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ZBIGNIEW T. DĄBROWSKI[1], TOMASZ TWARDOWSKI[2]

[1]Katedra Entomologii Stosowanej
Szkoła Główna Gospodarstwa Wiejskiego
Nowoursynowska 159, 02-776 Warszawa
[2]Instytut Chemii Bioorganicznej PAN
Noskowskiego 12, 61-704 Poznań
E-mail: zbigniew_dabrowski@sggw.pl
twardows@ibch.poznan.pl

„Hominis est propria veri inquisitio atque investigatio"

GMO — EDITORS' FOREWORD

Bioeconomy is based on knowledge and bioresources. The knowledge is critical for the development of innovative technologies, like informatics, new materials and biotechnology. Bioresources are based on agriculture (the so-called "Green biotechnology"), which in the 21st century is to produce not only and exclusively food, but also biomaterials and bioenergy and also all that is unknown today, but will be a common product tomorrow.

Knowledge generated by basic research is crucial for future development. However, nowadays ownership of the intellectual property rights (IPR) is a critical factor. The owner of IPR is in a position to limit the conditions for further development of economy. At the same time there's no way to obtain new patents and new know-how without basic research. Conduction of basic and applied research requires political acceptance, which is reflected by the formation of legislation that can be for or against the development of genetic engineering technology both in laboratory and in open environment.

More than 10 years of breeding of genetically modified plants and production of biopharmaceuticals using gene technology have provided background for the answers to key questions: Why do so many farmers prefer agrobiotech? What possibilities do modern pharmacy give us? Is it safe for human and for environment? The principal statement is following: in the past 10 years, statistically, all people living on the globe have been the consumers of genetically modified products (GM products). **Till today, we have not had a single verified report about negative effect of genetic engineering**. But we observed hundreds (if not thousands) of sensational reports in tabloids concerning for example "Frankenstein food".

Polish legislation concerning GMO has to be updated according to the latest scientific achievements and regulation worldwide. In February 2007, the past Government of Poland published the "Position paper of the Government on GMO". Based on this statement, the brand new version of amended bill entitled "Law on GMO" was prepared. This project of legislation is inconsistent with the Directives of European Commission. Legal restrictions contradictory to the EU's legislation will significantly limit the progress of research and economy (if this legislation is to be in force). The majority of Polish scientists (about 90%) and the biotechnological societies (Biotechnology Committee at the Presidium of the Polish Academy of Sciences and Polish Federation of Biotechnology) protested against this legislative initiative. However, we have to admit the presence of a group of highly skeptical Polish scientists who want to slow down the progress on GMO research,

including total embargo on the introduction of GMO to the open environment or trade. The new Parliament and Government is facing the amendment of the GMO legislation. That's is why presentation of the GMO properties is so critical for Polish society; only a knowledgeable member of the society is able to make the right choice. Very sophisticated achievements based on proteomics, genomics, bioinformatics, nutrigenomics etc. are converted into everyday products available in supermarkets and drug stores, for example vegetarian steak, ketchup or medicines saving human life, like insuline, interferon or interleukine, and many others.

Scientific data should be made available to the public so that answers to these questions can be found and doubts dissipated. This is why the Guest Editors of this special issue of "Kosmos"' have invited eminent Polish and foreign experts to share their knowledge. All of them can prove a long scientific and managerial track record in respect of GMOs. For the same reason we have used the Latin adage: *„Hominis est propria veri inquisitio atque investigatio"* (meaning: "The first duty of man is seeking after and investigating the truth") as the motto of our Preface. It has also been cited by Prof. Tomasz Borecki, the Vice-chancellor of Warsaw University of Life Sciences (SGGW) during the Opening Session of the third international conference (and the first one organized in Poland) entitled "Ecological impact of genetically modified organisms [EIGMO]", 23–25 May 2007, Warsaw, organized by the IOBC/WPRS Working Group "GMOs in Integrated Plant Protection". He also stated that looking for truth will give the background for our future discussion concerning GMO development and utilization and emphasized that it is critical to prepare the rules for risk assessment based on solid scientific data. These rules should be adequate to local environmental conditions as well as in accordance with local legislation. Many scientists and ecologists agree that direct transfer of data from another continent (e.g. from USA), with different agrarian system, weather and soil conditions, is not correctly related to the trophic relations in a specific location.

This issue of the "Kosmos" will be different in that the articles do not present a general overview of what has been accomplished but present concrete data gathered in scientific research. This we believe should be our response to the objections to inadequate data on the environmental impact of GMOs expressed by the politicians, Ministry of Environment officials and some scientists during conferences over the last two years. Their objections may be justified in that findings made in the USA or Canada may not be directly applicable in Poland due to the presence of different flora and fauna species found in Poland and other Central European countries. Also, the risk of pollen transfer among varieties is not as high in large scale farming typical for North America farming.

For this very reason this issue of "Kosmos"' presents scientific findings made in Poland and the Czech Republic, as well as guidelines on the co-existence of conventional and genetically modified plant species in our southern neighbours. The foreign authors took part in conferences and lectures in Poland. Dr. Richard L. Hellmich, USDA-ARS and Iowa State University professor gave a lecture in compliance with good practices in research projects concerning environmental risk assessment of GMOs. It has been presented in SGGW and the Institute of Plant Breeding and Acclimatization in Radzików. He visited Poland within the framework of the Borlaug Fellows Program. It is a new U.S. Government initiative which also provided an internship to Julia Górecka in Dr. Hellmich's laboratory in the USA, the first grant holder.

The work of dr R. L. Hellmich and his participation in a consortium of several research centers helped to clarify a misunderstanding over the alleged toxicity of pollen of one of genetically modified maize variety to the *Danaus plexippus* [L.] butterfly. The issue was taken by the media as the monarch butterfly is considered by the U.S. society as a charismatic species. Eventually the harmful impact turned out to be insignificant.

There are a number of articles devoted to the impact of GMOs on the fauna, and the Arthropoda in particular, which should not be surprising. They were the base for the statement made by the Plant Protection Committee of the Polish Academy of Sciences on the use of genetically modified varieties resistant to pests and tolerating total herbicides.

Besides the experts on plant protection, no other group of researchers has a comparable experience in assessing risk related to the implementation of new technologies in agriculture. The stories of DDT, aldrin, dieldrin and other chlorohydrocarbons' impact

on environment have taught them to be particularly careful and diligent in assessing new technology. The methodology generally accepted by the specialists and government agencies dealing with plant protection, toxicology and environment protection in the process of registration new chemicals is a model for assessing risk of introducing GMOs into the environment. We believe that only through an objective assessment of scientific data can we respond to the questions and reservations of the opponents of GMOs.

In the United Europe, a decision making system has been developed. This is a legal system with a guarantee that only genetically modified plants fully safe for the environment and agriculture are accepted for production. Accordingly, legislation system of labeling of GM products gives the European consumers a right to choose.

Lack of adaptation of the European rules concerning GM plants is difficult for Polish farmers and consumers. The adaptation procedure is slow among the group of EU states (Austria, Greece, Hungary and Poland). Political leaders for political, not scientific reasons, inhibit the introduction of GM plants for breeding. In the case of selected GM plants, European Food Safety Authority (EFSA) published the safety statements. These European countries suggest extension of moratorium, GMO free zones or extremely restrictive rules for the coexistence of conventional and GM cultivars; the rules will discourage European farmers from the cultivation of GM plants.

In the case of biopharmaceuticals, it is unquestionable that the quality of our life (particularly during the "golden age") depends on innovative medicines. Insuline, interferons, growth hormones or erythropoetine — these are life saving drugs.

In South-East Asia, we observe a very interesting case. India and China are large agriculture producers and huge markets for food and drugs. In these two countries, researchers developed their own, original technologies and know-how for the production of drugs and GM plants, independently of the patents owned by big international companies. As an effect of own innovative technologies in these countries, we have observed a very dynamic development of commercial applications of genetic engineering.

In order to take advantage of genetic modification technology in agriculture within European Union, one needs to harmonize legislation. Although academic research is supported by the European Commission, the system is not very effective in the case of commercialization of innovative products. Farmers and consumers don't take full advantage of modern biotechnology products. We should stress how important it is to be not only and exclusively a consumer, but producer as well. We need new jobs for highly qualified personnel and increase of national income. Will European leaders accept the advice of scientific experts and will they support the development of science and technology for agriculture, medicine, diagnosis and new materials? If not - we have to resign from bioeconomy, innovative technologies, bioenergetics, biomaterials and drugs saving and improving the quality of our lives.

We hope that thanks to the articles the Readers of this special "Kosmos" issue will have an opportunity to make their own assessment of GMO risks and chances.