Genetically Modified Food and Crops: Risks and Intellectual Property Rights

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Abstract

This paper attempts to present and analyze problems that may arise from the use of Genetically Modified (GM) products and issues raised by the Intellectual Property (IP) rights that Genetic Engineering (GE) companies have on their products. Arguments in favor and against the existence of health risks and environmental risks of GM products are presented. The European policy of the socioeconomic effects of the GM products is discussed and is proposed the application of the precautionary principle for the prevention of unintended consequences from the GM products to other than health and environmental domains. The need of IP rights is supported, but is also suggested an IP rights flexibility. Do IP rights violate the rights of all people to a nourishing life, natural resources, the right to decide about what they eat and the right to live in a viable ecosystem? Finally, I provide an analysis of the effects on the farmers due to the IP rights on GM crop for cultivation and state dependency issues that may occur.

Keywords: genetically modified products, risk assessment, intellectual property rights, precautionary principle, socioeconomic effects
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1. Introduction

The aim of this paper is to discuss risks and ethical problems that arise from the use of genetically modified (GM) products in everyday life and agriculture. Special focus will be given to ethical problems created by the Intellectual Property (IP) rights that Genetic Engineering (GE) companies have on their products. I will investigate the extent to which IP rights violate farmers’ and peoples’ rights to food security that ensures a nourishing life, all necessary resources, the decision of what they eat and a viable ecosystem.

As “GM products” I consider all genetically modified organisms and plants used for food, seeds and crop production. My paper and arguments are not focused on a specific geographical area since the use of GM products and the IP rights of companies will affect every part of the world.

In the second section, I will review arguments supporting that the use of GM products for consumption or agricultural purposes will pose a threat to consumers’ health and to the environment. To date, there is conflicting scientific evidence concerning this issue and therefore, opinions in favor of the use of GM products will also be documented. Generally, most objections against the use of GM products are based on the assumption that they are harmful to the environment and the health of the consumers. However, problems from the use of GM products may arise in other sectors, for example in trade.

The third section considers the hesitation of some European countries to accept GM products in their markets and their denial to accept GM seeds for cultivation in their territory. I will attempt to clarify whether this refusal is associated more with trade and socio-economic factors instead of health and environmental concerns. Several research questions are raised. Does the

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1European Food Safety Authority (EFSA) “is an independent European agency funded by the EU budget that operates separately from the European Commission, European Parliament and EU Member States”. According to EFSA “the term genetically modified organism (GMO) means an organism in which the genetic material has been altered in a way that does not occur naturally through fertilization and/or natural recombination. GMOs may be plants, animals or micro-organisms, such as bacteria, parasites and fungi”.

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precautionary principle hamper development? And does it enable countries to ban GM products for other than health and environment-related reasons?

The forth section investigates what are the IP rights and questions their current form. Furthermore, I discuss whether IP rights regarding GM products could be applied differently by using a ‘case-by-case principle’ instead of being so strict and unified as they are now. Such principle would offer the opportunity to countries with serious socioeconomic and malnutrition problems, to accept the GM products with better conditions challenging the application of the IP rights GE companies have. This way IP rights would be applied flexibly without the current uniformity of ‘one-fits-all principle’.

The fifth section will present arguments supporting that ethical problems that will arise from IP rights forge companies. The IP rights on GM products and the use of them for consumption and cultivation will affect the life of both farmers and consumers. However, the consequences from IP rights of companies will create problems that may now seem hypothetical, speculative and difficult to define. This section focuses more on investigating problems regarding IP rights related to market manipulation and dependency issues, taking into account the connection of IP rights and dependency.

The last section will conclude this thesis by encapsulating the evidence and the opinions of the support and the opposition.
2. Risks arising from the use of GM products

Currently there are many people all over the world that are increasingly concerned about the security of their food. According to the Food Security Portal², "food security is defined as access to sufficient food that meets the energy and nutrient requirements for a healthy and productive life".³ Numerous debates are held in the media about GM products. There are numerous forums on the internet where people mostly wonder if they can really know what they are eating and what the effects of GM products on them and the environment will be. The fear and the hesitation regarding GM products are mainly due to “the not yet well known risks of gene technology”⁴.

People feel threatened by this new food technology because there is no simple explanation about the additional benefits GM products have, compared to conventional methods. Also, there is a big confusion about the effects and benefits of GM products concerning health and environment. Peoples’ confusion is justifiably intensified by the diversion of opinions among the scientists in the world regarding GM products⁵.

It is also possible that people’s fear towards GM products is reflecting technophobia. GM products are merely new to the wide public audience. In its infancy every innovation and new technology seems confusing and generates suspicion and questions about its benefits and side effects. But even when such technologies become well-established and widely accepted they may still have side effects. Consider for example certified medicines that help people improve their health. We know that even small variations in the dosage or the duration of the treatment may lead to severe side effects or allergies that may even prove to be lethal. However, as it will be elaborated in the third section, I do not believe that this mistrust towards GM products originates from the 'fear of the new'. There must be a more sinister reason that leads developed

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² The Food Security Portal is facilitated by the International Food Policy Research Institute (IFPRI). “The IFPRI seeks sustainable solutions for ending hunger and poverty. Founded in 1975, IFPRI is a member of the CGIAR Consortium, a global research partnership for a food secure future”.
³ Food Security Portal
⁴ Blakeney 2009, p.142
⁵ Ibid, p. 144
European countries to refuse GM products in their markets and developing countries with pertinent starvation problems to refuse them as food aid as well.  

Here I will present arguments defending the opinion that the mistrust towards the use of GM products for food or for agricultural purposes is based on the belief that they can be health and environmental hazards. The counterarguments that support the use of GM products will be reviewed in order to present a comprehensive synopsis of this debate and explain the confusion for this relatively new method of breeding.

### 2.1 Health Risks

Miguel A. Altieri and Peter Rosset mention some of the possible health problems of GM food consumption:

"the new proteins [...] might a) act themselves as allergens or toxins, b) alter the metabolism of the food producing plant or animal, causing it to produce new allergens or toxins, c) or reduce its nutritional quality or value".  

These possible effects are mentioned in other more recent studies such as the one by Jack A. Heinemann’s. He was appointed by the Commission on Genetic Resources for Food and Agriculture (CGRFA) to prepare a paper that provides background information on the topic of GM organism gene flow. This would be discussed at the Tenth Regular Session of the Commission. Heinemann’s study is “a typology on possible effects of (trans) gene flow on agriculture, plant and animal biodiversity and human and animal health”. According to Heinemann, the possible effects of the gene flow to the agriculture will affect wild animal biodiversity as well and this is an interesting point that will be analyzed later in this paper. These effects might be “loss and disruption of habit, food supply and other resources for animals to the...

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6 The National 2010  
7 Altieri & Rosset 1999, pp.156-157  
8 Heinemann, 2007, p. 29
direct toxic effects of agricultural chemicals”, but he also notes that the studies relating to effects on animals are extremely contradictory.9

Furthermore, Heinemann argues that further studies have indicated that “gene flow to and from GM crop plants may introduce toxic, allergenic or anti-nutrient compounds into the food supply of human, domestic and wild animals”.10

Potential health risks are also mentioned by Stella G. Uzogara in her paper regarding the impact of the genetically modified food in the 21st century. She puts forward the view that the negative attitude towards genetic engineering is due to the fear that this new technology is “far from foolproof”11. She acknowledges that mistakes or unexpected problems might occur from the food's gene modification. Some of the potential risks are: antibiotic resistance, potential toxicity or adverse immune reactions and alteration in nutritional quality of food. She notes that there is little information about the consequences gene modification will have on these areas. The antibiotic resistance could be transferred to disease-causing microbes that could be harmful for the environment, animals and humans. In addition, the genetic modification could enhance some natural toxins or allergens transferred from the microorganisms that have been used as donors to modified plants12.

The nutritional quality of food may change since these foreign genes may change the level of some nutrients while decreasing the level of others. As she puts it, this might complicate “the ability of the scientists to predict the significance of the changes in pediatric nutrition”13. Such nutritional issues have been reported by Collins Magalasi regarding the population in developing countries. He states that safety issues might occur when GM food is “given unprocessed to hungry people as their staple food, people whose immune system is weakened by illnesses such as HIV/AIDS”14.

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9Ibid, p. 38
10 Ibid, p.39
11 Ibid, p. 184
12 Ibid, pp. 185-186
13 Ibid, p. 185
14 Magalasi, p.163
2.2 Environmental Risks

Jack A. Heinemann contemplates in his paper that gene flows from GM crops might affect the agriculture causing the “development of new weeds” or “more fit ones”, a “loss of genetic resources”, a “loss of agricultural and commercial options” and finally “unanticipated or unintended effects on agronomic traits”.

Moreover, he stresses that a “case-by-case assessment” is necessary when there is a discussion about weed tolerant plants, since weeds are mostly crops growing in places where farmers do not want them to. Wild plants, wild relatives of crops or even GM crops that will by gene flow be converted into more persistent plants may be considered as weeds. Hence, it is difficult to have a common approach for all weeds and precisely predict what the gene flow effect will be.

Furthermore, Heinemann notes that “the protection of wild relatives is important for the maintenance of biodiversity or cultural practices”. He argues that there is a possible gene flow effect on the plant that will compromise the survival of many plant populations. As a result there is a potential effect on the biodiversity of some animal populations that depend on the disappearing plants. Finally, he points out that “it is difficult to extract universal truths about the extent or rate of gene flow from existing studies”, because these studies have taken place on different environments and are based on different factors, such as different soil or crop varieties.

Uzogara supports the aforementioned potential effect due to gene transfer and includes the potential risk of creating new viruses and toxins. She highlights that the virus-resistant transgenic plants might threaten other non-targeted organisms due to the toxic substances they express to the environment.

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15 Heinemann 2007, p. 45
16 Ibid., p.46
17 Ibid., p.37
19 Uzogara 2000, p. 186
2.3 Arguments in Favor of GM Products

On the other hand another group of researchers provide a different narrative in favor of GM products. Nicolia et al. conducted a review of the literature on GM crop issues published between 2002 and 2012, a grand total of 1783 scientific records. They put forward the view that the safety of the GM crops is the most important issue which will determine the future of GM products. Their analysis also showed that researchers’ interest mostly concentrated on issues of biodiversity, followed by traceability and GM food/feed consumption issues.²⁰

Moreover, they claim that according to their review no significant risks are posed to human and animal health and that until now there is “no scientific evidence of toxic or allergenic effects”.²¹ They also maintain that a complete segregation of GM crops is impossible but to date there are no impacts from the transfer of genetic information from GM species to other non-GM ones regarding the impacts on the weeds. They point out that the gene flow effects on the plant biodiversity existed long before the GE crops development and that it is an issue itself. They also suggest that the impact on biodiversity prior to GM crops was bigger because of the pesticides and herbicides used.²²

The researchers conclude that GE is an important means for a “sustainable agricultural production” and advocate that the hesitation and mistrust is due to “the interaction of complex sociological and psychological factors, risk/benefit ratios, political aspects and an unbalanced scientific communication”.²³

2.4 Who is right?

These powerful views indicate that there is no simple answer regarding the safety of the GM products. On the one hand, there is the concern that GM products will affect human health and environment, but on the other hand, there is optimism that GM products are safe and important for the world’s agricultural sustainability.

²⁰Nicolia et al. 2013, p. 1-8
²¹Ibid., p.7
²²Ibid., p. 3
²³Ibid., p. 9
It has been successfully established that the future of the GM products depends primarily on their safety for human health and the environment. Hence, before the scientific community reaches a more coherent decision or develops an international consensus for the safety of the GM products, the hesitation and mistrust will persist. Most of the scientists declare the need to conduct more safety studies and research the consequences. As with everything new, well designed international trials are required before scientists and people are able to see the long-term effects of GM products.

However, even if the potential health and environmental risks are proven false, the socioeconomic implications of introducing GM products to food or cultivation should also be taken into consideration. The effect on the life of consumers and farmers due to changes in the market should be analyzed. The adoption of the argument that the opposition towards GM products is a result of political, psychological and/or socioeconomic factors is not necessarily an automatic approval of the GM products. One could argue that there are other valid views against the use of GM products that do not concern health or the environment, but address socioeconomic factors. This is discussed in the next section by analyzing the policies of three European countries on GM food and crops.

3. European countries argue on GM products

In this section, I investigate the European policy towards GM products, why some countries are reluctant to accept them in their markets and their refusal to accept GM seeds for cultivation in their territory. It is relevant to start by analyzing the views of three European Union member states regarding the socioeconomic implications they fear that GM products will have. On the 4th of December 2008, the Environment Council provided the European Member States with a “questionnaire about the socioeconomic implications of the placing on the market of GMOs for cultivation”. “The European Council invited the Parties, Governments and relevant organizations to provide information on socio-economic considerations, including guidance material and case studies on, inter alia, institutional arrangements and best practices”.\(^{24}\) This questionnaire is “an assessment of the socio-economic implications of deliberate releases and placing on the market

\(^{24}\)European Commission 2011
of GMOs”. The deadline for contributions was January 2010. Since it is beyond the scope of this paper to feature the contributions from all the member states that responded to the questionnaire, only the responses from Austria, Sweden and Greece will be presented.

The Austrian and Greek responses have been chosen because they are both countries with a relatively small area of arable land and therefore the coexistence of GM and conventional or organic cultivation would be extremely difficult, if not impossible. Moreover, Greek agriculture and apiculture is very much based on organic and designated original products. In addition, “Austria is the EU member state having the highest portion of organic growing area”. Therefore, if GM products enter their market the agriculture and therefore each country’s economy will be affected considerably. Austria and Greece are two of the ten European countries that have GM cultivation bans in their area. The choice of the Swedish response is due to the moderate view it provides, regarding the acceptance of the GM products for cultivation and focuses more on safety assessments and the freedom of choice. The common factor between the three chosen countries is that they use the precautionary principle as a base for their decision making and legislation, mostly emphasized in the Swedish contribution.

### 3.1 General Statements

All three countries’ answered the questionnaire based on their agricultural structure and on the possible effects on their territory. It is worth noting that these countries did not have any experience of cultivating GM crops or had encountered any other direct effects from GM products except Sweden. Sweden was affected due to GM products use in animal feed. The Greek ministry in its general statement notes that its answers will come from “general prevision-expectation, based on international and scientific data”. While Austrian ministries follow the

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25 European Commission 2009, p. 1
26 European Commission 2010, p. 2
27 European Commission January 2010, p. 8
28 GMO-free Europe
29 European Commission February 2010, p. 1
30 Ibid., p. 2
31 European Commission 2010, p. 2
same rule of thumb, they express their doubts regarding the wording of the questions and note that the experience on GM cultivation in Europe is very limited, without concrete data.\textsuperscript{32} The Swedish ministry believes that the current “European Union (EU) legislation allows for socioeconomic considerations [...] provided they are performed on a case by-case basis”.\textsuperscript{33} It explains that a systematic use of socioeconomic factors in decision making for environmental issues might lead to decisions opposite to what is needed in order to save the environment. It maintains that product safety is the primary concern regarding its adoption as well as the application of the precautionary principle. It warns that safety might be compromised when other motivating factors affect the decision process and points that EU decision regarding the GM crop cultivation might influence socioeconomically the developing countries. Sweden also recognises that as a country it finds it difficult to balance the socioeconomic interests of all agricultural sectors within the EU. If the safety criteria are completed, then the GM cultivation and the placing on the market should be done on a utilitarian basis.\textsuperscript{34} The last guideline the Swedish ministry sets is the need to protect the freedom of choice farmers and consumers have in deciding between GM, conventional or organic crops and products.

3.2 Socioeconomic Risks

The Greek ministry claims that some of the reasons that the country is against GM cultivation are the country’s “small agricultural plots, the very developed apiculture and the anxiety of all scale, from farmers to consumers”.\textsuperscript{35} It is also claimed that coexistence in Greece and Austria is impossible due to small acreage and the conflicts neighbouring farmers will have. Both Austrian and Greek Ministries pointed that farmers’ profits are based mostly on the designation of origin products they produce which will face contamination risks.\textsuperscript{36} In this case Greek and Austrian consumers’ freedom of choice will be very limited. Moreover, the Greek Consumers’ Association are worried about decreased biodiversity and negative socioeconomic impacts, not taking into account ethical, philosophical and religious

\textsuperscript{32} European Commission January 2010, p. 7
\textsuperscript{33} European Commission February 2010, p. 1
\textsuperscript{34} Ibid., p.2
\textsuperscript{35} European Commission 2010, p. 2
\textsuperscript{36} European Commission January 2010, p. 6
concerns. The public administration and laboratories state that extra measures will be needed for the complete separation between conventional, organic and GM products as well as for conducting analysis to prove the non-contamination of the products. Therefore, there would be extra costs for farmers whose microenterprises will not be able to cope with. Extra costs are mentioned by the Austrian and Swedish ministries for additional investment in measures to protect against contamination from GM products.

The Austrian ministry also argues that a possible effect will be the dependence on the seed industry as the GM seeds are in the hands of very few multinational companies. Another threat is that farmers with small and medium scale corporations will not be able to cope with the extra costs and will turn to GM seed suppliers abandoning the indigenous domestic breeding which will be another factor for biodiversity.37

The aforementioned as well as other European and non-European countries have chosen to decide about the GE technology based on the precautionary principle. This principle provides safety from the unintended consequences GM products might have, but at the same time it can be considered as an obstacle to development. One could argue that the need for development is less important than the need for safety. Should countries have the right to ban GM products for other than health or environmental concerns? Could then the precautionary principle be used for other than health and environmental concerns? Could the precautionary principle be an accepted method for socioeconomic aspects?

### 3.3 The Precautionary Principle

The Regulation EC/178/2002(Article 7) formally establishes the Precautionary Principle as:

“[A]n option open to risk managers when decisions have to be made to protect health but scientific information concerning the risk is inconclusive or incomplete in some way”. Moreover, “when faced with these specific circumstances, decision makers or risk managers, may take measures or other actions to protect health based on the precautionary principle while seeking more complete scientific and other data”38.

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37Ibid., pp. 12-13
38European Commission 2002
Currently according to the above regulation, Member States of the European Union have the right only to restrict or ban the cultivation of authorized GM crops by adopting a safeguard clause which is based on potential risks to human and animal health as well as the environment. Hence, the precautionary principle is used only for risk assessment based on scientific proof or on the lack of them. However, on the 12th of June 2014 the European Commission reached a political agreement by giving to Member States the choice to restrict or ban GM crop cultivation on their territory based also on other reasons such as socioeconomic ones. This ability will be granted from spring 2015. This political agreement follows a more recent provisional agreement in 4 December 2014 that will give to Member States “at least the same weight as scientific advice when it comes to important decisions concerning food and environment”.

However, the application of the precautionary principle is linked to significant economic consequences, impacts in agriculture and food as well as errors in public policy. The precautionary principle is also criticised for "its extreme variability in interpretation" and the necessity to "respond to varying degrees of public opinion". The precautionary principle is adopted by European countries in the case of GM products, in order to avoid unintended consequences from their consumption and cultivation. However, it is stated that when adopted due "to scientific uncertainty or in the absence of scientific proof it may lead to other unintended consequences to other domains".

It could be argued that the extreme variability in interpretation could be used to prevent the consequences that are stated above. The precautionary principle should be used by Member States as an argument against GM products concerning health and environmental aspects only. But, recently European Commission gave a new interpretation of the principle by enabling Member States to apply the principle to other aspects such as socioeconomic ones. Thus, the principle theoretically could be used in order to avoid consequences in economy and public policy among others. On the other hand, this could lead to conflict. Such a conflict is addressed, in section 3.1 by the Swedish ministry that warns that safety might be compromised by socioeconomic factors.

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39 European Commission June 2014, p.2
40 Ibid., p.1
41 European Commission December 2014, p.1
42 Turvey & Mojdusza 2005, pp. 159-160
43 Ibid., p. 147
44 Turvey & Mojdusza 2005, p. 148
4. What are Intellectual Property Rights?

World Intellectual Property Organization (WIPO) is an international organization which “as part of the United Nations system of specialized agencies, serves as a forum for its Member States to establish and harmonize rules and practices for the protection of intellectual property rights”. The organization also provides consultation to countries in order to evolve their IP systems. According to WIPO, “Intellectual property refers to creations of the mind: inventions”, which are divided into the categories of ‘Industrial Property’ and ‘Copyright’. “Industrial Property includes patents for inventions, trademarks, industrial designs and geographical indications. Copyright covers literary works (such as novels, poems and plays), films, music, artistic works (e.g., drawings, paintings, photographs and sculptures) and architectural design”.

GE companies IP rights’ are considered to be in the first category. GM seeds are mostly protected by patents, thus they “cannot be commercially made, used, distributed or sold without the patent owner’s consent”. Patents generally expire after 20 years and patent owners have the right to decide who gets permission to use the patented invention and under which circumstances. However, the invention owners are obliged to disclose all information regarding their invention in return for the protection the patent provides.

4.1 Is There a Need for Intellectual Property Rights?

The importance of the IP rights is mainly emphasized by WIPO, which states that the protection of every invention is very important not only for the companies and consumers but for countries as well. According to the organization, the “progress and well-being of the humanity rest on its capacity to create and invent new technologies”. The protection that patents provide to the inventions gives their owners the possibility of material and moral rewards and encourages people to make further inventions that will increase other peoples’ quality of life.

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45 World Intellectual Property Organization (WIPO), p. 23
46 Ibid., p. 2
47 Ibid., p. 5
48 Ibid., p. 5
49 Ibid., p. 3
The main question is that since patents and IP rights generally promote peoples’ quality of life and innovation, why are there people that argue against them? Should IP rights be applied differently or should they not be applied at all regarding food or other essential products?

James Boyle states that “intellectual property rights are not ends in themselves” and that “their goal is to give us a decentralized system of innovation in science and culture” that is not bounded from anyone\(^{50}\). He promotes WIPO as an organization that could help restore the lost balance between “the public domain and the realm of property”\(^{51}\) by ensuring that the IP rights are not favoring neither of these two parts. In his view WIPO currently fails to provide that balance since it is in favor of the need for stronger IP standards without making room for exceptions where it is needed. He criticizes WIPO for adopting the “one size fits all” attitude instead of a “case by case principle” which would ensure the interests of the least fortunate ones. He emphasizes that problems may occur because stronger IP rights will result in less flexibility, which is needed in order to benefit for example developing countries\(^{52}\).

He goes further to suggest that WIPO should adopt seven principles which will lead to its greater function\(^{53}\). Among them lies the principle of balance which has been already mentioned above, the principle of proportionality, the participation and transparency principle as well as the principle of neutrality. WIPO should apply the principle of proportionality in order to provide IP legislation after a cost-benefit assessment under which GM products should not be patented if the benefits are less than the costs. In that context it can be argued that if the IP rights on GM products would produce more costs than benefits to the developing world then they should not be applied there. The third mentioned principle would “increase the participation of civil society groups in the discussion and debate”\(^{54}\).

Boyle states that because IP rights implicate peoples’ access to substantial recourses and rights the decision making should not be done according to minority groups’ assumptions.\(^{55}\) In addition, WIPO is “generating more than 90 percent of its annual budget through its widely used

\(^{50}\) Boyle 2004, p.1  
\(^{51}\) Ibid., p.2  
\(^{52}\) Ibid., p. 4  
\(^{53}\) Ibid., p. 9-11  
\(^{54}\) Ibid., p.9  
\(^{55}\) Ibid., p. 9
international registration and filing systems, as well as through its publications and arbitration and mediation services."\textsuperscript{56} Hence, its reliance towards innovations is obvious and therefore its neutrality could be compromised.

Another approach suggested by Silva Repetto & Cavalcanti is the "protection of natural, cultural and intellectual property as part of the overall protection of indigenous people's human rights".\textsuperscript{57} As they state, in this case IP rights would belong indivisibly to all members of the community. This would enable them to use, protect and control their traditional knowledge and resources as they prefer. They also present an approach "of bilateral agreements as a pathway for sharing of benefits"\textsuperscript{58}. However, it is noted that the conditions of the agreement should be enforced with legal regulations.

5. Analysis of ethical problems arising from IP rights of GE companies

This section will present ethical problems that may arise by the IP rights companies have on GM products. As GM products I consider plants and other organisms intended for food, seeds and crops that have been genetically modified. The focus here is primarily on GM seeds and crops and the problems farmers are facing due to IP rights.

5.1 High cost crops

As WIPO states, generally patents expire after 20 years. At the end of that period the patented technology will no longer be under restrictions and will became available for exploitation by others. Throughout the period the patent exists, farmers are prohibited to keep seeds from the plants created from GM seeds in order to be used for the next year’s crop.\textsuperscript{59}DanChurchAid\textsuperscript{60}

\textsuperscript{56}World Intellectual Property Organization (WIPO), p. 23
\textsuperscript{57}Silva Repetto & Cavalcanti 2000, chapter 1.5
\textsuperscript{58}Ibid., chapter 1.5
\textsuperscript{59}Ibid., p. 3-7
\textsuperscript{60}DanChurchAid is rooted in the Danish National Evangelical Lutheran Church, but is active wherever we find the need is highest, regardless of religion, gender, political beliefs, race, national or ethnic origins, handicaps or sexual orientation”. DanChurchAid is an independent organisation and a part of the ACT
states among other critics that farmers who have commercial transactions with GE companies, especially in developing countries, will be strongly affected by the IP rights of companies on their seeds, especially those concerning the reusability of the seeds in the next year's crops.\textsuperscript{61} GE companies argue that they have every right to protect their seeds with patents since they are inventions and did not occur naturally. The GE company Monsanto, states that:

\textquote{The farmers who were saving seed in the past were saving seeds that naturally occurred, not the type of enhanced-trait seeds Monsanto is marketing to modern growers.}\textsuperscript{62}

GE companies spend a lot of money on research and how to engineer new GM products. Moreover, the uniqueness of the seeds deriving from the monopoly of the IP rights as well as their claimed high quality will raise their price in the markets. Thus, the price of the GM seeds will be higher than seeds from other producers. Poor farmers in developing and developed countries cannot cope with the extraordinary prices GM products have and even if they could it is questionable whether they could cope with the extensive care that is required for such corps to be productive, in contrast to organic or conventional breeding methods. GM seeds need special care and most of the times farmers need to buy complementary packages that include vitamins and fertilizers necessary for the breeding process. This package also contains specific instructions under which seeds and crops should be treated. These high standards derive from the homogenization of the GM crops IP rights require.\textsuperscript{63}

\section*{5.2 Undereducated farmers}

Companies provide GM seeds with certain characteristics that cannot change since they are protected by the IP homogeneity rights. Many poorly educated farmers all over the world do not have the skills to understand the complexity of the instructions or in some cases even read them. It should also be stressed that GM seeds are not compatible with every type of field or with the quality of water. Consequently, poor farmers with no such skills or farmers in developing

\footnotesize{Alliance (Action by Churches Together) that works with development, humanitarian assistance and advocacy. More information can be found: https://www.danchurchaid.org/}

\textsuperscript{61}\textsuperscript{Friis Bach & Söderberg 2005, p.p. 6-8}

\textsuperscript{62}\textsuperscript{Freeman 2008}

\textsuperscript{63}\textsuperscript{Friis Bach & Söderberg 2005, p.p.6-8}
countries owning infertile lands where the water does not have the necessary elements cannot use them.64

GE companies ask continuously for stronger IP rights which means that fields not satisfying the standards of GM seeds will not be possible to use. It is logical to assume that GM seeds are made from GE companies for big land owners only and not for all farmers. These advanced GM seeds that GE companies and proponents of GM products claim will help developing countries, cannot be used before IP rights become more compliant. Moreover, “farmers might be liable for any biohazards that may occur from the use of patented seeds”65 to neighboring properties.

5.3 Market manipulation

Another potential problem the opponents point out is that GE companies will push out any other seed producer from the market that might support other methods of breeding and in the end achieve a large scale agricultural monopoly.66 This fear might be justifiable since GE companies are large multinational corporations that can gradually force the market into following any trend they dictate. If GE companies succeed in their goals then, based on the IP rights, farmers will have to buy new seeds from them each year. As a result of this dependence, GE companies will be able to decide about the prices since they will be able to also decide to whom they sell to. This might seem as an exaggeration since GM products are not widely used and not acceptable in Europe. GE companies currently have GM seeds of certain varieties as soybean, maize, wheat and some others. However, markets all over the world are gradually, but slowly, accepting GM products and new varieties are produced. In the near future it is likely that there will be a vast variety of GM products and seeds available for purchase.

Multinational seed companies argue that they are losing a big part of the potential market because of “illegal breeding” and from cultivation of unregistered seed varieties.67 The GE companies’ justification is that they spend large amounts of money in order to patent their

64 Ibid., p.p. 9-10
65 Blakeney 2009, p. 156
66 Schulman 2000
67 Silva Repetto & Cavalcanti 2000, chapter 1.5
products while many small and medium scale farmers all over the world cultivate many varieties of plants that are not patented and since they do not have this extra cost they are able to be competitive. Therefore, their products are preferred more by consumers than those derived from seeds sold by multinational companies.

The problem with this reasoning is that small or medium scale farmers comply to trade and competition legislation as multinational companies do. Therefore they cannot manipulate the prices in order to gain more consumers. Moreover, multinational companies may address a larger buying audience than local farmers can. In addition, small and medium farmers do not trade seeds, thus they do not pose a threat to multinational seed companies’ trade.

A proposal to the Agriculture Committee of the European Parliament suggested the creation of a list containing seed varieties that would have been previously certified from the Community Plant Variety Office (CPVO). After the ratification of the proposal, it would be illegal to cultivate, breed and trade seed or reproductive material which has not been checked and certified by the CPVO. The seed varieties should be entered on a list while restrictions on trade for traditional and modern varieties will be imposed. Farmers would be obliged to pay an annual fee in order for their varieties to remain on the list and be checked for suitability. This time the proposal was voted down, but this proposal is a sign that multinational GE companies influence a lot the market and the executive committees.

Only GE companies would have a benefit in case the above proposal were granted and it would only assist the GE companies’ entrance and prevalence to other markets. IP rights would help them have more influence to the market. If the small and medium scale farmers had to pay an annual fee in order to preserve the varieties they are cultivating then gradually they would not cope with the expenses. Farmers would probably have to abandon their varieties or sell their rights on them and buy seeds from the multinational companies that would not have a problem on preserving their varieties. This might also have an effect to plant biodiversity. The GE companies would gradually enter into new markets which in the past were GM-free after the farmers’ inability to grow their own varieties. This would develop a need for seeds which GE
companies will be expected to fulfill. The IP rights on the GE companies’ products would not leave any choice to the farmers but to cooperate under the companies’ instructions.

5.4 Dependency as a problem

It could be argued that dependency does not have a negative connotation. When there is mutual dependency, both parties can benefit from it but when the dependence is unilateral it usually means that one of the parties is less benefitted than the other. When only one side depends on the other then dependency could be a problem. In the case of GM products the farmers’ dependency to GE multinational companies might in some cases signify the country’s dependence to them as well, since agriculture is a basic sector of the state’s economy. An example of such a dependency can be found in developing countries, where multinational companies take advantage of the countries’ need for resources and buy or rent large-scale lands for agricultural purposes, for a lifetime period in most of the cases. These large-scale lands are cultivated by these companies for years using their crops. There is a fear that progressively this might threaten crop diversity. The commercialization of GM crops, the terminator seed technology and the cultivation of these lands with GM crops will reduce the diversity of the crop varieties since the indigenous farmers will be forced by the industry to cultivate the new GM crops and/or there will be no free lands for indigenous farmers to cultivate traditional crops.

The importance of crop diversity is stated by Roger A. Sedjo, who warns that developing countries are a unique wild genetic resource base and that the “land-use changes that destroy existing habitats and individual phenotypes can inadvertently drive to extinction potentially valuable genotypes” . However, he recognizes that patents and property rights give the incentives for the unique genetic resources to be preserved by their owners for commercial reasons . Sedjo claims that patents and property rights have already helped in preserving wild genetic resources and have lowered the costs of their protection . But he also argues that "gene-

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69 Uzogara 2000, p.187
70 Sedjo, 1992, pp. 203
71 Ibid., p. 210
72 Sedjo, p. 210
rich countries”, countries rich in genetic resources, in the developing world could “trade collection rights in return for various types of compensation”\(^73\).

I would only agree with this claim if the developing countries had the ability to have property rights on these resources and not only GE or other companies. Unfortunately, I believe that this is not the case for the developing countries since they neither have the financial resources to appropriate natural genetic resources nor the mechanisms to enhance their property rights. The patenting of an invention requires quite a lot of funds and guidance regarding the rights and obligations an invention has. Moreover, developing countries have to spend money on other more important sectors than the research on genetic technology. And finally, WIPO as it has been already mentioned is criticized for not providing the adequate guidance for such issues. I believe that the patent and property rights, at least as they are presently structured, cannot offer the developing countries any benefits. On the contrary, “private IP rights […] and biopiracy has created a global imbalance of sharing, use, and products”\(^74\).

Moreover, it is argued that the idea of the "trade collections rights" is difficult to be achieved, because "the origin of plant species or genetic material [...] cannot be defined within politically settled geographical areas"\(^75\). Instead of being beneficial, stronger IP rights "raise costs of technology acquisition to developing countries"\(^76\) since they are forced to buy new technological inventions that relay on their indigenous knowledge and the genetic recourses that were once theirs.

Biodiversity is an important factor that affects the good function of the market since there are more choices provided to farmers and consumers. Hence, there is competition between the producers and a motive for further development and innovation. However, IP rights are not means to provide biodiversity, as Sedjo argues, since IP rights require "gene uniformity" in order to grant a patent. On the contrary, it is a way towards monopoly that would lead to dependency. Such kind of dependency might be contrary to "democratic principles "argues Collins Magalasi. He claims that GM products will increase the reliance and dependence of developing countries.

\(^{73}\) Ibid., p. 211
\(^{74}\) Mackey & Liang 2012, pp. 1092
\(^{75}\) Silva Repetto & Cavalcanti 2000, Chapter 1.4
\(^{76}\) Ibid, Chapter 1.3.2
on multinational companies\textsuperscript{77}. He argues that developing countries are, due to the starvation problems they face, forced to accept GM food aid despite the health concerns. In that sense developing countries will lack the freedom of choice in contrast to democratic principles. He also states that in the absence of an international consensus about the implications of GM food legal liability should be generated by the donor community, concerning the unforeseen consequences of their consumption\textsuperscript{78}.

\textsuperscript{77}Magalasi 2003, p. 162
\textsuperscript{78}Ibid, p.163
6. Conclusion

This paper presented the problems that may arise from the use of GM products and the issues raised by the IP rights. In particular, this paper focused on the debate between the opponents and supporters of the use of GM products and presented the arguments of each side. The main arguments of the critics addressed concerns regarding health and environmental effects. On the other hand, supporters argued that the opposition towards GM products is a result of technophobia, political and socioeconomic factors. However, the paper argues that this claim is not necessarily an approval of GM products. Both critics and supporters have strong arguments that make it difficult to completely agree with the one or the other side.

Also it is argued that the use of GM products might have effects on other domains of the society such as socioeconomic ones. Therefore the European policy towards GM products is investigated. The concern regarding the socioeconomic risks is evident from the responses of the three countries that are presented. Austria, Greece and Sweden mainly base their decision against GM products on safety assessments regarding health, environmental and socioeconomic effects as well as on the precautionary principle. The use of the precautionary principle is criticized for hampering development, having economic consequences, having impacts on agriculture and food as well as public policy.

However, the European Commission recently reached a provisional decision that enables member states to use the principle in order to refuse the use or cultivation of GM products in their territory. The decision can be based not only on health and environmental concerns but also on socioeconomic ones. The paper proposes that the precautionary principle could be used to prevent unintended consequences also in other than solely on health and environmental domains.

The paper also supported the need for IP rights, but criticised WIPO's "one fits all" attitude instead of a "case by case principle". It is argued that stronger IP rights will result in less flexibility and will not benefit developing countries that face serious malnutrition problems. IP rights as they are currently formed cannot benefit developing countries and it is argued that IP rights policy needs to be changed in a way that sharing of benefits will be attainable.

The last section of the paper analyzed the ethical problems arising from IP rights of GE companies. IP rights require crops homogenization which requires expensive and extended
research by GE companies that leads to high cost crops and special care expenditures for the farmers. Farmers used to rely on the reusability of the seeds in the next year's crops. IP rights prohibit the reusability of seeds and also require that poorly educated farmers understand complex instructions in order to maintain the characteristics of the crops. The importance of the crop diversity is stated as a factor that affects the good function of the market since there are more choices provided to farmers and consumers. It is argued that the predominance of the GM products and the absence of biodiversity will lead to a large scale agricultural monopoly which due to IP rights will lead to farmers' and countries' dependency on multinational GE companies. Such a dependency is stated as contrary to democratic principles since farmers and countries will lack the freedom of choice.
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