Scientific Journals
Maritime University of Szczecin

Zeszyty Naukowe
Akademia Morska w Szczecinie

2009, 19(91) pp. 35–38

2009, 19(91) s. 35–38

Genetically modified soya ground grain in feed production

Rola genetycznie modyfikowanej śruty sojowej w produkcji pasz

Beata Drzewieniecka

Akademia Morska w Szczecinie, Wydział Inżynieryjno-Ekonomiczny Transportu, Instytut Inżynierii Transportu, 70-500 Szczecin, ul. H. Pobożnego 11, e-mail: drzewbea@interia.pl

Key words: feed, genetically modified plants, soya ground grain

Abstract
The development of biotechnology has essential influence on obtaining new varieties of plants commonly grown in the world for consumption and as raw materials for the feed industry. The application of new techniques permits modifying plants as regards the quality and quantity content of raw materials and products obtained from them.

Słowa kluczowe: pasze, rośliny genetycznie modyfikowane, śruta sojowa

Abstrakt
Rozwój biotechnologii ma znaczący wpływ na otrzymywanie nowych odmian roślin, uprawianych powszechnie na świecie w celach spożywczych i jako surowce dla przemysłu paszowego. Zastosowanie nowych technik pozwala na modyfikację roślin pod względem składu jakościowego i ilościowego pozyskiwanych z nich surowców i produktów.

Introduction

Genetically modified products, appearing more and more frequently in our market, evoke a lot of consumers' reservations and remarks. In spite of much research these products did not show any negative effect of GMO on the environment or on man.

Most assertions about the safe application of genetically modified plants for the production of feed and feeding animals do not reach society's awareness throughout the world. In European Union countries, where there is quite strong social pressure for prohibiting or restricting GMO application, legal regulations have been created concerning growing, application and transporting those plants. These regulations clearly stress that products containing more than 0.9% GMO must be marked as genetically modified organisms [1].

Genetically modified vegetable organisms are divided into several groups depending on the properties introduced or modified. These are varieties [2]:

- in which growing and harvesting properties have been improved,
- with their chemical composition changed to enhance their properties as an industrial raw material or food product,
- of crop plants accumulating large amounts of chemical substances useful for the pharmaceutical or chemical industry,
- with improved dietary and sanitary properties of the crop,
- of plants producing energy resources.

In Poland, due to the awareness of the high quality of produced food as compared with the highly processed food from highly developed countries, the use of GMO feed and GMO-originated sowing material have been prohibited by legal act, which creates quite big difficulties in importing the basic raw material for feed

production, that is soya ground grain, which emerges in result of soya seed extraction. It is characterised by high nutritive value due to the high protein content ranging from 44 to 50% and an exceptionally favourable, from the nutritional point of view, amino-acid composition, as compared with other kinds of vegetable feed. It is currently the basic protein source in fodder and has an over 50% share among other oil plant seeds in the world's oil industry, where ground grain is a useful by-product.

In the world, the USA in particular, soya ground grain is the main vegetable protein source used in animal feeding. It is accepted as a comparative standard when assessing the usefulness of other kinds of vegetable protein feed. In sales of goods post-extraction soya ground grain plays the biggest part as the best high-protein component of feed mixtures, because of lysine – the indispensable amino acid present in its protein; for this reason, it can replace animal protein.

In countries of the world's forefront producing soya ground grain: Argentina, the USA and Brazil the overwhelming majority of soya comes from genetically modified cultivation. It is similar in other soya-producing countries; currently, 95% of the world's export of soya seeds and soya ground grain is made up by GMO products, and only 5.5 million tons of soya ground grain sold in the world comes from genetically unmodified seeds [2].

According to ASA (American Soybean Association) data, over 150 million tons of soya ground grain is annually used in the whole world [3]. Most genetically unmodified ground grain is consumed by European Union countries – the yearly import to EU countries equalled about 5 million tons in 2007, whereas total ground grain consumption in the EU was about 35 million tons, from which it can be concluded that the amount of non-GMO equals about 13% [4]. In addition, it can be noticed that this amount will be subject to decrease, as the supply of seeds and genetically unmodified ground grain may decrease.

The controversial opinions concerning GMO are certainly based on the reliability of genetic methods, safety of using genetically modified food and feed, threat to the environment and the risk of gene flow, called biothreat (fig. 1).

The obligation to mark groceries containing over 0.9% GMO made it necessary to control the presence of GMO in products on the markets, as also in components used for production.

In soya varieties commonly grown in the world the protein content equals about 40%, and that of raw fat 19%. US growers engaged in genetic improvement have already obtained a soya variety deviating from this assumption by about 2% [1].

In spite of open reservations, European countries have accepted genetically modified soya from the USA. Soya is the first genetically modified plant; it depends on institutions permitting the growing and use of soya for food production, whether novel plants with strange genes will appear in the world market.

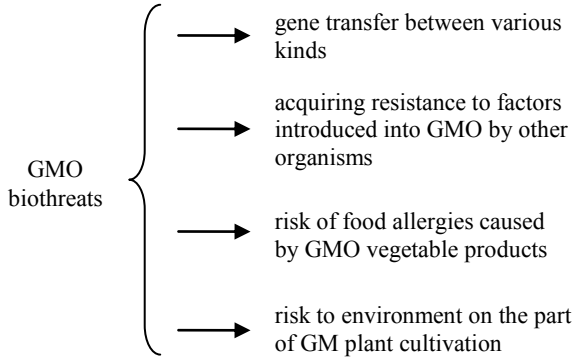

Fig. 1. Main biothreats of genetic modification
Rys. 1. Główne biozagrożenia genetycznej modyfikacji

According to ACNFP – The Advisory Committee on Novel Foods and Processes, it is not possible to estimate the risk borne by mutated soya bean and what long-lasting health effects and changes in the environment may be caused by genetic engineering [5].

Due to the ever growing demand for feed, production and its turnover requires constant monitoring with regard to health protection of humans and animals, as well as environment protection.

The modern approach to ensuring food and feed safety in EU countries is based on control at all stages of the food production chain in accordance with the principle "from field to table" [3] starting from production of raw materials, their processing, storage, transport, up to the final product. Ever more attention is paid to methods of obtaining raw materials as the elements decisive about feed properties and qualities directly affecting the animals' health and in further production chain stages – people's health. The ISO 22 000 standard, published in 2006, contains requirements for organisations in the food chain and is directed to producers of food, feed and additives, as well as to farmers and retailers.

Poland's integration with European Union countries and market requirements has created for feed producers new tasks of improving the quality of feed industry products. The binding principle is to produce safe food of animal origin using safe industrial feed.

The basic document of nutritional safety in Poland is the uniform text of the Act of 25th August 2006, which replaced the 2001 Act on sanitary conditions of food and nutrition [6]. This Act and executive regulations are strictly harmonised with the EU's food laws embracing the White Book on Food Safety including assumptions of the new food safety strategy, Regulation (EC) No. 178/2002 of the European Parliament and the Council of Europe of 28th January 2002 and 147 directives in force in the EU [7].

New statutory solutions in the scope of securing the safety and sanitary quality of food lay stress on a system of internal control in the whole chain of food production, in particular at the stage of primary production and take account of feed requirements including its production and application in the range of being intended for feeding animals assigned for food production.

Regulation EC No. 178/2002 established the general principles and requirements of food law, called into being the European Food Safety Authority and laid down procedures in the range of food, providing the basis for implementing the basic goal of food law, which is a high level of people's and animals' health protection. This regulation standardises Union requirements taking account of the responsibility principle in the scope of food and feed. Food and feed control in the EU at all stages of production, implementation principles and observation of hygiene will be performed in accordance with standardised legal regulations published in the Official Journal of European Communities covering regulations of 29th April 2004 and concerning:

- hygiene of foodstuffs (852/2004),
- specific hygiene rules for food of animal origin (853/2004),
- specific rules for the organisation of official controls on products of animal origin intended for human consumption (854/2004),
- official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules (882/2004/EC).

As these regulations are mutually interrelated, it was necessary to implement them simultaneously from January 2006 in all countries of the European Community [8].

Within the framework of large-scale feed monitoring control of feed and feed components was carried out with regard to GMO occurrence. One of the research objects was post-extraction flaked soya ground grain of uneven break-up.

The research was carried out at the National Feed Laboratory in Szczecin. The presence of GMO in the samples was determined by qualitative methods based on PCR technique making use of screening tests. In the case of samples quantitative markings were carried out by Real Time PCR technique.

Research results have been presented in table 1. In two cases (in the years 2004 and 2005) GMO content was found in soya ground grain in 14 and 8 samples, which constituted respectively 77.8% and 80% of the whole, the soya being Roundup Ready.

Table 1. Research results of GMO in soya ground grain in the years 2004–2006 [2 s. 9], [4 s. 9–10]
Tabela 1. Wyniki badań GMO w śrucie sojowej w latach 2004–2006 [2 p. 9], [4 pp. 9–10]

No.	Kind of sample –Year of research	Number of samples	Positive research result – GMO content above 0.9%	Kind of genetic modification
1	Soya ground grain – 2004	18	14 (77.8%)	Roundup Ready
2	Soya ground grain – 2005	10	8 (80%)	Roundup Ready
3	Soya ground grain – 2006	20	20 (100%)	Roundup Ready

In research conducted in 2006 it was found that all examined soya ground grain samples contained genetically modified RR soya (fig. 2).

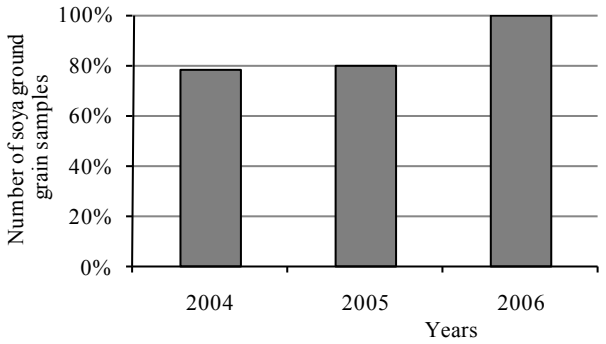

Fig. 2. Comparison of research results on soya ground grain with regard to GMO occurrence in the years 2004–2006
Rys. 2. Zestawienie wyników badań śruty sojowej w kierunku występowania GMO w latach 2004–2006

Recapitulation

It follows from the research conducted that soya ground grain present in the Polish market was in the majority of cases a product containing genetically modified soya Roundup Ready.

Considering the fact that 77.8% and 80% of the examined soya ground grain contained modified soya RR in amounts above 0.9%, it can be stated

that it will appear in similar proportion in feed mixtures. Results in later years confirmed previous assumptions about an increase of GMO products in the market.

It is also important to carry out constant control research on animal feed, which will permit monitoring the proper marking of GMO products in the process of feed production.

The observed systematic development of food and feed law aiming at a systemic solution of problems, widening the scope of compulsoriness and increasing the accuracy of requirements, provide the basis for ensuring good sanitary quality, required safety level and usefulness of feed for animal feeding in all links of the production and delivery chain.

References

1. Rozporządzenie (WE) Nr 1829/2003 parlamentu Europejskiego i Rady w sprawie genetycznie zmodyfikowanej żywności i paszy.
2. KOROL W., MARKOWSKI J.: Badania kontrolne środków żywienia zwierząt w zakresie wykrywania i oznaczania zawartości produktów genetycznie zmodyfikowanych. Pasze Przemysłowe nr 9, Lublin 2005.
3. KWIATEK K.: Nowe regulacje prawne Wspólnoty Europejskiej w zakresie zapewnienia bezpieczeństwa żywności i pasz. Przegląd Zbożowo-Młynarski nr 7, Warszawa 2005.
4. SIERADZKI Z., KWIATEK K.: Stosowanie roślin genetycznie zmodyfikowanych w produkcji pasz i żywieniu zwierząt w Polsce, Pasze Przemysłowe nr 9–10, Lublin 2007.
5. KOSIERADZKI J.: Wysokobiałkowa śruta sojowa. Przegląd Zbożowo-Młynarski nr 5, Warszawa 2000.
6. Ustawa o bezpieczeństwie żywności i żywienia. Dziennik Ustaw z dnia 25 sierpnia 2006 r. nr 171, poz. 1225.
7. Rozporządzenie (WE) nr 178/2002 Parlamentu Europejskiego i Rady z dnia 28 stycznia 2002 r. ustanawiające ogólne zasady i wymagania prawa żywnościowego, powołujące Europejski Urząd ds. Bezpieczeństwa Żywności oraz ustanawiające procedury w zakresie bezpieczeństwa żywności.
8. MALESZKA A., SWAT U., KOWALCZYK V.: Specyfikacja wymagań dla podmiotów rynkowych w zakresie bezpieczeństwa zdrowotnego żywności w świetle najnowszych wymagań UE. W: Wymagania prawne w sferze obrotu żywnością. Jakość w doskonaleniu współczesnej ekonomii i techniki cz. II, praca zbiorowa pod redakcją naukową S. Doroszewicza i A. Zwierzchowskiej, SGH, Warszawa 2005.
9. Rozporządzenie (WE) nr 1830/2003 Parlamentu Europejskiego i Rady z dnia 22 września 2003 r. dotyczące możliwości i etykietowania organizmów zmodyfikowanych genetycznie oraz możliwości śledzenia żywności produktów paszowych wyprodukowanych z organizmów zmodyfikowanych genetycznie i zmieniające dyrektywę 2001/18/WE.

Recenzent:
prof. dr hab. Zofia Cichoń
Uniwersytet Ekonomiczny w Krakowie