helping to a world-wide need to feed the worlds' growing population[15]. Despite these advances and expectations in plant biotechnology, one of the major concerns about genetically modified crops, is their possible environmental effects[16]. Because, some new products as varieties of transgenic plant obtained by modifying its genetic structure can cause risks for environment by creating genetic pollution[17].

In spite of this, today, the planting field of genetically engineered plants as new corn, cotton, boll, potato and soy principally in United States, Argentina, Brazil, and India has reached 40 million hectares. The commerce of these plants was 1 million dollar in 1995; in 1999 this number has reached about 3 billion dollar[18]. In recent years, the breeding of these plants in Turkey is on the agenda.

While making decisions about the application of biotechnological methods that will be effective on natural environment, consideration of right and law concepts is important. Although human rights have a history over two thousands year, handling of rights and freedoms with a modern approach and evaluating them in the framework of law have two hundred years history[19]. Environmental right is one of the fundamental human rights[20]. When considered more widely, it is clear that environ-

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12 Wackett, L. P., Environmental biotechnology, Trends in Biotechnology, 2000, 18, p. 21.

13 Hare, P.D., Chua, N-H., Excision of selectable marker genes from transgenic plants, Nature Biotechnology, 2002, 20, p. 575.

14 Polkinghorne, J. C., Ethical issues in biotechnology, Trends in Biotechnology, 2000, 18, p. 9.

15 Emiroğlu, H., Foods produced using biotechnology: how does the law protect consumers? International Journal of Consumer Studies, 2002, 26, p. 199.

16 Polkinghorne, J.C., 2000, p. 9.

17 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., 2000, p. 273.

18 James, C.A., Global status of commercialized transgenic crops: 1999, Ithaca: International Service for the Acquisition of Agri-biotech Applications Briefs No:17, ISAAA, 2000, p. 1.

19 Kaboğlu, İ., Çevre hakkı. Ankara: İmge Kitabevi Yayınları. 1996, p. 9

20 Mccallion, K.F., Sharma, H.R., Environmental justice without borders: the need for an

mental right does not only belong to human but also it belongs to all organisms. However, at this point, giving the opportunity to human, which is one of the components of the environment, to demand the protection of biodiversity elements has gained importance. Object of the environment right is primarily people living today. In law articles, people who can demand respect to environment right are expressed with terms as citizens, individuals, public, and community. People living today have responsibility to take in to consideration interests of next generations. This is a characteristic, which is not in other rights in terms of the beneficiaries of environmental right[21]. Values that form subject of the environmental right also form the cope of environmental law great part of which was completed in last 30 years.

Environmental law is a branch of law that occurs as linked with environment problematic and that has close relation with disciplines related to the quality of problematic. Environmental law requires profiting from scientific and technical data in terms of forming legal rules, practicing them and adapting them to today's conditions. Determination of environmental problems with supports of disciplines to form legal rules and proposing solutions is required addressing related disciplines[22].

A considerable number of legal methods in environmental law are rather new, such as environmental impact assessments, emission limits, quality objectives, the creation of special protection zones and ecological audits, and others. Environmental law, which is very technical concept, has experimental stages that include waste, best available technologies, clean up plan, safe elimination, and the polluter-pays-principle[23].

It has been reported that environmental law includes three elements as a) law of nature protection, b) protection of cultural, rural and urban environment, c) legal regulations related to pollution and damage. First element of environment law is protection of natural surroundings. Law of nature protection includes protection of plant and animal species, nat-

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international court of the environment to protect fundamental environmental rights, The George Washington Journal of International Law and Economics, 2000, 32 (3), p. 354.

21 Kaboğlu, İ., 1996, pp. 55-56.

22 Turgut, N., Teknolojik gelişmelerin geleneksel hukuka etkisi: çevre hukukunun doğuşu, Bilişim Toplumuna Giderken Psikoloji, Sosyoloji ve Hukukta Etkiler Sempozyumu, Ankara: Aydoğdu Ofset Matbaacılık Sanayi ve Ticaret. 2001, p. 276.

23 Kramer, L., On the interrelation between consumer and environmental policies in the European Community. Journal of Consumer Policy, 1993, 21, pp. 460-461.

ural richness (forest, mountain and costal areas) and decreased sensitive natural richness (sites, natural fields, national parks and watery places) Protection of cultural, rural and urban environment forms second element of environmental law. Regulation in agricultural activities is in the framework of rural environment. Third element of environmental law is related to pollution and environmental damages and it classifies and supervises institutions and structures that lead destruction[24].

Discussions about genetic pollution derived from genetically engineered organisms that are permanent. In this article, environmental problems derived from new biotechnological developments will be examined in the framework of environmental law and international and national regulations will be talked about.

2. Environmental Risks of Transgenic Crops

The most important menace in terms of disappearing of plant gene resources derives from genetic changes that can lead defeat in ecological balance. In recent years, thanks to beneficing biotechnology and gene engineering techniques gene transfer between different biological systems is made possible. Especially, with the transfer of genes originated bacteria and virus, sound species to herbicides, illnesses and damages are developed, some important plant's as corn, potato and cotton structures are modified by transferring gene, planting of notified new plant varieties has began commonly in United States and other countries[25].

There are many reasons of the destruction of ecological balance because of the use of transgenic plants and damage in plant genetic resources related to this unbalance. When this subject is handled generally, we face with the prevalence of single kind planting by removing other varieties` production because of the transgenic plants as the most important reason for damage in genetic diversity. When the subject is examined in terms of transferred genes, we see that genes that provide durability to herbicides and dangerous substances, can lead important problems in terms of plant genetic resources because of their relation with environment. Many wild gene resources, that carry important genes in terms of development of new plant varieties, are the relatives of the culture plants as wheat, beet, tobacco, tomato and potato as well as gene transfer is possible among them by transferring pollen[26].

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24 Kaboğlu, İ., 1996, pp. 60-72.

25 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., 2000, p. 273.

26 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., 2000, p. 274.

For this reason, transmission possibility of durability genes of transgenic plants to their relative species is always available. For instance, when transgenic plants developed as durable to herbicides, transmit this characteristic to relative species, which are in the position of wild grass, durability of wild grass will increase and fight with these wild grass will be impossible. Also, increase of culture plant's durability to herbicides will encourage use of chemicals and wild grass that are kept under pressure with the use of same herbicide intensively can show durability by showing genetic change[27].

Same problems are present for the use of transgenic varieties durable to noxious. For instance, bacterial originated `Bt` genes transferred to corn, cotton and potato due to provide protection against noxious cause immediate death of mashers and instincts that eat plants, since they produce toxins. In case of intensive use of these varieties in agricultural fields, disappearing of many instinct species that have not any damage even have usefulness will be possible. The possibility of the transmission of these genes to wild varieties with natural crossbreeding is always present. It is inevitable that these will transform to durable species that will change structure of noxious rapidly before the environmental pressure derived from toxic effect of durable plants surrounding of it. On the other hand, thanks to their leaves, entry of transgenic plants by contaminating in to soil and water in to food chain of organisms is another dimension of the problem[28].

Seed firms` that are commercial institutions continuity is dependent to selling of seeds. This is another reality. Due to prevent use of transgenic plants both as product and as seed by buying one time, a genetic system of which patent is taken is developed, so transgenic plants are considered to be kept under control[29]. Thus, there will be an obligation of renovation of transgenic varieties each year as well as hybrid seeds. With this genetic control system, thanks to toxic substances produced during the late maturating period of transgenic plant seed, cells are died and consequently embryo loses its liveliness. So, with the use of this seed of which germination capability is lost, second generation production

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27 Holt, J.S., Powles, S.B., Holtum, J.A.M., Mechanismis and agronomic aspects of Herbicide Resistance. An. Rev. Plant Physiol. Plant Molecular Biology., 1993, 44, p. 204.

28 James, C.A., 2000, p. 1.

29 Crouch, M.L., How the terminator terminates: an explanation for the non-scientist of a remarkable patent for killing second generation seeds of crop plants. An occasional paper of the Edmonts Institute, 1998, p. 3.

becomes impossible. This seed control system managed with genes can transmit to same specie's classical varieties thank to the pollens and will cause both defeat of varieties and disappearing of these wild species by preventing their multiplication with natural ways. In order to take in to action this gene system that will be transferred due to prevent second year production of its seed genetically engineered that was sold to the consumer, the obligation of treatment with an antibiotic before selling, when considered the planting fields of wheat and cotton plants, will cause a great part of antibiotic transfer to the nature. In this respect, some bacteria in soil will die; some of them will be durable to antibiotic as time passed. Because of the antibiotic accumulation in soil each year, defeat in micro-organism balance, important ecological balance problems and damage of plants that have close relations with micro-organisms are inevitable[30].

Consequently, to prevent the transmission of new bacteria originated genes of genetically engineered plants as well as genes that prevent the future production expected to be practiced in short term, to wild species seems impossible. In case of determination of negative results, even planting of these species is abandoned, transmission of these varieties` genes will increase day-by-day, problems that are posed for human health, gene resources and ecological balances will continue. We have not yet known long term effects of these varieties that carry genetically engineered genes, on human health. For these reasons, without collecting multiyear results, planting of transgenic plants that carry genes originated bacteria and virus of which future results are not well known for human health, can cause vital problems in future[31].

3. Using the Environmental Law

When we handle these problems in comply with the environmental law, detailed examination of new developed transgenic species in conformity with the precautionary principle occurred after the principal of the polluter- pays and principal of participation will be useful for making decision about their usage. Precautionary described of principal in environment law as an aspect which can find solutions to the environment problems that can occur in some fields of which law cannot explain enough definitely and specifically. She indicates that, this principal

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30 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., 2000, p. 275.

31 Özgen, M., Adak, S., Söylemezoğlu, G., Ulukan, H., 2000, p. 276.

involves scientific uncertainty and environmental damage risk, specific uncertainty includes some elements which are as follows: science cannot find a complete response, scientific findings are not convincing, there is not an absolute and clear scientific evidence, there is no scientific finding, there is deficiency of complete scientific data and document and science is uncertain, unreliable and inconvenient. Environmental damage risk involves possible harmful effects, damages that cannot be compensated, an important decrease and danger of disappearing. In other words, the precautionary principles built on the premise that activities threatening harm to human health or the environment require precautionary measures, even if some cause-and-effect relationships are not fully established scientifically. This approach is gaining importance in environmental policy and law as applied to commercial use of genetically modified organisms[32].

In more general usage the term "risk assessment" denotes a procedure that investigates specific harms. It assesses the extent or likelihood of effects already deemed unacceptable and plausible, especially those effects already documented in previous cases deemed analogous[33]. But, risk assessment for the releasing of GMOs into the environment is based on hazard identification, evaluation of potential consequences, prediction of damage potential on implementation of risk mitigation strategies, respectively. Regulations related to transgenic crops require risk evaluations to be performed with the best available science and demand ethical behavior in decision making, built on the prima facie principles of minimizing risk and reducing the damage potential from potential hazards[34]. Regulators have no prior norm for defining unacceptable effects; rather, they must devise such norms, especially at the stage of market approval. Neither could the regulators have relied on some consensual analogy from the past as a basis for predicting future effects[35].

Unfortunately, the precautionary principle can not generally be applied to products produced using biotechnological methods. It is, how-

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32 Turgut, N., Çevre hukuku. Ankara: Savaş Yayınevi. 1998, p. 306, 315.

33 Levidow, L., Carr, S., Wield, D., European biotechnology regulation: framing the risk assessment of a herbicide-tolerant crop, Science, Technology and Human Values, 1997, 22, p. 500.

34 Auberson-Huang, L., The dialogue between precaution and risk, Nature Biotechnology, 2002, 20, p. 1076.

35 Levidow, L., Carr, S., Wield, D., European biotechnology regulation: framing the risk assessment of a herbicide-tolerant crop, Science, Technology and Human Values, 1997, 22, p. 500.

ever, important to evaluate the use of such products from the viewpoint of scientific uncertainty and environmental harm since the element of risk is very high and may become more so in the future. The transfer of transgenic plant properties to other plants to potential harm to the ecosystem and other biological varieties is possible in time. There is no way of estimating what irrevocable harm may occur in the future, so there is a scientific uncertainty and environmental risk[36]. In this respect, protection of biodiversity may be impossible.

4. Policies Related to Biotechnology and the Protection of Natural Environment

Today, although there are studies based on scientific uncertainty related to several factors that cause environment pollution, without reaching studies related to genetically engineered organisms that can cause genetic change to necessary level, in some countries, these products` usage and production are permitted. On the other hand, in some countries, precautionary principle related to genetically engineered organisms is applied seriously. But, all countries should make common decisions against this problem that have an extension feature and should apply them.

The Cartagena Protocol on Bio-safety to the Convention on Biological Diversity, a multilateral environmental agreement to protect biodiversity, may also have implications for trade in genetically engineered crops. According to Article 1 of the Cartegena Protocol "the objective of the protocol is to contribute to ensuring an adequate level of protection in the field of safe transfer, handling and use of modified living organisms resulting from modern biotechnology that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human health, and specifically focusing on transboundary movements". Article 2 emphasizes the right of states to enforce more stringent protection goals for the "conservation and sustainable use of biological diversity then called for in this protocol". Different views on the implementation of the agreement remain particularly with respect to Article 18 which deals with the handling, transport, packaging and identification of living modified organisms[37].

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36 Emiroğlu, H., 2002, p. 204.

37 Anonymous, OECD: Modern biotechnology and agricultural markets: a discussion of selected issues. Working Party on Agricultural Policies and Markets. Organization for Economic Cooperation and Development. AGR/CA/APM(2000)5/FINAL, 2000a. pp. 35-36.

When it enters into force, Cartagena Protocol on Bio-safety will be the first legally binding international agreement to honor the precautionary principle as a policy instrument for the conservation and sustainable use of biological diversity and the protection of human health, both relevant to the trasboundary movement of GMOs[38].

Capability of formation results of important effects on environments outside the country, in other words, feature of supra-border of environment factors have required preparation of regional and international agreements and their entering in to force[39]. However, uncertainty subject of genetically engineered organisms` effects on environment and human health was handled in Rio Conference organized in 1992 and in Biodiversity Agreement signed related to this matter, measures on national and international level have been located. In case of an uncertainty derived from inadequacy of scientific data about negative effects of genetically engineered organisms that can occur on nature and human health, from obtaining definite results to preventing uncertainty, not giving permission of these products` releasing to nature form the basis of this Agreement.

Awareness level of European Union (EU) countries about environmental problems is very high thanks to the contributions of media. With the perspective of `there is a single environment`, they approach very sensitively to regional and national problems[40]. In European Union, the early regulatory framework for biotechnology was founded on a horizontal approach which took account of the protection of both human health and the environment across relevant sectors. Directive 90/220/EEC governed the deliberate release into the environment of GMOs and the placing on the market of products containing or consisting of GMOs for use as foods, feeds and seeds as well as pharmaceuticals. Directive 90/219/EEC governs work activities involving the contained use of genetically modified micro-organisms (GMOs). Bio-security is the basis of both directives. Member states demand that their national regulations would be in common decisions of EU. However, they could not obtain a complete harmonization for these regulations. Application of the decisions can differ country to country. For instance, directive numbered 90/220 which regulates field trials of genetically engineered organisms is open to the application in France, England and Belgium, same directive is applied by

38 Auberson-Huang, L., 2002, p. 1078.

39 Kaboğlu, İ., 1996, p. 134.

40 Kramer, L., 1993, p. 459.

Germany in more careful and restrictive way. Approach of European Union related to regulations about bio-security is significantly different from United States. Firstly, instead of use of EU current legislation, it supports especially new legislation that regulates use of genetically engineered organisms. Secondly, production methods of genetically engineered organisms are taken as basis instead of products of genetically engineered organisms in EU regulations[41].

Recent regulations in European Union aim to high protection of environment, which involves human health and biodiversity related to the gene technology. Present regulative framework was realized in October 2002 with the adaptation of the directive of 2002/18/EC instead of the directive of 90/220/ECC. Commission has aim to complete the regulative framework associated with genetically engineered organisms and related products by bringing up adequate evolution criteria in comply with the directive of 2001/18/EC, by guaranteeing an ample following system based on 2001/19/EC, by addressing the issue of liability with respect to significant environmental damage arising from contained use of genetically modified micro organisms within the scope of Directive 90/219/EC and deliberate release into the environment of GMOs within the scope of Directive 2001/18/EC and ensuring that the provisions of the Bio-safety Protocol are appropriately implemented in Community legislation. Moreover, the Commission intends to present some proposals such as an amendment of the seeds legislation introducing purity criteria for the adventitious presence of traces of GMOs in conventional seed lots and the labeling requirements for seed of GM varieties, a Regulation concerning the environmental risk assessment in respect of genetically modified plant varieties, a Directive on the prevention and restoration of significant environmental damage to include damage from GMOs and GMMs, and a legal instrument implementing the provisions of the Biosafety Protocol. Moreover, the commission suggests that future regulation on GMOs should be developed appropriate methodologies for risk assessment, risk management and risk communication[42].

In Turkey, in general terms, environmental problems were shown firstly in `Third Five Year Development Plan` that include 1973-1977

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41 Chen, Z., Mcdermott, A., International comparisons of biotechnology policies. Journal of Consumer Policy, 1998, 2, pp. 534-535.

42 Anonymous, Commission of the European Communities: Communication from the Commission towards a Strategic Vision of Life Sciences and Biotechnology: Consultation Document, 454 Final, Brussels. 2001, pp. 17-20.

period and they were tried to be in a more increasingly effective position in later years. In Turkey, generally, there are some regulations related to the protection of environment and biodiversity. 45. and 63. articles of constitution, Forest Law numbered 6831, National Parks Law numbered 2873, Land Hunting Law numbered 3167, Protection of Cultural and Natural Wealth Law numbered 2863 and Environment Law numbered 2872 are principal laws. Except these laws, `Directive in terms of Collection, Protection and Use of Plant Genetic Resources` made by Agriculture and Village Affairs Ministry which regulates objective of special protection and collection of plant wealth, entered in to force after published in official journal dated 15 August 1995 and numbered 21316. These regulations have characteristic that contains articles, which sometimes complete each other about free subjects, and sometimes contains articles which makes impossible to have relationship with each other.

In Turkey, protection of plant genetic resources is made as protection fields. There are three main categories of regions as `Site Fields`, `National Parks` and "Special Protection Regions`. Site fields are fields determined by `Natural and Cultural Wealth Protection Council`. These fields are protection fields in which we cannot make planning, regulation and orientation, and they are closed to opinions and rejections of third person. Only decisions of protection councils and without requiring Council of Ministry decisions can cause changes as time passed. Thus, we cannot say that there is definite protection effectiveness. `National parks` are important protection fields that aim protection of water region and watery fields in conformity with general principals in `Environmental Law` and `Directive of Water Pollution Control` with the positive perspective of Council of Minister. `Special Environment Protection` fields are important protection fields completely determined by authority of Council of Minister. Turkey has signed this agreement in the framework of `Barcelona Agreement`. In Turkey, in comply with 2004 data, 33 national park, 17 nature park, 35 nature protection field, 58 nature monument and 13 special environment protection field are constituted[43].

Economic plans that will response socio-economic development and changes and plans that will protect environment values for these fields are prepared and applied. However, when these protection fields are examined generally, it is seen that there isn't a common understanding

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43 Anonymous, Ministry of Environ. and Forest. Available at: www.cevreorman.gov.tr/, 2000.

in protection fields and in an effective environment order plans in terms of ecological balance and responsible cannot be determined definitely when use of land fields decisions are not applied.

As stipulated in g paragraph of 8th Article of Biodiversity Agreement of which Turkey is a signatory, there are responsibilities of founding and continuing a system for controlling management and regulation of risk that can derive from usage and entry of genetically engineered organisms by considering effects of genetically engineered organisms in human health. Protocol belongs to European Wild Life and Wild Life Fields (Bern Agreement) was also approved by Turkey[44]. So, risk position of products that contain genetically engineered organisms in terms of human, plant and animal health and biodiversity and efforts of undertaking this subject with international trade rules are required that Turkey has to complete national legislation preparation studies[45].

In Turkey, first simple regulation about biodiversity was `Instruction about Field Trials of Transgenic Culture Plants` related to transgenic varieties of genetically engineered organisms that form an important group, made by Agriculture and Village Affairs Ministry in 1998. Legislation studies about this subject contain regulations of production and marketing of genetically engineered organisms[46]. Initiator of a wide study can be shown as establishment of `Biotechnology and Bio-security` sub-commission, which will handle regulations related to bio-security for the preparation of 8th Five-Year Development Plan in 2001-2005[47]. However, environmental legislation is insufficient for preventing some new problems, which are principally genetic pollution derived from products obtained as results of biotechnological methods. When dates, in which similar regulations in biotechnology are handled in developed countries, are compared, we see how Turkey is late about this subject.

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44 Bern Agreement, Avrupa'nın Yaban Hayatı ve Yaşama Ortamlarını Koruma Sözleşmesi Metni, Ankara: T.C. Tarım, Orman ve Köyişleri Bakanlığı, Orman Genel Müdürlüğü, Milli Parklar Genel Müdürlüğü, Milli Parklar Daire Başkanlığı Basım, Foto, Film Değerlendirme Müdürlüğü, 1985, pp. 3-53.

45 Acar, A., Modern biyoteknolojide dünya ticareti II. Küreselleşme sürecinde biyoteknoloji ve biyogüvenlik sempozyumu, pp. 21-25 , Ankara, 2000, p. 23.

46 Eser, V., Modern biyoteknolojideki gelişmelerin ışığı altında dünyada ve Türkiye'de Tarım. Küreselleşme sürecinde biyoteknoloji ve biyogüvenlik sempozyumu, Ankara, 2000, p. 14.

47 Anonymous, State Planning Organization, Sekizinci beş yıllık kalkınma planı (2001-2005) özel ihtisas komisyonları el kitabı. Ankara: DPT, Yayın ve Temsil Dairesi Başkanlığı, Yayın ve Basım Şube Müdürlüğü, 1999, p. 13.

5. Conclusion

Today, sustainable development forms focal point of national and international environmental protection policies. Environmental protection phenomenon, which is seen before as narrow extensional pollution problems and short term solutions in terms of these problems, is handled with a contemporaneous approach that consider environment as an entity with natural, economic, social and cultural values. While doing this, they consider the reality of rapid destruction of resources used in development. However, this approach cannot prevent that biodiversity seen as an important resource for economy both for world and for countries, will be damaged because of short-term interests of market economy. Varieties, which have high market value as time passed, damage local varieties and their wild relatives and this situation cause especially disappearing of gene resources required for plant breeding. However, real danger derives from genetic changes that can lead defeat in ecological balance.

In recent years, perspective about that products obtained by modifying genetic structure with biotechnological methods, especially new plant varieties (transgenic varieties) can cause genetic change, has become wide spread. While problems about human health and environment that will occur in future are not well known, prohibiting to give permission for planting of transgenic varieties carrying bacteria and virus originated genes, without collecting multiyear results, will be an appropriate approach. Uncertainties about negative positions that can occur in many years later and vital damage of transgenic characteristics which can transfer with pollens to other plants, are required an evaluation in terms of a precautionary principle that contains scientific uncertainty and environmental damage risk of environmental law of genetically engineered organisms.

In Turkey, there are many legal regulations, which aim protection of environment in classical meaning. However, environmental legislation is insufficient to prevent problems as genetic pollution derived from rapid developed some biotechnological applications. At present, in order to prevent environment pollution derived from new technologies and especially to protect biodiversity, review of Turkish Environmental Law and a new understanding that emphasize precautionary principle of environmental law by considering biotechnological developments are required.

Precautionary principle, which emphasizes uncertainty subject,

related to the effects of genetically engineered organisms on environment and human health are also found in some international agreements signed by Turkey. However, applications differ from country to country. But, in order to manage problems related to world future and to make international regulations, application of these regulations is required.