

**Jacek Chotkowski\*, Jerzy Rembeza\*\***

*\*Koszalin University of Technology,*

*\*\*Institute of Plant Breeding and Acclimatization in Bonin*

## **MARKETING ASPECTS OF THE EXPANSION OF GENETICALLY MODIFIED ORGANISM (GMO) IN AGRICULTURE<sup>1</sup>**

### *MARKETINGOWE ASPEKTY EKSPANSJI PRODUKTÓW MODYFIKOWANYCH GENETYCZNIE (GMO) W ROLNICTWIE*

**Key words: genetically modified organisms, food products, plant cultivation, marketing, counter-marketing**

*Słowa kluczowe: GMO, produkcja żywności, uprawa roślin, marketing, kontrmarketing*

**Abstract.** The present study covers an analysis of the market problems concerning an introduction of genetically modified varieties to cultivation in Poland. The world and European tendencies in this area were presented. The arguments of the supporters and opponents of this modern technology were presented. The intensive marketing activities that are conducted will decide on the target participation of the different systems of agriculture. An urgent need was found to work out effective legal regulations concerning the coexistence of genetically modified cultivations as well as ecological and traditional cultivations in the Polish agriculture.

### **Introduction**

Biology (biotechnology) is mentioned among those future areas whose development in the coming decades is to be particularly rapid. The development based on the inventions from this area is on the list of the main mega-tendencies of the present world [Kotler 2005]. Genetic engineering is included among the new disciplines of biological sciences starting from the mid 1970's. The dynamic development of this science has led to the creation of genetically modified organisms (GMO) which possess manifold applications in medicine, pharmaceutical industry, agriculture and environmental protection [Komitet...2012]. The term of a genetically modified organism is related to an organism that is different from the human organism, where the genetic material has been modified in a way which does not occur in natural conditions as a result of crossing or a natural recombination [Twardowski 2009]. The application of this modern technology, which is based on the genetic transformations, does not give rise to any fundamental objections in those area which are not connected with the production of foods. The world expansion of the cultivation of genetically modified plant varieties, which began in the year 1996, raises plenty of controversies in numerous countries and environments. They result mainly from the imperfect knowledge concerning the effects of the introduction of genetically modified organisms to the natural environment and to the food diet [Rembeza 2011]. In particular, fears are expressed by the representatives of the ecological and traditional agriculture. Nevertheless, it seems that in the discussions that have been held to date, there have been too few substantive arguments. Instead of aiming at working out optimal solutions, including consensual ones, both sides of the dispute focus on an emotional expression of their own positions. Instead of a substantive discussion, they apply a unilateral marketing aimed at achieving a complete victory.

The purpose of the article is an attempt to outline the idea of the existing controversies and to present the arguments of the supporters and opponents of this technology in agriculture. The following theses constitute the fundamental idea of the deliberations included in the study:

- the progress cannot be stopped, it can only be delayed; genetic modifications and biotechnology are undoubtedly included among the leading directions of the scientific progress;
- it is the customer who makes the final. By selecting a specific product, the customer opts in favour of specific production methods and technologies; however, in the global “village” the significance is growing of a specific positive or negative image and global marketing that is not based on the values of the product but on the intensity of the impact on the market;

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- socially difficult and sensitive topics require a broad discussion, a dissemination of credible information and objective knowledge; in discussions, the views should be respected of those people who think differently, even if their position results in our opinion from the lack of knowledge, emotions or their own particular interests;
- decision-makers, in order to take political decisions, apart from the knowledge of social moods and the force of the influence of the groups of interests, should acquire as much as possible reliable knowledge that is the result of the observation of facts and scientific research.

### Developmental tendencies of the cultivation of genetically modified organisms in the world and in Europe

In the year 1986, obtaining of the first patent for genetically modified varieties, and in the year 1990, obtaining of the first patent for a genetically modified variety for the production of food constituted the bases of the expansion of genetically modified varieties in agriculture [Harhoff et al. 2001]. As it is evident from the data of ISAAA [Clive 2011], sixteen years after the introduction of the first genetically modified varieties, the area of their crops in the world achieved has the level of 160 mln ha. In 29 countries in the world, 16.7 mln producers (farmers) are currently involved in the cultivation of the varieties of genetically modified organisms. There are ca. 10 mln ha of new crops every year on the average. The high dynamics of the growth for the area of GMO plants is especially observed in developing countries. In the year 2011, the share of this group of countries was 50% of the total acreage of the varieties of genetically modified organisms. In developed states, they are mainly introduced considering economic reasons (lower costs of the product unit), while in poorer countries, they first of all serve the purpose of a reduction of the level of undernourishment [Sadowski 2011]. The United States of America with an area of 69 mln ha (43.1% of the world acreage) is the absolute leader concerning the area of the cultivation of this type plants. Brazil: 30.3 mln ha (18.9%), Argentina: 23.7 mln ha (14.8%), India: 10.6 mln ha (6.6%) and Canada: 10.4 mln ha (6.5%) occupy further positions [Clive 2011]. The abovementioned five countries concentrate almost 90 percent of the area of genetically modified varieties. The remaining countries with a significant area of genetically modified plants include China: 3.9 mln ha, Paraguay: 2.8 mln ha, Pakistan: 2.6 mln ha, the Republic of South Africa: 2.3 mln ha, Uruguay: 1.3 mln ha, Bolivia: 0.9 mln ha, Australia: 0.7 mln ha and the Philippines: 0.6 mln ha. Cultivation includes 22 species of genetically modified plants, yet it is four species that are dominant. The greatest share in the cultivation of genetically modified organism is related to soya: 75.4 mln ha (47.1%), maize: 51 mln ha (31.9%), cotton: 24.7 mln ha (15.4%) and rape: 8.2 mln ha (5.1%) [Clive 2011]. Concerning the most commonly introduced technologies of genetic engineering, those varieties which are resistant to herbicides constitute almost 59% of the whole area. Owing to the growing resistance of plants to the total herbicide glyphosate (creation of the so-called super weeds), a reduction is predicted of the participation of this technology [Kaniewski 2012]. Ca. 26% is taken up by genetic modifications concerning an implementation of two or more features (participation of this technology is systematically growing), while the remaining 15% is constituted by genetic modifications that introduce resistance to diseases and pests.

In the year 2011, in the European Union states, the cultivation of genetically modified organisms took up only 114.6 thousand ha. The MON 810 maize variety was almost exclusively cultivated, which contained the gene of the *Bacillus thuringiensis* bacterium that offers resistance to pests (the European corn borer), out of which 90% was cultivated in Spain. The cultivation of Amfora variety potatoes, which possesses a modified composition of starch, contains only amylopectin starch and is intended for the production of paper, takes up as little as 17 ha [Zimnoch-Guzowska 2012]. As a result of the regulations accepted on the level of the European Committee concerning the requirement of an authorization of genetically modified varieties and marking of those products where the content of genetically modified ingredients exceeds 0.9% [Rembeza, Chotkowski 2011], the cultivation of genetically modified varieties has stabilized on a low level. Apart from that, several countries including Germany, France, Austria, Italy, Greece, Hungary and Bulgaria have practically speaking abandoned any cultivation of genetically modified plants [Lisowska 2012]. In Poland, according to the data provided by the ISAAA for the years of 2008-2011, the MON 810 variety maize is cultivated on the constant level of 3000 ha, yet there may be even 30 thousand ha of the so-called illegal cultivations [Kaniewski 2012]. In March 2012, the Minister of Agriculture and Rural Development signed a draft regulation which prohibits any cultivations of the MON 810 maize in Poland due to the danger of the pollution of honey with the pollen from the plants of generally modified maize.

The second trend concerning the application of the products of genetically modified organisms in agriculture is their use as a feed for animals. Poland has accepted the most restrictive regulations as compared to other countries, i.e. a prohibition of the imports of genetically modified soya to Poland,

which is commonly used in the blends of concentrates for poultry and other animals (until the end of the year 2012, there is a moratorium concerning the application of this act). It can be accepted that as to this problem, it is obvious that in the present conditions, Poland has not the possibilities to resign from the imports of soya without significant economic losses in the sector of agriculture [Dzwonkowski, Hryszko 2011; Lisowska 2012]. According to the estimations of the Institute of Agriculture Economics and Food Economy: the National Research Institute, a reduction is to be expected of revenues in agriculture within the limits of 3 per cent annually [Józwiak, Mirkowska 2011]. The negative consequences concerning the prohibition of the imports of genetically modified soya shall in particular affect the poultry sector and, to a smaller extent, the production of pigs.

The production of genetically modified varieties is often opposed to the production in the conditions of the application of ecological agriculture and traditional agriculture. According to the data provided by the FIBL and the IFOAM [2010], in the year 2008, the world area of arable lands in ecological farms was 35 mln ha. The largest acreage of ecological cultivations is to be found in Australia: 12.2 mln ha (almost exclusively meadows and pastures). Further countries on this list are Argentina: 4.0 mln ha, China: 1.85 mln ha, the United States: 1.82 mln ha, Brazil: 1.77 mln ha, Spain 1.13 mln ha, India 1.02 mln ha and Italy 1.00 mln ha. Additionally, 33 mln ha of certified crops from those plants that grow wild on natural lands are included in ecological production [Szymona 2009]. The markets of the products of ecological agriculture concentrate in highly developed states: in Europe: 51% (Germany, Great Britain, France, Italy) and in the North America: 46% (chiefly the United States). The production of ecological food is the most rapidly developing segment of farming and food market in the world. In Poland, the majority of ecological farms produce only to cover the needs of the family, and they do not conduct any commercial production [Szymona 2009].

### **Effective marketing of biotechnological companies as the basis of the expansion of genetically modified organisms in agriculture**

Three main entities are involved in the marketing activities of the technologies and products of genetically modified organism: biotechnological concerns that operate on the global scale and offer the seed material of modified plants varieties (Monsanto, Syngenta, Pioneer, BASF, Bayer Crop Science, KWS etc.), scientific centres that are involved in biotechnological research and those organizations that associate agricultural producers, especially those that represent farms with larger acreage. The influence of those biotechnological companies which realize the so-called global marketing is the most important. Its characteristic feature is not a focus on the fulfillment of the actual consumer needs but an intensification of marketing activities. In order to reduce the costs of production and marketing (and consequently the prices), it is the standard product that is offered the most often; it is subject to an intensive distribution and promotion. A disposal of a huge economic potential and experience in strategic and operational marketing increases the chances to defeat competitors: firstly, smaller local firms. In the case of the marketing of genetically modified varieties, an additional chief asset is the possession of an innovative product. The following are the most important premises and arguments for admitting genetically modified plants to cultivation in Poland [Sowa 2012, Twardowski 2009, Zimnoch-Guzowska 2012]:

1. Raising of the food safety threshold in the world scale. There is a shortage of those areas of land that could be use for cultivation (the area of tropical forests has already been excessively diminished) in the context of the predicted increase of the population of our globe of up to 9 billion in the year 2050.
2. The economic benefits for producers in the form of a reduction of unit costs of the production of agricultural produce, which in further ought to translate into lower prices for consumers.
3. Facilitations in the technology of cultivation for producers through a facilitated counteraction against pests, and in many cases a reduction of the quantities of chemical plant pesticides that are applied in the natural environment.
4. The high dynamics of the growth of the acreage of genetically modified species and varieties in the world scale proves in an indirect manner the competitiveness of those plants in relation to conventional plants.
5. An extension of the application of biotechnologies to include the sector of agriculture shall constitute a factor of the scientific progress and raising the level of the innovation of the Polish economy.
6. Genetic engineering offers possibilities to obtain such varieties of plants that have a beneficial effect on the exploitation of natural resources in the environment (e.g. plants which are drought-resistant) and for an improvement of nutritious values of plant products (e.g. rice containing A provitamin).
7. In the light of social opposition with respect to carrying (transmission) of gens from taxonomically distant species, there exists a possibility to use gens within the framework of a given species (cisgenesis), e.g. a transformation of resistance gens onto potato diseases from the wild species of this plant.

8. Small opportunities for an ecologization of the Polish agriculture above 10% of arable lands. It is true that the European Union experts recommend this scenario to Poland, yet it is not certain whether these recommendations are sincere or whether their purpose is to cause a further reduction of our competitiveness.

### **Counter-marketing of ecological and consumer environments**

The premises of the aversion of consumers, especially on the part of consumers in the European countries to accept genetically modified food can be compared with the social opposition towards other modern technological solutions, for example nuclear technology. The residents of the European Union maintain a distance to the new food and perceive it as a big unknown [Wicha 2009]. According to the research conducted by Eurobarometer, the highest level of aversion to genetically modified food is found in Germany, Scandinavia and Poland. In turn, the majority of American consumers accept this type of food, while consumers in developing countries, especially China, accept a positive approach [Wicha 2009].

In the theory of marketing, counter-marketing activities concern socially harmful products. They consist in exerting an influence on a reduction of the demand through legal limitations, a restriction of the availability, high purchase costs (taxes) and social campaigns [Kotler 2005]. The counteraction of the expansion of genetically modified products in Poland also possesses features of social campaigns. In these campaigns, the following arguments are popularized for the “harmfulness” of the introduction of genetically modified varieties to cultivation in Poland and the use of genetically modified products as food [Lisowska 2012, Więckowski 2007]:

- causing an orientation of the development of agriculture in Poland onto the realization of a system of industrial agriculture, thus closing or hindering the possibilities of the realization of other directions of development, in particular those concerning ecological, traditional and integrated agriculture,
- a contribution to an increase of the monocultural cultivation and a further reduction of the bio-diversity in the natural environment,
- a danger of an “escape” of genes to the natural environment,
- a danger of the disclosure of unfavourable health effects of the consumption of genetically modified products, even after many years,
- no possibility of the co-existence of genetically modified crops and conventional crops including ecological ones, because the latter ones cannot be effectively protected against pollutions,
- a monopolization of the seed market based on the enforcement of patent rights to the varieties possessed. Aiming at a maximization of the profits of the owners of varieties can even out any potential economic benefits to producers,
- occurring cases of plants becoming resistant to glyphosate (creation of super-weeds) and pests which are resistant to the Bt toxin instead of a reduction of expenditures on the chemisation of agriculture may cause the necessity to increase the consumption of plant pesticides; there is a danger of their negative influence on the useful flora and fauna including the bacterial flora and fauna of the soil,
- revealing of the negative phenomena of a non-equal treatment of farmers on the part of biotechnological concerns in particular in developing countries,
- introduction of a moratorium concerning the cultivation of genetically modified organism in such “wise” countries as Germany, France and Austria.

### **Conclusions**

Decisions concerning an admission and prohibition of the cultivation of plants in Poland which are produced with the use of the modern biotechnological methods of genetic engineering are very difficult ones. They concern those products which exert strong external effects also including irreversible ones, that are unequally perceived by the different groups of consumers in individual states [Rembeza, Chotkowski 2011]. So far, there is no explicit settlement (through scientific evidence) of the problem of hazards to the health of consumers and to the natural environment in relation to cultivation and use as food of plant varieties produced with the use of genetic engineering. The discussion between the supporters and opponents of this technology focuses on the expression of a subjective position with respect to the abovementioned problem. An increased availability of objective information including the results of scientific research would be advisable instead of the domination of media reports. In order to take political decisions, the results are required of analysis concerning influence of a wide introduction of genetically modified organism to the agriculture in social, economic, political and cultural areas [Stankiewicz 2012]. The legal regulations that are created on the European Union level concerning the admission of genetically modified varieties to cultivation on the EU territory are very restrictive. However, under

the influence of negotiations in the WTO forum that aiming at a liberalization of the world trade, two varieties of arable crops: the MON 810 maize and the Amflora potato have been authorized. It seems that in spite of the introduction of the prohibition concerning the cultivation of these varieties in several states, the European Committee shall take decisions that admit further varieties. It seems that in the confrontation of the marketing of genetically modified food with counter-marketing activities, there is an advantage not only of arguments but also of the marketing potential is on the side of the supporters of genetically modified organisms. Nevertheless, it is the results of objective scientific research that settle the questions of the harmfulness to the human health and natural environment should decide about any further expansion of this technology. What is also important is an introduction of maximally rational legal regulations concerning the co-existence of different systems of agriculture. Those regulations should comprehensively regulate the cases of an inspection of the cultivations of genetically modified organism, the responsibility for pollution, creation of buffer spheres, trade etc. Individual varieties and individual modifications necessitate an individual approach. It is currently impossible, yet in the future some modifications, e.g. those concerning tolerance for the level of yield expenditure can also be proposed with respect to ecological agriculture. In legal regulations taken, efforts should be taken aimed at an exclusion living organisms (plant varieties) from the activity of the patent law. Otherwise, we will be exposed to the negative effects of the monopolization of this market. In accordance with general rules, it is also a high level of the restrictiveness of regulations concerning the authorization of varieties that will promote a monopolization of the market by global concerns.

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### **Streszczenie**

*Treścią pracy jest analiza rynkowych problemów wprowadzania do uprawy w Polsce odmian modyfikowanych genetycznie. Przedstawiono światowe i europejskie trendy w tym zakresie. Zaprezentowano argumenty zwolenników i przeciwników tej nowoczesnej technologii. Prowadzone intensywne działania marketingowe zadecydują o docelowym udziale różnych systemów rolnictwa. Stwierdzono pilną potrzebę wypracowania efektywnych regulacji prawnych koegzystencji upraw GM oraz ekologicznych i tradycyjnych w polskim rolnictwie.*

**Correspondence address:**

Jacek Chotkowski, DSc  
Koszalin University of Technology  
Institute of Economics and Management, Unit of Marketing  
Kwiatkowskiego Str. 6E  
75-343 Koszalin, Poland  
phone: +48 94 343 91 52  
e-mail: jchotkowski@wp.pl