AZ ELSŐGENERÁCIÓS GÉNTECHNOLÓGIAI ÚTON MÓDOSÍTOTT NÖVÉNYEK MEGÍTÉLÉSÉNEK MAGYARORSZÁGI HÁTTERE

HUNGARIAN BACKGROUND ON VIEWS OF 1ST GENERATION GENETICALLY MODIFIED PLANTS

PUBLISHER
AGRICULTURAL COMMITTEE
OF THE
HUNGARIAN PARLIAMENT
BUDAPEST
2011

Hungarian Background on Views of 1st Generation Genetically Modified Plants

Editors
Béla Darvas and András Székács

Publisher
Agricultural Committee of the Hungarian Parliament

Budapest
2011

Az elsőgenerációs géntechnológiai úton módosított növények megítélésének magyarországi háttere

Szerkesztők
Darvas Béla és Székács András

Kiadó
a Magyar Országgyűlés Mezőgazdasági Bizottsága

Budapest
2011

AUTHORS

Prof. Dr. ***József Ángyán*** (DSc, agricultural sciences) – Director of the Institute of Environmental and Landscape Management. Faculty of Agricultural and Environmental Sciences, Szent István University; founder of the Environmental Sciences PhD School of Szent István University; founder of the GMO Round-table; Under-secretary of the Ministry of Rural Development (2010–); Head of MRD Agricultural and Industrial Gene Technology Authority (http://www.doktori.hu/index.php?menuid=192&sz_ID=2322)

Prof. Dr. ***Gábor Bakonyi*** (DSc, biology) – Director of the Institute of Basic Animal Sciences, Faculty of Agricultural and Environmental Sciences, Szent István University; Head of the Biological Sciences PhD School of the Szent István University; Member of the Presidency of the Hungarian Academy of Sciences (2007–2009); Member of the GMO Round-table (http://www.doktori.hu/index.php?menuid=192&sz_ID=387)

Prof. Dr. ***László Balla*** (DSc, agricultural sciences) – ex-Director of the Agricultural Research Institute of the Hungarian Academy of Sciences; Chairman of Hungarian Plant Breeders' Foundation; Honorary Chairman of Hungarian Plant Breeders' Association; Senior Scientist of the Karcag Institute, Agricultural Centrum, Debrecen University; Honorary Professor of the Szent István University; Member of the GMO Round-table (http://www.doktori.hu/index.php?menuid=192&sz_ID=4340)

Prof. Dr. ***Zsuzsa Bardócz*** (DSc, biology) – Professor of Debrecen University; Member of the Jenő Hankóczy PhD School of Debrecen University,; ex-Member of the Hungarian Gene Technology Board (2009–2010), ex-Member of the GMO Round-table (2005–2010); Member of MRD Agricultural and Industrial Gene Technology Authority (2010–) (http://www.doktori.hu/index.php?menuid=192&sz_ID=296)

Prof. Dr. ***Béla Darvas*** (DSc, biology) – Scientific Advisor at the Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the of Hungarian Academy of Sciences; Honorary Professor of the Debrecen University; founder of the Department of Ecotoxicology, Faculty of Agricultural and Environmental Sciences, Szent István University – extension at the Plant Protection Institute of the Hungarian Academy of Sciences; Primary Member of the Environmental Sciences PhD School of Eötvös Loránd University; founder of the GMO Round-table; member of the Hungarian Gene Technology Board (2006–), Chairman (2009–); Member of the Committee of the Hungarian Scientific Research Fund (*OTKA*) (2010–) (http://www.doktori.hu/index.php?menuid=192&sz_ID=5627)

Dr. ***Adrien Fónagy*** (DSc, biology) – Scientific Advisor at the Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the of Hungarian Academy of Sciences

Gábor Füsti Molnár – Senior Counsellor of the Central Agricultural Office, Directorate of Plant Production and Horticulture (Seed Inspectorate); leader of the Hungarian Gene Technology Board Secretariat

GMO Round-table – The GMO Round-table was initiated by Béla Darvas on 15th September 2005 following a conversation with Zoltán Illés, the preliminary of which was a working dinner about GM plants given by the Ambassador of the United States.[1] The majority of the initial members of this professional body, independent of political parties were admitted on the basis of recommendations by Béla Darvas and József Ángyán. The Chair of the GMO Round-table[2] was Béla Darvas between 2005–2009, and is presently András Székács since 2009. The GMO Round-table is the advisory board for the National Assembly of Agriculture (Chairman: Sándor Font) and the National Assembly of Sustainable Development (Chairman: Benedek Jávor); http://www.bdarvas.hu/english/gmo_roundtable

Dr. ***Iván Gyulai*** – Director of The Ecology Institute for Sustainable Development; ex-Member of the Hungarian Gene Technology Board (1999–2008)

Prof. Dr. ***László Heszky*** (DSc, biology; Member of the Hungarian Academy of Sciences) – Professor of the Institute of Genetics and Biotechnology, Faculty of Agricultural and Environmental Sciences, Szent István University; Head of the Plant Sciences PhD School of the Szent István University; ex-Member of the GMO Round-table (2005–2006); ex-Member of Zoltán Barabás Biotechnology Association (1999–2010); Member of the Hungarian Gene Technology Board (1999–2006; 2010–); founder of the Agricultural Biotechnology MS program at Szent István University (http://www.doktori.hu/index.php?menuid=192&sz_ID=1028)

Dr. ***Katalin Rodics*** – Deputy head of Department of the Ministry of Rural Development, Head of the Agricultural and Industrial Gene Technology Authority

Dr. habil ***András Székács*** (DSc, chemistry) – Scientific Advisor, Head of the Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the of Hungarian Academy of Sciences; habilitation was passed at the Budapest University of Technology and Economics (*BME*); Head of the Department of Ecotoxicology, Faculty of Agricultural and Environmental Sciences, Szent István University – extension at the Plant Protection Institute of the Hungarian Academy of Sciences; Primary Member of the Environmental

[1] Further Hungarians: Zoltán Bedő (Hungarian Academy of Sciences, Agricultural Research Institute), József Kiss (Szent István University, Faculty of Agricultural and Environmental Sciences, Institute of Plant Protection; presently member of EFSA GMO Panel) and Ilona Vass (*OMFB/NKTH*; presently National Innovation Office)

[2] The GMO Round-table attempted to invite certain members of the Zoltán Barabás Biotechnology Association representing moderate opinion and national interests. At the moment Barnabás Jenes (Agricultural Biotechnology Center) is a member of the GMO Round-table.

Sciences PhD School of the Szent István University; Chair of the GMO Roundtable (2009–); Editor-in-Chief of *Biokontroll*, Editor of *Biokémia* (http://www.doktori.hu/index.php?menuid=192&sz_ID=5696)

Eszter Takács – PhD Student of the Environmental Sciences PhD School of the Szent István University; Associate Research Fellow at the Department of Ecotoxiclogy and Environmental Analysis, Plant Protection Institute of the of Hungarian Academy of Sciences

Dr. ***András Takács-Sánta*** (PhD, *ELTE*) – Assistant Professor of Centre for Environmental Science, Faculty of Science, Eötvös Loránd University

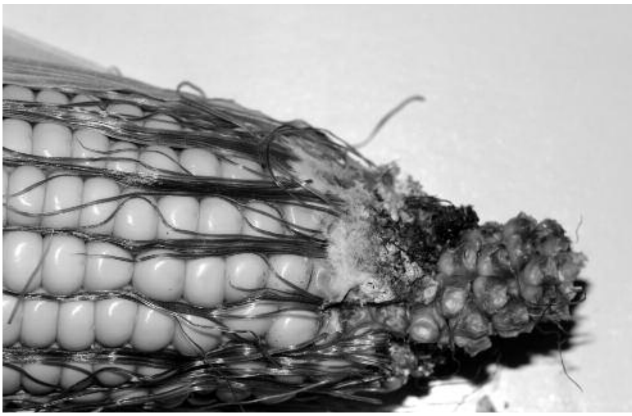

Figure 6: Damage of *Helicoverpa armigera* and *Fusarium verticillioides* –
Helicoverpa armigera *és* Fusarium verticillioides *kártétel*
(Photo: Béla Darvas)

Figure 7: Damage of *Ostrinia nubilalis* and *Fusarium verticillioides* –
Ostrinia nubilalis *és* Fusarium verticillioides *kártétel*
(Photo: Béla Darvas)

FOREWORDS

Preface of the Editors

Béla Darvas and András Székács

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: bdarvas@freemail.hu

Novel crop varieties created by plant genetic technology are debated fiercely in Hungary since their occurrence on the market.[3] A characteristic feature of this debate is that while critical voices are heard from scientific fields (e.g., environmental sciences and dietetics) surveying side-effects of the first generation GM plants (mostly *Bt*- and *glyphosate* tolerant maize lines), promotion arrives mainly from the NGO Zoltán Barabás Biotechnology Association[4] (headed by Dénes Dudits) serving the interest representation of the international GM variety owners. Even the advocates of the latter organization are not on the opinion that the GM maize variety containing the *MON 810* genetic event is economically needed for Hungary, as agricultural damage by the European corn borer (*Ostrinia nubilalis*) is not significant. They presume, however, that the present moratorium (since 2005) on the cultivation of *MON 810* maize encumbers the introduction of further GM crop varieties, and reduces the R+D investments directed to this field. A Parliament Decree (53/2006 XI. 29 *OGy*) on the cultivation of GM crops (actually *MON 810* varieties), legislated with the consent of all parties of the Parliament, has been in force since 2006.[5]

As proven by numerous surveys, the majority of the population of Hungary opposes food products from GM produce, and – similarly to most European nations – considers its food products in a conservative manner. This mode of cultivation does not occupy a preferred position in the Hungarian vision of future on agriculture/food industry. The economic reason is that GM products, in contrast to quality food products originated from ecological agriculture, are not competitive on the European markets. However,

---

[3] See http://www.bdarvas.hu/gmo – under „Jelentősebb közéleti viták" (in Hungarian)
[4] member of the *EuropaBio* association
[5] http://www.bdarvas.hu/letoltes/mezogazdasagi_gentechnologia pp. 140–142. (in Hungarian)

ecological agriculture does not accept GM varieties, or even, does not favour these crops in the proximity of its farming areas (i.e., foreign pollinated plants). The majority of Hungarian farmers secluded themselves from cultivation of GM crops, and thus, a substantial part of the country joined as GM free regions.

This book compiles momentous results of the last decade in environmental sciences – mostly related to *MON 810* maize – along with statements representing the position of many and independent from commercial production, with the aim to expound the precautious and earnest approach to the cultivation of GM crops.

The extent of the book allowed presenting only short communications,[6] but reference to the complete publications, wherever possible, are also listed. An up-to-date availability of a collection of domestic scientific efforts (http://www.bdarvas.hu/gmo/idn3005) and more expended opinion statements (http://www.bdarvas.hu/gmo/idn3004) is provided. Moreover, a few summary books broadly discussing the fundamentals of the area, are listed below:

Darvas B. (1997): *A genetikailag módosított élőszervezetek kibocsátásának környezeti kockázatai*. pp. 1-–64. A Fenntartható Fejlődés Bizottság kiadványa. KTM, Budapest. (ISBN 963 03 4418 1) – http://www.bdarvas.hu/ismeretterjesztes/genetikai_biztonsag/idn3013 (in Hungarian)

Darvas B. (2000): *Virágot Oikosnak*. pp. 1–430. l'Harmattan, Budapest. (ISBN 963 00 4741 1) (in Hungarian)

Darvas B. (Ed.) (2007): *Mezőgazdasági géntechnológia. Elsőgenerációs GM-növények*. pp. 1–164. Magyar Országgyűlés Mezőgazdasági Bizottsága, Budapest. (ISBN 978 963 87505 1 8) – http://www.bdarvas.hu/letoltes/mezogazdasagi_gentechnologia (in Hungarian)

Darvas B. and Székács A. (Eds.) (2006): *Mezőgazdasági ökotoxikológia*. pp. 1–382. l'Harmattan, Budapest. (ISBN 963 7343 39 3) (in Hungarian)

Dudits D. and Heszky L. (2003): *Növényi biotechnológia és géntechnológia*. pp. 1–312. Agroinform Kiadó, Budapest. (ISBN 963 502 697 8) (in Hungarian)

Ferenczy A. (Ed.) (1999): *Genetika – génetika*. pp. 1–149. Harmat Kiadó, Budapest. (ISBN 963 9148 16 4) (in Hungarian); (2001): *Genetics – Gene-ethics*. pp 1–163. Handsel, Edinburgh. (1 871828 61 9)

Heszky L., Fésüs L. and Hornok L. (2005): *Mezőgazdasági biotechnológia*. pp. 1–366. Agroinform Kiadó, Budapest. (ISBN 963 502 837 7) (in Hungarian)

Pusztai Á. and Bardócz Zs. (2004): *A genetikailag módosított élelmiszerek biztonsága*. pp. 1–184. Kölcsey Füzetek VII. Kölcsey Intézet, Budapest. (ISBN 963 216 132 7) – http://mek.oszk.hu/03200/03216/03216.doc (in Hungarian)

[6] To avoid destruction of novelty, this book does not contain several results prior to international publication (e.g., decomposition of stubble containing Cry toxin, the Cry1 toxin balance, areal distribution of maize pollen, the effects of pollen containing Cry1 toxin on protected caterpillars, etc.)

Vajta G. (2004): *Egy klónozó vallomásai*. pp. 1–301. Noran Kiadó, Budapest. (ISBN 963 9539 48 1) (in Hungarian)
Venetianer P. (1998): *A DNS szép új világa*. pp. 1–165. Kulturtrade/Vince Kiadó, Budapest. (ISBN 963 9069 57 4) (in Hungarian)
Venetianer P. (2010): *Génmódosított növények. Mire jók?* pp. 1–150. Typotex Kiadó, Budapest (ISBN 978-963-2791-53-1) (in Hungarian)

***

Agricultural structure and production policy, natural resource management

József Ángyán

Ministry of Rural Development, H-1055 Budapest, Kossuth Lajos tér 1, Hungary
E-mail: jozsef.angyan@vm.gov.hu

An agricultural structure and production policy strengthening rural economy, and thus, stabilising the rural society, local communities must serve the regional, social objectives of multi-functional agriculture regarding quality, alimentation, food safety, energetics, environmental safety and employment! In order to achieve this:

(*1*) to avoid mass production by monocultivation, special management systems should be supported, which:

– provide good quality, pesticide residue free, healthy, safe and unique food along with greater produce supply,
– use less fossil energy, therefore, are less likely to be defenseless against the remote energy markets, moreover,
– pose lower social, environmental, public health related external costs due to their favourable environmental, nutritional and public health impacts, and
– create significantly more workplaces, provide more jobs to families in the rural areas than the centralised, industry-driven agricultural systems, and thus, the social costs of unemployment can be substantially reduced;

(*2*) for the sake of the safety of our food, nourishment, and environment as well as the market competitiveness of our agricultural products and the attractive touristic character title of „Hungary the healer", our rural development strategy has to be built on a system that produces "clean, healthy and safe foodstuff in a clean and alive environment", and one of the basic requirements of this is the GMO-free status of the country, while keeping genetically modified organisms and products away;

(*3*) it is necessary to create a land usage structure that conforms to the different conditions of the landscape, and is built on own traditions, local knowledge, and up-to-date redefinition of the locally well-tried traditional forms of farming, processing and marketing, as well as on species and variety usage taking climate change into account, moreover, on the balance between plant cultivation and animal husbandry characteristic to the landscape, and the restoration of this balance, offer special, local, conventional and colourful product range, better in market positions than the mass products, and may serve as the basis of public catering and health tourism withal;

(*4*) in order to achieve the above, the jeopardised gene bank network serving the maintenance of our traditional cultivated plants, bred animals and genetic resources, as well as the by now disjointed research institution network that established landscape economy, have to be rebuilt and strengthened, the domestic plant breeding that operates on this basis has to be revitalised, and the present financial fare collecting system for variety utilisation has to be reviewed;

(*5*) our protein program – formulated as early as in the 1970s – has to be renewed, rendering us to produce essential protein sources used in forage and food products, and thus, substitute protein sources and food additives of doubtful effects on human health and of foreign origin, e.g., GM soy;

(*6*) on the basis of our ever more valuable natural environment capable of regeneration, mosaic-type, diverse economy structure, maintenance of local biodiversity, traditional quality foodstuff and other resources (e.g., medical springs, relatively clean and silent), and the domestic development of village eco- and medical tourism serving the multi-functionality of the rural economy has to be supported;

(*7*) the economic regulatory system must transfer public burdens from alive labour to the use of the environment, the external energy-usage and transportation, thus motivating the spread of economic management systems using alive work, human contribution, being environmentally friendly, energy-conserving and concentrating on local, regional services;

(*8*) the opportunities of the energy utilisation of forestry and agricultural by-products, the communal and other integral wastes have to be rethought. We have to aim for the development of the local energy supplying systems on the micro-region level, and to create the local energy basis of the local processing industry, the local government and the heating of local institutions. With all this, we could increase the autonomy of the local communities and moderate the country's energy dependence.

The all-time safety of the nation is fundamentally defined by the quality and quantity of its national resources, and furthermore by the degree of sovereignty practiced above all. A key issue is to keep self-determination on landscape, on land and water resources, on forests and the activities arising from all this, such as food security and food safety, the safety of drinking water and energy supply, and the creation and guarantee of the safety of the environment. Therefore natural resource management, the retention of the autonomy of the natural resources are key issues of the national sovereignty.

To achieve this:

(*a*) it is necessary to strengthen the guarantees of the law of the soil protection and the economic asset systems to protect soil quality and quantity;

(*b*) in the interest of the quantitative and qualitative conservation, augmentation and reasonable utilisation of water resources,

- it is necessary to draw up a program for the conservation and utilisation with national interest of our thermal water supply;
- our drinking water basis and infrastructure being used for its exploration and utilisation needs to be kept within national competence.
- most of the water resources coming to the country should be retained and used locally. A complex, multi-angle, sustainable utilisation program of the river valleys (water management, flood protection, irrigation, ecological, rural development) has to be worked out. The current programs (such as the VTT in the Tisza valley) must be revived without failure and a solution has to be found to the problems of the water balance of the Duna–Tisza alley;
- water detaining and draining (inland inundation, flood, irrigation) systems must be managed by the local communities and local land users, and their maintenance should be supported by communal goods;

(*c*) it is necessary to recover the energy supplying big-systems and the national sovereignty above these. In addition, its crucial to reduce our dependence and defenselessness with the development of local energy supplying.

(*d*) it is necessary to review the case-maps of exploitation of our natural resources residing in the depth underground and the concessional conditions by the corresponding contracts.

Keywords: pesticide residue; food safety; environmental friendly; energy-conserving; drinking water source; GMO-free; land usage; health tourism; Hungaricum; protein program
Data of publication and link: Agrár- és vidékpolitikai programvázlat (*in prep*)

GENERAL VIEWS

Scientific problems associated with the cultivation of transgenic (GM) crops

László Heszky

Szent István University, Faculty of Agricultural and Environmental Sciences,
Department of Genetics and Biotechnology, H-2103 Gödöllő, Páter Károly u. 1, Hungary
E-mail: heszky.laszlo@mkk.szie.hu

The scientific significance of gene technology

By the end of the 20th century mankind recognized the molecule carrying the information of the earthly life and it was capable of its modification. In the 21st century the knowledge based societies stepped into the era of genetic technology, representing the enormous success of life sciences.

The molecular toolbar of genetic technology gave to the hands of humanity the possibility to invest the plant species with characteristics that would produce substances, which may not have taken shape in the course of the evolution in the given race or not in the desired quantity or quality. Modern agriculture and its serving sciences tried to bring out the maximum from those arable, horticultural or forestry species that were offered by nature (evolution). The small but after all enormous step was not done, which would have made the alteration of the ability, characteristics of the plants at the level of information carrying molecules of life, DNA. Although at the beginning of the 21st century, this scientific possibility is given with the usage of genetic engineering.

The economic significance of plant genetic engineering

The economic significance of genetic engineering is the fact that the genetic program of the living organisms' – in this case plants – controlling function can be changed according to the needs of society and economy.

Onto the utilization of this opportunity a competition of genetic engineering took place in the name of globalization in the past decade. In this process the chemical industry syndicates merged together and buy up the biotechnology and seed companies As a result of this, concentration of capital in magnitudes never known before took and takes place in the seed industry.

These multinational companies can invest billions of dollars into the production, global management and protection of new genes and molecular techniques, new GM varieties and GM products. This process differs from the preceding development that those countries or firms that now are running behind, have a minimal chance for catching up. Hungary did not even start in this competition, because the preparation costs of the original development, patenting and global commercialization of a new GM variety (modified with genetic engineering) is around 100 million dollars (20–22 billion forints).

Scientific problems of gene technology in plants

The majority of scholars adopt the set of arguments of GM variety owners without criticisms, and such arguments sometimes tend to partly or totally withhold the real problems and the dangers of gene technology as a process and its products, the GM varieties. The charges are declined by the fact that 134 million hectares were cultivated with GM crops (transgenic) in 2009, and during the last 15 years, and no serious problems have occurred in those eight countries, where the cultivated land of GM maize, soybean, canola and cotton reach over a million hectares. The lasting cultivation of GM crops, however, brought several problems to the surface in 2010, because of which a shift can be experienced even in the scientific and vocational circles in the United States, in the judgment of the benefits and risks of green biotechnology.

Other scholars self-critically declare that we are still in the „Stone Age" of gene technology. „We know a lot, but not enough"! – they claim. We have to be careful not to cause irreparable damages in the flora and fauna around us with our braveness stemming from ignorance. Among other things, this is the reason that the crop land of transgenic plants decreases in Europe, and it does not reach the 0.1 million hectares, which is 0.01% of the cropland in the EU. The standpoint is consistently represented that the scholars and scientific bodies must have one common aim, namely, to produce GM crops which fulfil the need of the world's population, serve the development of civilization and are safe to mankind and their environment.

The cultivated GM plant species do not meet these requirements, from a scientific viewpoint they are considered „semi-finished" products. The current GM species – explicable with knowledge deficiency – have several problems and defects:

(*1*) One of the most considerable evidence of knowledge deficiency has come to light recently. It has been proven that only the linear information of genes is known, which means only 1–2% of the molecules carrying genetic information (DNA). We know almost nothing about 98% of the genetic material of higher living organisms. Or more accurately, we know it by now that that part is not "junk" either, as we thought before, but highly likely to take part in gene regulation. If this is true, then the discoveries of the coming years may modify in many ways the knowledge and processes related to gene technology.

(*2*) Currently, the most frequently applied gene transfer methods can not even be called perfect, because thousands of transgenes are being shot into the cells not knowing how and even more importantly where they will be integrated. This approach is, for the moment, a mere caricature of the phrase: genetic engineering.

(*3*) In the currently grown GM varieties it is not regulated how and where the transgenes should work. Therefore, for example, all the cells of the insect-resistant *Bt*-maize produce toxins, while it should be enough to produce the insecticidal *Bt*-protein only in the cells of the stem in case of the European corn borer, and only in the root cells in the case of the corn rootworm. This deficiency is the principal cause of the environmental and food safety risk factor arisen rightfully by environmentalists and consumers.

(*4*) In the course of the cultivation of currently grown insect resistant and herbicide tolerant GM crops, the initiation of insecticidal (for example Cry proteins) toxin resistant (mutant) pests and total herbicide tolerant (for example *glyphosate*) weeds can not be prevented. After the propagation and multiplication of these GM species, they essentially loose those characteristics wherefore they were produced.

(*5*) The highest risk is the possibility of gene flow. The reason is that the pollen of GM crops and the reproductive organs both contain the transgene. Therefore in the course of the cultivation of GM varieties – especially in the open pollinated (wind- and insect-pollinated) species in agriculture, forestry, horticulture and grass –, the escape of the transgene with pollen (biological way) or mixing seed and reproductive organs (physical way) can not be prevented jeopardizing the biodiversity of nature as well as the traditional and organic farming and food safety. Even the regulations stated in the most severe coexistence law can only provide short-term solutions.

The tasks of science in the interest of safe cultivation of transgenetic crops are:

(*a*) It is necessary to recognize not linear sequence codes and stored information, which is total up to 98% of the genome.

(*b*) Gene transfer techniques have to be improved with which the targeted integration could be possible into the right place of the genome.

(*c*) In the new GM varieties tissue, organ and developmental stage specific expression of the transgene can be achieved by improving our knowledge on gene regulation.

(*d*) It is necessary to attain the possibility of turning the transgenes on and off during the life of the GM plants.
(*e*) It is necessary to reduce the probability of the development of resistant pathogens and pests as well as weeds to the minimum, and it is necessary to resolve the destruction of resistant mutants.
(*f*) In the interest of the elimination of gene flow it is necessary for the pollen not to contain the transgene or at least not in an operational state.
(*g*) Regarding the protein products of transgenes it is important to know the effects on the natural and agricultural flora and fauna, and mankind, as well as on non-target wildlife (species, cultivars).
(*h*) Toxicology and allergology research and animal feeding experiments are necessary to filter out in the experimental phase the GM plants carrying gene constructs dangerous to the environment.
(*i*) In some cases (viral-resistant GM varieties) the possibility of the development of new viruses must be excluded.
(j) The advantage of the cultivation of GM crops in a given area or region must be proven by economic calculations and social analysis.

Nobel-price winner, James Watson's recommendation states: "We have to learn to live together with our knowledge obtained on DNA." This may come true when scientific research will be able to solve these problems. This process, however, will be long, in which knowledge and methods need to be perfected for science and has to provide additional evidence regarding the safety of GM crops. The biology knowledge of the public should be improved in order to become capable of acceptance of GM plants and food proven to be safe in the future.

Keywords: gene transfer; GM plant; coexistence; gene flow; resistant weeds; resistant pests; gene regulation
Data of publication and link: *Magyar Tudomány*, 2011. **172**: 104–107.
http://w3.mkk.szie.hu/dep/genetika/pdf/Heszky/Tudos_forum2011_1.pdf

Approaches toward genetically modified plants at the Eastern border of European Union

Béla Darvas and András Székács

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: bdarvas@freemail.hu

The acreage of genetically modified (GM) crops decreased in the European Union by 12% in 2009, as compared to the preceding year, corresponding to 0.7‰ of the world GM crop production. Within the EU, national moratoria on sowing given GM crop varieties were announced in Austria (1999), Hungary (2005), Greece (2005), Poland (2006), Italy (2006), France (2008), Romania (2008), Germany (2009), Luxemburg (2009) and Bulgaria (2010). As for banning GMOs, Austria, Greece and Poland are outstanding, having announced GMO-free status for their entire terrain. Large areas joined GMO-free zones in Albania, Belgium, Croatia, France, Germany, Hungary, Ireland, Italy, Latvia, Slovenia and the United Kingdom. Among major corn growers of the EU, Hungary and Italy have never grown GM corn of genetic event *MON 810*, while France suspended its production in 2008, upon three years of cultivation. Certain European countries express their definite opposition to given statements of the European Food Safety Authority (EFSA) on GMOs. Such debated issues include, for example, (*i*) the form of statistical analysis for environmental risk assessment (ERA); (*ii*) the validity range of the ecotoxicological approaches; and (*iii*) the applicability of GM crops in environmentally friendly technologies. An additional concern in registration of *Bt*-crops is the erroneous concept that considers these plants as simply new varieties, meanwhile they are also new formulations of Cry toxin derivatives. Cultivation of GM crops affects unfavourably absurdly the concurrent traditional and ecological agricultural practices, as they are the producers in these practices, who have to provide verification that their produce is free of GMOs. The most accepting within the EU towards GM crops are the population of the Czech Republic, Italy, the Netherlands, Portugal and Spain, where 26–35% of those questioned were in favour of the technology. In contrast, most rejective are citizens of Cyprus, Finland, France, Germany, Greece, Hungary, Latvia, Lithuania, Luxemburg, Sweden and Slovenia, where 70–87% of the surveyed population were opposing.

Keywords: gene technology, GM plant, GMO-free, European Union, EFSA, *MON 810*, maize, moratorium, ecotoxicology, environmental analysis
Data of publication and link: *Biokontroll*, 2010. **1**: 13–23;
http://www.biokontroll.hu/cms/images/stories/Biokontrol/downloads/Biokontrol_01.pdf

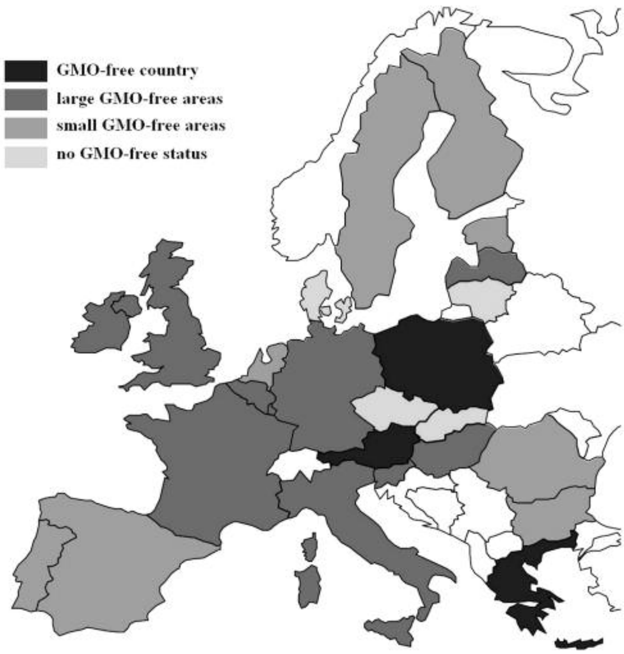

Figure 8: GMO-free zone in EU –
GMO-mentes zónák az Európai Unióban
(Graphics: András Székács and Béla Darvas)

Results of the Hungarian variety evaluation of genetically modified varieties awaiting government authorization

Gábor Füsti Molnár

Central Agricultural Office, Directorate of Plant Production and Horticulture
(Seed Inspectorate)
H-1024 Budapest, Keleti Károly u. 24, Hungary
E-mail: FustimG@mgszh.gov.hu

A quotation from King Solomon – considered to be a wise man throughout the ages – had been selected as a motto for this occasion: „I returned, and saw under the Sun, that the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favour to men of skill; but time and chance happeneth to them all." I believe that this quotation taken from the Book of Preachers (Ecclesiastes) (9, 11) describes the present scientific situation well, which evolved in connection with the first-generation GM plants at home and abroad, and we truly need divine wisdom to answer the existing scientific questions. I mention it in advance that some of my colleagues who performed the concrete experiments no longer work at our Institute, so I rely solely on the results of their work.

At the Agricultural Office Directorate of Plant Production and Horticulture, Seed Inspectorate (*OMMI*) examinations were conducted with GM maize lines between 2001 and 2004 with the aim of being certified and put on the National Seed List. All materials had to be complied with the requirements and laws set out by the Government in Act 2003/LII, the law regulating seed production and sales (Min. Directive 40/2004. (IV.7.) *FVM*), and to the regulations dealing with GMOs (1998/ XXVII.). These laws make it compulsory to carry out – in addition to other experiments – the examination of morphological (*DUS*), economical evaluation, benefit and cost analysis. The owner of the new plant lines also have to have a proper and distinguishable name for the new lines, and have to comply with all the requirements of laws and regulations. The acronym *DUS* refers to the initial letters of the words distinguishable, unique and stable. These three major characteristics are the prerequisites to be fulfilled by each plant line before gaining international recognition under international rules and laws. Regulation 40/2004. (IV.7.) *FVM* contains the requirements necessary for putting a novel GM plant line on the National Seed List, but each novel plant line have also to comply with the rules and regulation include in the National Gene Law. Experimentation should only start with the novel GM plant after a positive opinion was given on the experiment by the Gene Technology Safety Committee of the Country.

OMMI asks permission for the sites of the official experiments necessary to be performed before authorization from the Gene Technology Authority of the Ministry of Rural Development. At the same time those who seek authorization must apply for a permission to import the seeds necessary for the experiments, and in case of maize, the import permit should extend to the importation of the parental lines necessary for *DUS* examinations. Before the 2004 proposal for a line to qualificy, between 2001 and 2004 the following lines were submitted for certification and were examined (the nominees were examined in different times):

Candidate	Breed	Event	Type	Owner
X1019VT	DK-440 BTY	*MON 810*	corn borer resistant	Pioneer
MEB 391	DK-391 RR	*NK603*	*glyphosate*-tolerant	Monsanto
MEB 471	DK-440 RR	*NK603*	*glyphosate*-tolerant	Monsanto
NX3035	Alpha BT	*SYN-Bt11*	corn borer resistant	Syngenta
MEB 470 BT	DKC 4442YG	*MON 810*	corn borer resistant	Monsanto
X0987ZT	PR37R71	*MON 810*	corn borer resistant	Pioneer

In 2004 three candidate lines were proposed for cultivation to the Breeding Committee: NX3035, MEB 470 BT and X0987ZT, however by 2005 only the last two remained under consideration. Both of them belong to the early maturing group of maize, and were modified to carry the transgene conferring insect resistance. The experiments had to be performed according to the methodology prescribed by the Central Agricultural Office Directorate of Plant Production and Horticulture, Seed Inspectorate (*OMMI*). It is compulsory to comply with the requirements with all experiments carried out by GM plants according to the regulations set by the official state board, specifying the design to be performed and requiring identical number of plots in a regular 4 repetitious-randomized blocks using with both the control traditional and GM plants, while implementing all safety measures, such as setting up protection zones consisting of several rows of traditional maize plants around the GM maize site, which had to be destroyed after flowering. The areas have to be monitored constantly after the appearance of the sexual organs. If the traditional counterpart (the parent variety) of the GM event is listed in the National Seed Register then that variety must also be included as a standard in the experiment. The performance of the GM event should be assessed in comparison with this line and also with *OMMI*'s standard lines of the relevant same maturity group. For destruction the experimental material has to be chopped and worked into the soil with a rotary cultivator. The following years it is necessary to visit the exact experimental plots identified on the basis of the draft map for follow-up controls. It is necessary for the certification of GM lines to analyze the positive effect of the attribution of the transgene, which can be determined in separate experiments, but which is a part of the official state experimentation process. In the course of this examination the GM events receive treatments necessary for the expression of their phenotype. These treatments are given to the adequate parcels, such as treatment with chemicals or infection with pests. During such treatments the novel characteristic should show homogeneity and stability and these have to be checked. *OMMI* entrusted the Regional Plant Protection Service with the accomplishment of any additional examinations, these results of which have to be presented when the proposed line is to be considered by the Seed Inspectorate.

MEB 470 BT and X0987ZT lines submitted for certification were both *Bt*-hybrids containing *MON 810* genetic transformation event. Their production attribute was resistance to corn borer with the aim to be used as feed. The required length of examination for certification was specified to last three years for both. The research has showed that the hybrids and their components are distinguishable, stable and constant, and that they are morphologically similar to the parents and their components. The modified attributes were manifested in the examined hybrids. According to the results of the examination of economic performance carried out by the institute, these hybrids met the requirements of certification. The results of the expert examinations regarding the attributes of the corn-borer resistance to yield were positive. The yield results for the year 2004 were as follows:

MEB 470 BT gave 5.3% higher yield then the control, and 0.2% higher than the DK-440 conventional line. The NX3035 produced 8.7% more than the control, and 4.3% more than the breed called Alpha. The X0987ZT event showed significantly more (7.6%) yield then the control, while it yielded 5% more than the parent line PR37M81. Yields of the GM hybrid events expressed as (t/ha) and their moisture content at harvest (%):

Candidate	**2001**		**2002**		**2003**		**Average**		**Yield as % of parent control**
	t/ha	%	t/ha	%	t/ha	%	t/ha	%	
MEB 470 BT	7.71	22.30	10.33	28.53	9.23	12.49	9.09	21.11	100.2
NX3035	8.23	23.30	10.43	28.91	9.49	13.52	9.38	21.91	104.3
X0987ZT	7.96	21.90	10.26	29.21	9.65	13.01	9.29	21.37	105.0

At the evaluation of the experiments the emphasis was put on findings similarities and differences between the parent and GM lines in fertility and adoptability putting the emphasis on the expression of the newly evolved characteristic. As during all three years of the experiment a strong infection of corn borer and corn earworm was experienced, a slight yield gain of the GM varieties (0–5%) was typically experienced compared with traditional lines. The consistently higher moisture content of the seeds, along with greater fertility rather reflected bigger vitality then the extension of cultivation time, and this was one of the factors responsible for yield gain in addition to less wastage. However, the national certification of these GM maize events submitted before was suspended in 2005, when the Hungarian safeguard-close was announced on 20th of January 2005.

Keywords: *OMMI*; *DUS*; *MON 810*; *NK603*; *SYN-Bt11*; GM maize; yield
Data of publication and link: *GMO Round-table Leaflets*, 2006. **10**: 17–19.

Bt-plants in plant protection

Eszter Takács, Éva Lauber, Hajnalka Bánáti, András Székács and Béla Darvas

Department of Ecotoxicology and Environmental Chemistry, Plant Protection Institute, Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó út 15, Hungary

At present there are 110 single or stacked event genetically modified (GM) plant varieties under EU registration. *Bt*-plants emerged in Hungary considerably in maize, and their range was limited to varieties resistant to corn borer and corn rootworm. It has been mentioned as an advantage of *Bt*-plants that they provide continuous protection against the target pest and related species with similar mode of action. The active substance is not subject to certain environmental effects (UV radiation and rain) that could possibly lower its efficacy. It has been considered as a disadvantage, however, that the pollen of *Bt*-maize containing the *cry* gene originated from *Bacillus thuringiensis* may fertilize the flowers of traditional varieties. Long term coexistence of a conventional a GM variety with same flowering time in case of cross-pollination is an ecological nonsense. *Bt*-plants produce large specific amounts of Cry toxin protein (toxin/hectare), and this toxin encapsulated in the plant cells remain long in the environment. The effects of the toxin on the arthropods involved in the decomposition of the stubble and on soil microbial populations are not yet sufficiently revealed. Pollen of Cry toxin content drifting off the fields modifies the habitat quality of the fields and its borders, therefore, may cause risks to protected butterflies. Rapid insect resistance development is observed with plant varieties producing a single Cry toxin. There remain wide-ranging and unresolved debates regarding the food safety aspects of Cry toxins.

Keyword: *Bt*-plant; *Bt*-maize; *cry* gene; Cry toxin; protoxin; *MON 810*; *MON 863*; *DAS-59122*; *SYN-Bt11*; Cry toxin resistance; intraspecific hybridization; coexistence; stubble; Cry toxin production; protected lepidopteran; pollen distribution; sediment in water; food safety

Data of publication and link: *Növényvédelem*, 2009. **45**: 549–558; http://www.ecotox.hu/download/pdf/Btnoveny.pdf

***

Coexistence is professionally unacceptable, practically unaccomplishable

László Heszky

Szent István University, Faculty of Agricultural and Environmental Sciences,
Department of Genetics and Biotechnology, H-2103 Gödöllő, Páter Károly u. 1, Hungary
E-mail: heszky.laszlo@mkk.szie.hu

The proper GM legislation should not be for the current GM crops –as semifinished products– but proper transgenic plant varieties should be produced that meet the requirements of GMO law.[7] Some Member States of the EU and also Hungary should legislate GMO that only allows the cultivation of transgenic plant varieties wherein gene flow and gene escape are excluded.[8] Until such final products are not produced, the GM varieties must not be cultivated in the interest of the protection of the flora and fauna moreover of the traditional and organic production.

The current GM varieties are "semifinished" products

Nowadays the problem is that the currently cultivated genetically modified (GM) varieties are considered as semifinished products. Semifinished products are the following:

- What we can definitely expect from the GM varieties is the expression of the modified characteristics in all of the individuals in the GM population. This is true and this is a significant success of the gene-technological developments.
- What we may not expect from the GM varieties unfortunately is the transgene not to be strewed into the air with the pollen containing the transgene, in other words not to infect the environment with the transgene (gene flow). This is also true and this is a big flaw of the gene-technology developments. Therefore the currently available semifinished products mean constant source of pollution for the traditional- and organic farming.

This latter problem made it necessary for the EU to come up with coexistence, which was a wrong decision technically and in practice,

[7] Heszky L. 2006. *Mag*, nov. – dec. 14–15.
[8] Heszky L. 2007. *Magyar Mezőgazdaság*, febr. 28. 10–11.

especially on the long run, unaccomplishable. Hereinafter I wish to support technically these serious statements from the traditional and organic farmers' viewpoint.

The principle and goal of coexistence

The coexistence means concurrent plant breeding of GM and traditional varieties, sowing seed and commercial production (in one country, in one region, within the boundaries of one village or in a farmland) in a way that the product would meet EU requirements. This requirement is in traditional products produced by farmers maximum 0.9%[9] GMO content, in organic products is 0.0% content. This means from the farmers viewpoint that the organic product can not be organic with more than 0.0% GMO content. The product from traditional farming with over 0.9% GMO content considered as GMO product.

The need for practice of coexistence that is the concurrent application of GM and traditional varieties in the different steps of cultivation technology, according to a decision of the European Union none of the farming method can be excluded, let it be GMO, traditional farming or organic cultivation. According to EU, it is necessary to give the opportunity for farmers to choose from the above mentioned farming methods. As for the consumers, it is necessary to give them the opportunity to decide whether they wish to choose GM, traditional or organic products.

This is not more than a neoliberal empty phrases which is professionally unacceptable, in practice it can not be implemented.

The possibility of choice seems to be sympathetic and convincing at first glace. The professional consequences could land the agriculture in chaos because of the above mentioned semifinished state of the GM varieties.

In the viewpoint of traditional and organic farming the semifinished GM varieties considered to be pollution sources (genetic pollution). The EU's decision for coexistence does not exclude or eliminate the infection sources but – with the introduction of coexistence – wish to allow the spread of infection sources in the whole territory of the EU. In this regard it is no surprise if some regions are declared to be GMO-free. Hereinafter let's examine the consequences in detail.

[9] This was the detection limit earlier (practically this was the zero tolerance); the detection limit is one tenth today (0.1%)

The gene flow can not be prevented

The most important aim of the coexistence law and the implementing regulations based on it is to provide conditions that would minimize the harmful consequences of the involvement of the current GM varieties in cultivation.

Gene flow can be defined as movement of a transgene, via pollen, seed or multipliable organs, followed by transgene integration in a new population. The gene escape means the evasion of the transgene from human control. Both gene flow and gene escape have to alternatives: biological and physical.

The biological gene flow

The biological gene flow is that process when the GM pollen of the GM plant containing a transgene is transferred:

- to the flower of the same crop varieties (crop-to-crop gene flow);
- to the flower of the wild relatives species (crop-to-wild relatives gene flow);
- to the flower of the ecotypes of the same crop species (crop-to ecotypes gene flow).

In the course of the fertilization the transgene from GM pollen is also transferred, therefore the cells of the embryos of the developing seeds will also contain the transgene. After all, GM seeds develop on non-GM plant. If this occurs in organic cultivation then the product could not be sold as ecological product. In case of traditional farming, the proportion of GM seeds determines the classification of the product, which is traditional if GM containment is under 0.9% , if its above 0.9%, GM classification is used.

The direction of the biological gene flow can be diverse, which is rarely discussed:

- The gene flow via pollen can occur from the GM varieties to the traditional varieties which is regulated by the current coexistence law. The gene flow can occur also in the reverse direction. In this case the conventional variety contaminate the GM varieties, which is very dangerous e.g., in herbicide resistance. This situation is not regulated by the current coexistence law.
- The gene flow via pollen can also occur from the GM varieties to the other GM varieties of the same crop species, which is not regulated by the current coexistence law.

- From the grass, trees, the fruit open pollinated species, etc. the gene flow via pollen may happen from GM varieties to the wild ecotypes of the same plant species and it can occur also in the reverse direction. In this case the gene flow via pollen may happen from the wild grass, trees, etc. species to the GM varieties of the same plant species. The law does not say anything about this.

Gene escape into the direction of wild flora can occur when the cultivation of different GM varieties of grass and papilionaceous, forest and fruit trees species will be allowed. Certainly a separate coexistence law and regulations need to be worked out and accepted.

The sowing seeds of traditional varieties can not contain GM seeds

The occurrence of biological gene flow in the case of current GM varieties can not be excluded even with different production technology tricks, such as isolation distance or sowing ban, it can only be reduced. After all the biological gene flow is inevitable at the open pollinated (wind or insect) species whatever the isolation distance is.

This is best proved by the fact that multinational firms dealing with breeding and propagation of traditional corn hybrids nowadays can not guarantee GMO-free traditional maize sowing seeds. The reason is that the traditional hybrid seeds are produced in countries where cultivation of GM hybrids is allowed. The GM content in traditional hybrid's seeds can only be 0.0%. This is the reason that nowadays owners of GM maize hybrids try to reach at least 0.1–0.5% GM content in traditional hybrid's sowing seeds. This however is unacceptable and impermissible professionally and genetically.

To support this, let's do a quick calculation. In case of 0.5% GMO content in traditional maize seed and calculating with 70000 plants per hectare, 350 GM plants are produced. Projected this to 1.2 million hectares of domestic cultivation land, this means 420 million GM maize plants per country. This amount of plants equals to 6000 hectares of pure GM maize cultivated land. In case of calculating with 0.1% the result is 60 GMO plants per hectare and 70 million GM maize plants per country. This amount of plants equals to 1000 hectares of pure GM maize production land.

So in case the EU allows GMO content in sowing seeds of traditional corn varieties then Hungary will lose its GMO free status in spite of the fact that farmers only produce traditional varieties. 70–420 million GM-plants develop and tasseling in the country from the allowed GM content in the traditional hybrid sowing seeds spreading the pollen containing the transgene. If this occurs, our country can no longer be called GMO-free. This is the catch and Member States should not accept this.

The physical gene flow

The physical gene flow is the process where the GM seed or any other part of plant capable of reproduction (bulb, sprout, root, cuttings, etc.) gets mixed with the seed of the non-GM varieties or any other part of the plant capable of reproduction (gene flow), or scatters or possibly stays in the soil, so it gets out of human control (gene escape).

The physical mixing can never be excluded due to human factors. (indiscipline, inattention, negligence, neglect, etc.). This is proved by national and international scandals in recent years *Bt*-maize or *LL*-rice, etc. stories can all be originated in negligence of workers of different companies. The reason is that the GM and traditional seed, do not differ from one another; they can only be distinguished with marker genes or special and expensive molecular techniques.

Every step of the technology is threatened by biological or physical gene flow

Both biological and physical gene flow can cause danger not only at the farmers but every technological step of the plant production sector. So in the plant breeding, seed growing, commercial production (sowing, harvesting) and post harvest technologies (transfer, storage, etc.) as well as in trade. Therefore, the different regulations of the coexistence law have to be applied during plant breeding, seed production, commercial production, storage, cleaning, packing.

The largest economic problem in the execution of the coexistence law will be the separate treatment of the harvested crops from GM and non-GM croplands as well as the storage, cleaning and distribution in our country because development of two parallel systems of storage, cleaning, supplying are required. The physical mixing of the harvested crops (GM and traditional) can only be excluded this way. The development of the parallel systems however increases the farmers' production costs reducing the profits of production and the competitiveness of the produced goods. Considering the current financial state and capital of Hungary and the Hungarian agriculture, development of the parallel storage, cleaning and distribution systems seems unrealistic.

The coexistence law can only be applied for a few years

In case the GM maize hybrids can be cultivated in the future in Hungary, it can already be predicted that the coexistence will be unaccomplishable in a short time. In case when the cultivated land of GM hybrids attains 30–40% of the maize cultivation area, the prevention of biological (for example: isolation) and physical (for example: transport, storage) gene flow will be impossible. This happened in the United States with soybean and because of this – nowadays in Argentina and in Brazil – the US is incapable of exporting GMO-free soybean. These examples prove that the cropland of GM species can attain the critical 30–40% during 4–6 years. The question is inevitable whether it's worth legislating and implementing such a law for a short time that does not solve the problems but generates many technological, economical and legal problems. The answer is clearly no, because the EU's agriculture or population should not be adjusted to the semifinished GM varieties but special improved GM varieties should be developed that meet the requirements of EU's law and meet the needs of people.

Conclusion and proposal

The EU set up a requirement for itself with the coexistence, which is burdened with many professional and implementation problems therefore Member States can not comply. Presumably it would be more professional and cheaper if the EU reviewed its decision on coexistence and would be looking for the solution in other directions. One possible solution could be a new legislation that would specify that cultivation of GM crops with gene flow exclusion can only be cultivated on the territory of the EU. With attention to the fast development of the methodology of gene technology and the billions of dollars invested in research, this is not an unreal expectation.

Keywords: coexistence; gene flow; gene escape; seed production; organic farming
Data of publication and link: *Biokultúra*, 2009. **4**: 10–12.

Flowering times of maize varieties in special respects for intraspecific hybridization (*MON 810* x other varieties) [No 1.]

Adrien Fónagy,[a] Krishnan, Muthukalingan,[b] Hajnalka Bánáti,[a] Éva Lauber,[a] Eszter Takács,[a,c] András Székács,[a,c] Andrea Nyiri,[a] Gábor Herman,[a] Nikolett Kugler[a] and Béla Darvas[a,c]

[a]Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15;
[b]Department of Environmental Biotechnology, Bharathidasan University, Tiruchirappalli;
[c]Szent István University, PhD School for Environmental Sciences, Gödöllő

Hybridization among cultivars is a major issue among foreign pollinators during seed grain production. Our basic experiments were run modelling mass production, in parallel with studies for pollen competition. We followed flowering and productivity of 70–80 individual plants originating from different cultivars (Yellow DK-440, Yellow DK-440 BTY, Yellow Y, Yellow Y', Yellow SU Zamora, Yellow X, Yellow X', Blue, Red dentiform, Mindszenti white, Kiskun white), where the plot was framed by six rows as border lines. Pollen capturing rows of yellow varieties were sawn 40–120 m away from these plots. The plots were surrounded by grass meadows with dominating alfalfa.

Flowering time of the cultivars under investigation may be subdivided into three groups: early (Blue and Mindszenti white), normal or mid (majority of varieties) and late (Kiskun white) pollinators, respectively. Tillering (pollination) followed this sequence. The appearance of silk and maturing of female flower modified this picture in case of SU Zamora, since it had to be aligned into the early flowering group. From flowering and fertility point of view the new hybrid varieties are much more uniform compared to traditional, regional cultivars (Blue, Red dentiform, Mindszenti white). All these circumstances allow a much broader range of pollination for the latter.

Tillering (pollen emission) in general is 10–14 days long. Female flowering or receptivity may be characterized similarly, however, it should be noted that the highest chance for female fertilization is on the day following the appearance of respective silk.

Cross pollination among all cultivars tested, due to the late flowering of Kiskun white, was rendered impossible. This also means, that if experiments are conducted without careful evaluation of characteristics of flowering/ tillering, few meters of isolation distance may be found appropriate.

In the crossbreeding studies the gene for silk red colouration of Red dentiform is dominant, thus colour of grains was not altered by using blue, yellow or white origin pollen. On the other hand, the pollen did not carry red colour gene in a dominant way. The blue/lilac colour of the Blue variety is, however, inherited dominantly opposite to yellow or white varieties. Besides the uniform blue colour appearance of mosaics is also common due to transposon activity. Our cross-breeding experiments with *MON 810* varieties resulted in well identifiable samples for further Cry1 toxin studies. The *cry1* gene transferred via the pollen produces Cry1 toxin in the same year. We encountered 5–30% hybrid formation during grain formation, which finding may be validated for the isogenic GM maize border lines. Resistance management regarding cob pests due to the mixed nature of kernels containing Cry toxin is questionable, because based on selection pressure more successful survival is allowed. Therefore, for border lines, varieties with significantly different flowering time are suggested. Under free flowering conditions, when the dominant pollen source (blue) was very limited and was surrounded by six border lines, appearance of blue/lilac hybrid mosaic cobs was below 1% in maize 40–120 m away At the same time, as far as 500 m from the respective pollen source we found 5 blue kernels on a single cob.

In our experiments next year – based on the above findings – we will investigate the seed grain production conditions (de-teaselling = male sterile techniques) excluding pollen competition.

Keywords: *MON 810*; blue maize; white maize; red maize; intraspecific hybrid; isolation; coexistence; Cry1 toxin
Data of publication and link: *Abs. Növényvédelmi Tudományos Napok*, 2010. **56**: 53.

***

Comparative aspects of Cry toxin usages in insect control

András Székács and Béla Darvas

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: aszek@nki.hu

Crystalline (Cry) endotoxins from *Bacillus thuringiensis* (*Bt*) and related toxins are currently being used in plant protection as insecticides and in genetically modified plants. While both take advantage of the specificity of Cry lectins against various insect orders, there occur characteristic differences in (*i*) form of application; (*ii*) compatibility with agrotechnologies; (*iii*) the exact active ingredient; and (*iv*) its environmental fate. The clear advantage of insect resistant *Bt*-plants is that they eliminate labour- and energy-demanding field application. In turn, however, *Bt*-plants continuously produce truncated Cry toxin during vegetation. As a result, these *Bt*-plants do not comply with the principle of integrated pest management, as Cry toxin administration cannot be limited to insect pest occurrence. *Bt*-insecticides and *Bt*-plants also differ in their active ingredients: while the former contain protoxins that require metabolic activation in the insect gut, the latter mostly produce preactivated toxin. In case of Cry1Ab, DIPEL® contains a 131 kDa CrylAb protoxin, along with further Cryl and Cry2 protoxins. In contrast, *Bt*-plants of genetic event *MON 810* express a single truncated CrylAb toxin of 91 kDa. In addition to pesticide registration issues, this difference has pronounced effects on the easy development of insect resistance against CrylAb. Finally, Cry1Ab lectin protected from rapid decomposition in the plant tissue show environmental persistence in stubble.

Keywords: *Bt*-plant; Cry toxin; protoxin; preactivated toxin; persistence in stubble, Cry1-resistance; integrated pest management; *IPM*
Data of publication and link: *Programme and Book of Abstracts of IXth European Congress of Entomology*, 2010. p. 102; http://www.bdarvas.hu/gmo/idn6011

***

Bt-maize originated Cry1Ab toxin resistant *Plodia interpunctella*

Béla Darvas, Éva Lauber, Judit Kincses, Gyöngyi Vajdics, Judit Juracsek and András Székács

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary

Survivals of *Plodia interpunctella* larvae with *MON 810* maize leaves contained feed, Cry1-resistant stocks – consist of 200 imagos – were collected in June, 2001. Larvae were feed on PI_{db} feed contained ~1.4 ppm (this slightly higher than the Cry1Ab toxin in fresh maize stem) truncated *Bacillus thuringiensis* toxin (Cry1Ab) plus maize leaves originated allelochemicals. Stocks were followed during 21 generations in 6 repetitions. In cases of 4th, 10th and 20th generations of *Bt*-resistant (Bt^R) and *Bt*-sensitive (Bt^S) stocks mortality (5 repetitions), pupal mass (10 repetitions) and developmental time between

egg laying and adult emergence (>100 repetitions) were evaluated. ELISA (EnviroLogix Inc, Portland, ME, USA) was used to quantity of Cry1Ab toxin DK-440 BTY (YieldGard) maize (*MON 810* event). The dried and grinded leave of DK-440 BTY contained ~10 ppm Cry1Ab toxin.

The rate of survivals higher during the 1st – 3rd generations based on progeny production of a female. Stabilization of the Cry1-resistance was a dynamic procedure. The breading reached the lower point at 6th generation and the Cry1Ab-resistant stock based on progenies of 24 imagos. This was caused by gene-combinations with disadvantages of population part was selected during 1st – 4th generations.

Not only the truncated Cry1Ab toxin was the agent of selection, but different allelochemicals of maize leaves in which DIMBOA at the first half of June is well-known. Between 10th – 11th generations a deep population crash was also recognized.

The larvae of 4th Bt^R generation – where the selection pressure was 1.5 ppm – survived on 0.9 ppm Cry1Ab toxin, while they died when 1.7 ppm was applied. The developmental time of *P. interpunctella* was significantly longer consuming Cry1Ab toxin contained PI_{db} feed. The larvae of 4th generation of Bt^R was tolerant to Cry1Ab toxin.

The larvae of 10th Bt^R generation – where the selection pressure was 1.5 ppm – a significant part survived on 1.6 ppm Cry1Ab toxin. Although the developmental time (embryonic + postembryonic times) of *P. interpunctella* was near the untreated control the pupal mass were half of them. The larvae of 10th generation of Bt^R was near resistant to Cry1Ab toxin.

The larvae of 20th Bt^R generation – where the selection pressure was 1.5 ppm – no mortality was found on 1.6 ppm Cry1Ab toxin. Developmental time and pupal mass were similar than in case of isogenic control.

In case of *Bt*-maize a relatively quick decrease in efficacy may be counted.

Keywords: Cry1-resistance; *Plodia interpunctella*; *MON 810*; DK-440 BTY; YieldGard; Dimboa
Data of publication and link: *Abs. Növényvédelmi Tudományos Napok* 2005. **51**: 9.

***

GM plants and resistance – resistance-management

Béla Darvas

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: bdarvas@freemail.hu

Ninety % of first generation GM plants evaluated in EU serve plant protection purpose. Twenty % is „insect"-resistant (*Bt*), 30% is „herbicide"-tolerant (*glyphosate*) and the further 40% is the combination of the mentioned two types. Pesticide resistance for an active ingredient used in a longer period is developed sooner or later in treated pest communities.

The 10th generation of *Plodia interpunctella* was tolerant for *MON 810* grinded leaf which suggest a quick expiration time for this GM hybrid. Larvae resistant for *MON 810* maize showed tolerance for DIPEL. In case of *Plutella xylostella*, four Cry-receptors were separated. Larvae of Cry1C-resistant *P. xylostella* showed strong cross-resistance on CrylAb, CrylAc and Cry1F toxins. Middle or low cross-resistance was demonstrated on Cry1Aa and Cry9C toxins. In cases of Cry1Bb, CrylJa and Cry2A toxins cross-resistance did not appear. Cross-resistance may develop in case of toxin with two different binding sites by way different mechanisms in background of resistance. Owners of GM plants suggest a 20–50% isogenic showing rate which conserve the Cry toxin sensitive pest population as a management of Cry1 resistance. This method means pest breeding in a significant sized field. In next rows 5–30% intraspecific hybrid seeds were measured with pollen competition. Resistance management in case of cob pests (*Helicoverpa armigera*) is problematic because of variable Cry toxin contents of seeds in different position. Thus strong selection pressure with sublethal concentration resulted in larval survivors and generated Cry1A-resistant pest populations. As a solution maize varieties with different flowering time as GM variety may be advised. A further problem in the present „Cry1-resistance management" that the developing times of larvae and swarming of imagos may significantly different consuming *Bt*-plant or its near isogenic line. This decrease the chance of meeting the Cry toxin sensitive and resistant populations. In case of GM varieties producing variable Cry toxins, the Cry toxin amount was produced in a hectare – which is presently critical too – higher onward.

Glyphosate active ingredient as a total herbicide was introduced in the market at 1970. Well known that some weeds originally tolerate *glyphosate*, for example *Abutilon theophrasti*, *Chenopodium album* and *Xanthium* *stumarium*. There are two strategies for *glyphosate* tolerance. *Glyphosate* binding site was change to less sensitive type or plants produce extra detoxifying enzymes which metabolize *glyphosate* into its less phytotoxic metabolites. The *glyphosate*-tolerant GM plant made possible the post emergent *glyphosate* usage, thus *glyphosate* utilization may be expanded. *Glyphosate*-tolerant *Amaranthus* spp., *Ambrosia artemisifolia*, *Conyza canadensis*, *Eleusine indica*, *Lolium multiflorum*, *Plantago lanceolata*, *Plantago major*, *Sorghum halepense* populations have described until now. The *glyphosate*-tolerance may be 8–15 times more as in case of a sensitive weed population. In a longer *glyphosate* usage may result 10–50% populations of a species belong to *glyphosate*-tolerant group. This participate in that phenomenon while herbicide usage slightly decrease during the first 3–5 years after GM plant appearance, but later when resistant weed populations selected herbicide usage start to increase again. There are no examinations on this field in Hungary.

Keywords: Cry1-resistance; *MON 810*; Dipel; Cry receptor; cross-resistance; resistance-management; *glyphosate*; *glyphosate*-tolerant weeds; *Eleusine indica*; *Conyza canadensis*; *Plantago major*; *Plantago lanceolata*; *Lolium multiflorum*; *Ambrosia artemisifolia*; *Sorghum halepense*

Data of publication and link: *GMO Round-table Leaflets*, 2009. 22: 11.

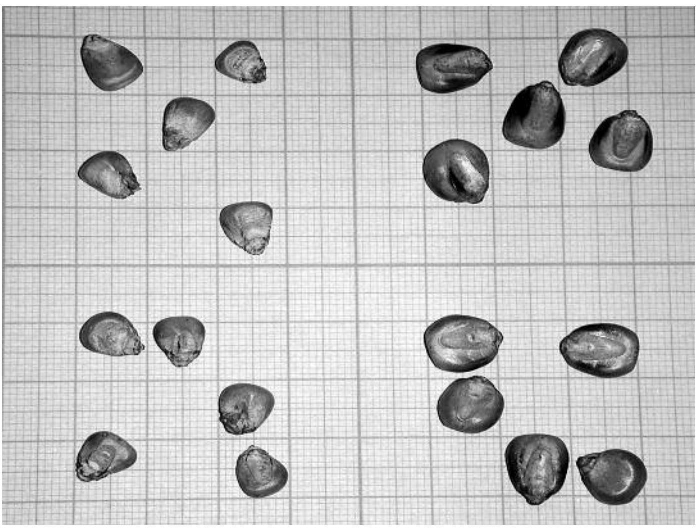

Figure 9: Two different seed-types of *MON 810*, originated from Monsanto –
Két eltérő, Monsantótól származó MON 810 *magtípus*
(Photo: Béla Darvas)

Some data to the risk analysis of *Bt*-corn pollen and protected Lepidoptera species in Hungary

Béla Darvas,[a] Attila Csóti,[a,b] Adel Gharib,[a,c] László Peregovits,[d] László Ronkay,[d] Éva Laubera,[b] and László A Polgár[a]

[a]Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary;
[b]Budapest University of Economics, Public Administration and Horticulture;
[c]Faculty of Agriculture, Minia University, Minia, Egypt; dHungarian Natural History Museum, Budapest, Hungary
E-mail: bdarvas@freemail.hu

Risk assessment of the potential impact of *Bt*-corn pollen on protected Lepidoptera species in Hungary was studied. Pollination of the DK-440 BTY (event *MON 810*) occurs 74–88 day after sowing, and yielded 35 kg/hectare of pollen. The pollination of the cultivated corn varieties is in July to mid August in Hungary. Pollen density dropped under 100 pollen/cm^2 at 5 m from the arable edge. Young caterpillars feeding on weeds nearly or in the cornfield might be affected. Pollen-deposition is the most effective on plants with broad, hairy and horizontal leaves. The leaf area/leaf weight ratio of the great nettle, *Urtica dioica* L. (Urticaceae) is 2,85 times higher than that of common milkweed, *Asclepias syriaca* L. (Asclepiadaceae), which might mean approximately 3 times higher toxin consumption at same pollen density. In Hungary, law protects 187 Lepidoptera species. 16% of them might feed on weeds growing at the edge of cornfields. We proved that *Inachis io* (L.) and *Vanessa atalanta* (L.) (Nymphalidae) might be affected by *Bt*-pollen. Both species feed on great nettle, a common weed in the water furrows of cornfields in Hungary. The eggs of these species hatch exactly at the time of corn pollination.

Keywords: risk assessment, *Bt*-maize pollen, *MON 810*, *Urtica dioica*, *Inachis io*, *Vanessa atalanta*, protected Lepidoptera species, Pannonian Bio-Geographical Region
Data of publication and link: *Növényvédelem*, 2004. **40**: 441–449;
http://www.bdarvas.hu/tudomany/okotoxikologia/idn4004

Cry1Ab toxin production of *MON 810* transgenic maize

András Székács, Éva Lauber, Judit Juracsek and Béla Darvas

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: aszek@nki.hu

Levels of Cry1Ab toxin were detected in genetically modified maize of genetic event *MON 810* against near isogenic maize as negative control by two commercial immunoassays. The immunoassays were characterized for their cross-reactivity (CR) between Cry1Ab protoxin and activated toxin, and were compared with each other for toxin detection in a reference plant sample. Cry1Ab toxin levels, corrected for active toxin content using the CR values obtained, were monitored in maize DK-440 BTY through the entire vegetation period. The toxin concentration was found to show a rapid rise in the leaves to 17.15 ± 1.66 μg/g by the end of the fifth week of cultivation, followed by a gradual decline to 9.61 ± 2.07 μg/g by the 16th week and a slight increase again to 13.51 ± 1.96 μg/g during the last 2 weeks due to partial desiccation. Similar but lesser fluctuation of toxin levels was seen in the roots between 5.32 ± 0.49 μg/g at the less differentiated V1 stage and 2.25 ± 0.30 μg/g during plant development. In contrast, Cry1Ab toxin levels appeared to be stably 1.36 ± 0.45, 4.98 ± 0.31, 0.47 ± 0.03, and 0.83 ± 0.15 μg/g in the stem, anther wall, pollen, and grain, respectively. Toxin concentrations produced at the VT-R4 phenological stages under actual cultivation conditions were compared with each other in three different years within an 8-year period.

Keywords: genetically modified organism; GMO; *MON 810* genetic event; Cry1Ab toxin; enzyme-linked immunosorbent assay; ELISA; maize
Data of publication and link: *Environ. Toxicol. Chem*., 2010. **29**: 182–190; http://onlinelibrary.wiley.com/doi/10.1002/etc.5/abstract

***

Detection of Cry1Ab toxin in the leaves of *MON 810* transgenic maize

András Székács, Éva Lauber, Eszter Takács and Béla Darvas

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: aszek@nki.hu

The distribution of Cry1Ab toxin was detected in the leaves of genetically modified maize of genetic event *MON 810* by enzyme-linked immunosorbent assay. Cry1Ab toxin contents in the leaves at reproductive (milk, R3) phenological stage were measured to be between 3878 and 11148 ng Cry1Ab toxin/g fresh weight. Toxin content was significantly lesser (significant difference (LSD) = 1823 ng Cry1Ab toxin/g fresh leaf weight, $p<0.01$) in leaves at the lowest leaf level, than at higher leaf levels, probably due to partial leaf necrotisation. A substantial (up to 22%) plant-to-plant variation in Cry1Ab contents in leaves was observed. When studying toxin distribution within the cross and longitudinal sections of single leaves, lesser variability was detected diagonally, with approximately 20% higher toxin concentrations at or near the leaf vein. More significant variability (LSD = 2220 ng Cry1Ab toxin/g fresh leaf weight, $p<0.01$) was seen lengthwise along the leaf, starting at 1892 ng Cry1Ab toxin/g fresh weight at the sheath and rising to maximum concentration at the middle of the lamella. Cry1Ab toxin content may suffer significant (LSD = 2230 ng Cry1Ab toxin/g fresh leaf weight, $p<0.01$) decreases in the leaf due to necrotisation. The results indicate that the longitudinal dimension of the leaf has more significance for sampling purposes than the diagonal position.

Keywords: genetically modified organism; GMO; *MON 810* maize leaf; Cry1Ab toxin; enzyme-linked immunosorbent assay; ELISA
Data of publication and link: *Anal. Bioanal. Chem*. 2010. **396**: 2203–2211;
http://www.springerlink.com/content/741u051150206123/fulltext.pdf

***

Determination of Cry1Ab toxin content of *MON 810* maize pollen by enzyme-immunoassay

András Székács, Eszter Takács, Judit Juracsek, Éva Lauber and Béla Darvas

Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: aszek@nki.hu

Activated Cry1Ab toxin was measured in the pollen of maize of *MON 810* genetic event using two enzyme-linked immunosorbent assays (ELISAs). Commercial 96-well microplate ELISAs, EnviroLogix Cry1Ab/Cry1Ac QuantiPlate® and Abraxis Bt-Cry1Ab/Ac ELISA were applied and optimized for pollen. Due to its high protein and starch quantity, pollen was found to be a difficult biological matrix, reflected in low but reproducible recoveries in sample preparation: 51–55% and 48–49% in spiked pollen relative to spiked pollen extract and buffer, respectively. To assess the role of extraction conditions on the digestibility of pollen grains as solid and hardly destructible particles, the efficacy of various protocols were compared. Concentration of activated Cry1Ab in pollen was calculated with Cry1Ab activated toxin/protoxin cross-reactivities in ELISA, 41% and 56%, for the EnviroLogix and Abraxis kits, respectively. Purity of the pollen fraction is an essential factor: in one batch of DK-440 BTY pollen, toxin content was 108 ± 7 ng Cry1Ab/g dry pollen, while the corresponding level was over 100-fold higher (13030 ± 1690 ng Cry1Ab/g dry weight) in the pollen sack. Considerable variability was found in Cry1Ab production in two, apparently different DK-440 BTY cultivar phenotypes with 100–150 and 4–18 ng Cry1Ab/g dry pollen. Cry1Ab content in pollen was severely affected by weather conditions: drought before teaselling might lead to increased Cry1Ab level in pollen, but reduced pollen production.

Keywords: genetically modified organism; GMO; *MON 810* maize pollen; Cry1Ab toxin; ELISA
Data of publication and link: *Programme and Book of Abstracts of IXth European Congress of Entomology*, 2010. p. 200; http://www.bdarvas.hu/gmo/idn6011

***

Preference tests with collembolas on isogenic and *Bt*-maize

Gábor Bakonyi,[a] *Fruzsina Szira,*[a] *István Kiss,*[a] *Ilona Villányi,*[b] *Anikó Seres*[a] *and András Székács*[c]

[a]Department of Zoology and Ecology, Szent István University, H-2100 Gödöllő, Páter Károly u. 1, Hungary;
[b]Research Institute for Soil Science and Agricultural Chemistry of the Hungarian Academy of Sciences, Budapest;
[c]Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest

Collembolas are important members of belowground food webs. There is little information available on the effects of the plant residues of transgenic maize expressing *Bacillus thuringiensis* (*Bt*) toxin on soil animals, including collembola. This is why two questions were addressed in laboratory feeding experiments with three collembolan species: (*i*) Are collembola equally distributed on residues of isogenic and *Bt*-maize? and (*ii*) Do collembola show feeding preference to either of the maize types? *Bt*-maize (producing Cry1Ab toxin) proved to be a less preferred food source for *Folsomia candida* than the isogenic one. No similar phenomenon was found in the case of *Heteromurus nitidus* and *Sinella coeca*. *F. candida* reacted to as low as 3.45 (± 0.8 µg g^{-1}) *Bt*-toxin content of the maize. Our results show that the effect of the *Bt*-toxin producing maize on the collembolan is species specific.

Keywords: *MON 810* maize; Cry1Ab toxin; Colembola; *Folsomia candida*; *Heteromurus nitidus*; *Sinella coeca*
Data of publication and link: *European Journal of Soil Biology* 2006. **42**: 132–135; http://w3.mkk.szie.hu/dep/zoo/eng/cikkek/EJSB06.pdf

Relationships of *Helicoverpa armigera*, *Ostrinia nubilalis* and *Fusarium verticillioides* on *MON 810* maize

Béla Darvas, Hajnalka Bánáti, Eszter Takács, Éva Lauber, Árpád Szécsi and András Székács

Plant Protection Institute of the Hungarian Academy of Sciences,
H-1022 Budapest, Herman Ottó u. 15, Hungary
E-mail: bdarvas@freemail.hu

MON 810 maize was developed against *Ostrinia nubilalis* and is suggested to indirectly decrease *Fusarium* spp. infestation in maize ears. To evaluate this effect, co-occurrence of insect and fungal pests on *MON 810* maize was studied. During 2009, exceptionally high maize ear infestation occurred in Julianna-major (Hungary). From investigation of some thousands of maize ears, the majority of the larval damage originated from *Helicoverpa armigera* larvae, while *O. nubilalis* larvae contributed significant damage only at a single plot. *Fusarium verticillioides* infection appeared only in a small portion (~20–30%) of the insect damaged cobs. *H. armigera* and *O. nubilalis* larvae feeding on *F. verticillioides* mycelia can distribute its conidia with their fecal pellets. *MON 810* maize showed 100% efficacy against *O. nubilalis* in the stem, but lower efficacy against *O. nubilalis* and *H. armigera* in maize ears. The ~Cry1Ab toxin content of maize silk, the entry site of *H. armigera*, was lower than that in the leaves/stem/husk leaves of *MON 810*. *Fusarium*-infected *MON 810* cobs are rarely found and only after larval damage by *O. nubilalis*. *H. armigera* larvae could not tolerate well *F. verticillioides* infected food and attempted to move out from the infected cobs. For further feeding they re-entered the maize ears through the 8–12 husk leaves, but in the case of the *MON 810* variety, they usually could not reach the kernels. Apical damage on cobs resulted in only a minor (about one-tenth of the cob) decrease in yield.

Keywords: *Ostrinia nubilalis*; *Helicoverpa armigera*; *Fusarium verticillioides*; *MON 810*; yield loss
Data of publication and link: *Insects*, 2011. **2**: 1–11;
http://www.mdpi.com/2075-4450/2/1/1/pdf

***

DIETETIC SCIENCES

The safety of GM crops from a nutritional aspect

Susan Bardócz and Árpád Pusztai

Institute of Food Science, Food Safety and Microbiology, Centre for Agricultural and Applied Economic Sciences, University of Debrecen, H-4025 Debrecen, Böszörményi út 128, Hungary[10]
E-mail: zsuzsanna.bardocz@vm.gov.hu

GM crops appeared first in the food/feed chain in the USA in 1996. In the US GM plants to date are not labelled and their authorization is still based of the idea of substantial equivalence. There are hardly any independent studies carried out to examine their health effects. Experiments performed with humans are also lacking, although the number of GM crops in the food and feed chain are steadily increasing. In the meantime, there is a growing body of evidence in the scientific literature to warn about the health risks of GM plants. It is understood that GM crops present in our food and animal feeds were released too early and without proper safety testing, their long term effects are unpredictable and might put the health of the forthcoming generations in danger. Therefore, strict safety testing protocols, accepted by the entire scientific community, should be established.

Keywords: GM plant, EFSA, insertional mutagenesis, horizontal gene transfer, dietetic studies, Cry toxin, *glyphosate*
Data of publication and link: *Biokontroll*, 2010. **1**: 24–32;
http://www.biokontroll.hu/cms/images/stories/Biokontrol/downloads/Biokontrol_01.pdf

[10] New address: Ministry of Rural Development, Department of Rural Development Strategy, Biodiversity and Gene Conservation Unit, H-1055 Budapest, Kossuth tér 11, Hungary

FURTHER VIEWS

GMO – yes or no?

László Balla

Hungarian Plant Breeding Foundation; University of Debrecen, Centre of Agriculture Science, Research Institute of Karcag, H-5300 Karcag, PO Box 11, Hungary
E-mail: drballa@t-online.hu

One cannot speak in general about the genetically modified plants, every species and every event has to be analysed case by case. There are four important plant species which have been modified by multinational company who sell them. The most powerful company is Monsanto. The four main plants are soy, maize, cotton and canola. These crops can be discussed also by examining them one by one.

Soybean is not domestic and cannot be cultivated in Hungary, since it would be harvested too late. The soy varieties are not used for human food at all or are applied in just small amounts. GM cotton is cultivated on a relatively small area worldwide. As far as canola is concerned, the Hungarian farmer could sow both hybrid and normal canola seed varieties.

The vegetable oil industry is in the hands of multinational companies. It is up to these companies to decide what species have to be sown, because the produce is exported from the country and processed elsewhere. Only the finished and bottled cooking oil, produced in a third country, returned to be sold in the country where its crop was grown.

Presently GM maize is the only plant that would be possible to consider for cultivation in Hungary. Should the attributes for cultivation (growth time, drought tolerance, resistance to diseases, cold tolerance, etc.) would comply with Hungarian requirements, GM maize could be cultivated here.

Considering maize, great chemical companies found possibilities in genetic modification of crops in the 1980's, so they commenced to develop GM maize in competition with each other. Presently, the best known GM maize is *MON 810* event, a product of Monsanto. This GM maize contains a transgene from a bacterium, *Bacillus thuringiensis*. This bacterium produces toxin(s) that kill(s) larvae of the European corn borer, when entering their digestive system. Therefore, in areas, where the damage by this pest is important, *MON 810* provides protection. Fortunately the Pannonian Bio-Geographical Region, where Hungary is situated, is not such an area, therefore, this GM maize has little relevance to our economy.

Another GM event, *MON 863* maize is resistant to the corn rootworm. Moreover, *MON 863* is outdone by *MON 88017*, which in addition to resistance to *Diabrotica*, shows herbicide resistance as well. Nonetheless, hybrids resistant to corn borer and corn rootworm are of higher significance in southern regions of Europe, as both pest types represent real risk of damage there.

GM plants are on the slow spread, mainly in the developing countries, where soy and cotton are of greater importance. It has been calculated, however, it would take at present growth rate 158 years for GM crops to capture the entire cultivation area.

The reception of GM maize in Europe is not univocal, or is nearly univocally negative. Under pressure from the World Trade Organization (WTO), the European Union authorized the import of GM hybrids, but committed utilization to the Member States. In turn, certain Member States announced moratoria, and formulated, according the EU requirements, regulations on the parallel cultivation of conventional, ecological and GM crops. Member States were allowed to produce their own special law on coexistence, which regulates the safe cultivation together of crops produced organically, conventionally or by using GM plants. In Hungary, the coexistence law, presently being in force, was accepted by an all-party consensus.

Marcel Bruins, Secretary General of the International Seed Grain Association pointed out at the *EESNET* seed conference in 2008 at Siófok that the greater legislation burden is manifested both at national and international levels. The safety of GM crops intended for food or feed purposes is of utmost importance at the national level.

It is necessary to prove in field trials that the GM plants case harm or damage neither in the agriculture nor in the environment. The issue is being regulated at the international level by the Cartagena Biosafety Protocol, Codex Alimentarius and OECD. Mr. Bruins also stated „However, ISF requests the developers of GM crops to release the testing methods appropriate for monitoring products of GM technology even at incidentally low level in the conventional environment".

Social reception and the issue of market position cannot be ignored in Hungary, either. The country produces 7–8, last year 9 million tons of maize. One-third of this amount is used domestically, while the greater part of the produce remains to be intended to market abroad. Tenders arrive only for GM free maize.

In summary, in hope to reassure the domestic general professional public, it is stated that there is no danger of GMO, because

– there exists no foreign GM varieties that would be worthwhile to domesticate;
– the domestic research in biotechnology have not fulfilled the promised and expected scientific result, and genetically modified are not yet even at the horizon;
– and as for research, it can be committed to the present distributors of funds, but the worlds of István Láng can be borrowed from one of his interviews: „The most severe problem waiting for a solution – bringing vast responsibility to scientific researchers – is, therefore, the conservation and reasonable utilisation of the Hungarian arable lands. The economic exploitage, exploration, marketing of the soil of erstwhile plough-lands and abandoned gardens is also the key of the social problems of rural areas."

I would like to add that the most economic and obvious task of crop cultivation is to realise the yield potential of the new varieties developed during the last few years. At the same time it is the national interest of Hungary to retain its GM free status as long as possible. Even if the EU, under the pressure of WTO, were imposed to authorise unlimited cultivation of GM varieties, it would still not mean obligatory introduction of these crops for us as well. Excellent conventionally bred maize hybrids are available for the maize producers in Hungary, capable to fulfil both the domestic and the export demands.

With all these factors considered, the issue will have to be decided: yes or no for GMOs? To force the import of presently existing GM maize is an extremely short sighted policy. It is absolutely transparent, should these varieties occupy the arable areas, any form of domestic corn breeding, conventional or genetically modified equally, would become useless. Maize breeding should be ceased immediately, fundamental research geared to genetic modification should be stopped, why to push such research, without chances, to achieve something that has already been developed abroad, and can be freely (or against a license fee) accessed? It is expected that successful multinational firms will appear in the near future with numerous genetically modified plant species, and we can select from these. We may select those proven to pose harm neither to human health, nor to the environment, including our soils and the living world surrounding us. Yet a pioneer role in the introduction of GM crops must not be taken upon ourselves, and it has to be avoided to become a guinea pig for genetic experimentation.

Keywords: GMO, *MON 810, MON 863*; *MON 88017*; *WTO*; coexistence; Marcel Bruins; *Cartagena Biosafety Protocol*; *OECD*; *ISF*
Data of publication and link: *Magyar Mezőgazdaság*, 2009. **64** (11): 32–33.

Gains of the „biomass fever”

Iván Gyulai

The Ecological Institute for Sustainable Development,
H-3525 Miskolc, Kossuth u. 13, Hungary
E-mail: gyulai@ecolinst.hu

There is a growing resource need by the society, while natural resources are being exploited far beyond their carrying capacity. Depleting energy resources and population/industrial growth urge the search for new types of renewable energy sources, such as biomass. Biomass is of small energy density and requires extensive land usage by either involving new intact habitats, or using cultivation areas presently used for crops produced by the agriculture. In this respect, food and energy production compete each other. Genetic engineering is being used and tested in every aspect of biomass production, focusing on various target genetically modified organisms (GMOs) including crops, bacteria, yeasts and catalysts. Researchers attempt to genetically engineer plants that grow faster, have high sugar content, contain more cellulose or less lignin, have greater resistance to stress conditions. Alternatively, microorganisms are also being genetically modified to improve fermentation or facilitate the breakdown of cellulose. As a latest development, modified algae to produce future fuel have been of great attention. Enhanced agricultural production of GMOs have raised serious doubts concerning their environmental impacts. In the case of energy crops, however, potential environmental risks may skip the attention of research and public discussion, as GMOs for non-food products get less attention from the consumers.

Keywords: biomass, utilization in energetics, GM energy plants, food price, natural regeneration capacity, geochemical cycles
Data of publication and link: *Biokontroll*, 2010. **1**: 33-39;
http://www.biokontroll.hu/cms/images/stories/Biokontrol/downloads/Biokontrol_01.pdf

***

Does the world need genetically modified plants?

András Takács-Sánta

Eötvös Loránd University, Faculty of Science, Centre for Environmental Science, H-1117 Budapest, Pázmány Péter sétány 1/A.
E-mail: tsa@mail.datanet.hu

The world's agriculture produces a tremendous amount of food at a tremendous environmental cost. Moreover, though the food produced would be enough for the nearly 7 billion human inhabitants of the world, about 1 billion people suffer from hunger due to the unequal distribution of food. The main question of the present article is whether genetically modified plants would be able to reduce environmental problems and hunger. The agrobiotech industry usually answers 'yes' to this question, but reality is much more complicated. GM plants produced nowadays do not (really) alleviate environmental problems, and it is totally uncertain, which types of GM plants will be chosen for cultivation in the future. Furthermore, it is very likely that increasing yields by the help of GM plants would not reduce hunger, since it is not a yield-related issue. All in all, though in certain cases GM plants would seem to be a good choice, there are virtually no signs of this technology increasing human well-being, while it is burdened with great risks.

Keywords: agrobiotechnology, GM plant, hunger, environmental problems
Data of publication and link: *Biokontroll*, 2010. **1**: 5–12;
http://www.biokontroll.hu/cms/images/stories/Biokontrol/downloads/Biokontrol_01.pdf

Authors' response to the Statement of the European Food Safety Authority GMO Panel concerning Environmental Analytical and Ecotoxicological Experiments Carried out in Hungary

Béla Darvas,[a] András Székács,[a] Gábor Bakonyi,[b] István Kiss,[b] Borbála Biró,[c] Ilona Villányi,[c] László Ronkay,[d] László Peregovits,[d] Éva Lauber[a] and László A. Polgár[a]

[a]Department for Ecotoxicology and Environmental Analysis, Plant Protection Institute, Hungarian Academy of Sciences, H-1022 Budapest, Herman Ottó u. 15, Hungary;
[b]Department of Animal Science and Ecology, Szent István University, Gödöllő;
[c]Department of Soil Biology and Biochemistry, Research Institute for Soil Science and Agricultural Chemistry, Hungarian Academy of Sciences, Budapest;
[d]Hungarian Natural History Museum, Budapest
E-mail: bdarvas@freemail.hu

The GMO panel of EFSA published a statement on June 8, 2005, regarding the temporary moratorium ordered by the Hungarian Minister of Agriculture on Jan 20, 2005, on maize variety based of *MON 810* genetic event, and regarding the corresponding environmental analytical and ecotoxicological survey performed. In its statement the GMO panel debated whether the concerns from the aspect of environmental science, set forth in four areas, would be sufficient to enact such measure of precaution, and expressed their statement that registration of genetically modified organisms can be restricted in EU Member States only if it is justified with risk factors thoroughly proven scientifically. The GMO panel of EFSA ignored the fact that the Author of the decree is the Minister of Agriculture of the Hungarian Government, who has ascertained through his colleagues the profoundness of our methodology and credibility of our data, while the GMO panel has not even attempted to do so. It is unsubstantiated and in international diplomacy unusual that the competency and right of disposal of the Hungarian authority on gene technology on the unique habitat types and ecosystems in our region (the so-called Pannonian Bio-Geographical Region) is questioned by a committee specified on food safety. At the same time the GMO panel of EFSA would have been obliged to propose that Monsanto, the owner of the maize variety, should supply the deficiencies regarding the environmental concerns raised. Yet this assignment of its own the GMO panel has not fulfilled.

In contrast to the statement of the GMO panel of EFSA, the Hungarian studies have not focused at all on monitoring effects on human health. Therefore, it is not adequate to relate them to this area in any context. As for the environmental and ecotoxicological effects, the GMO panel of EFSA promises – and later misses to fulfil – the evaluation whether the Hungarian (i.e., Carpathian Basin) ecosystem differs from those in the neighbouring countries. The Carpathian Basin is considered a substantive Bio-Geographical Region, subject to right of disposal, by ecological sciences and by two EU directives on the protection of habitats and species (Wild Birds Directive, 79/43/EEC and Habitat Directive 92/43/EEC). In our general opinion the GMO panel of EFSA issued a superficial statement related to areas beyond its competency, therefore, its conclusions improper for scientific consideration are refused. Our answer specifies our detailed opinion.

Keywords: EFSA GMO Panel, *MON 810*, Pannonian Bio-Geographical Region
Data of publication and link: *Növényvédelem*, 2006. **42**: 313–325;
http://www.bdarvas.hu/tudomany/okotoxikologia/idn4006

***

The hereafter of Hungarian scientific lectures for EFSA GMO Panel (Parma, June 11, 2008)

Katalin Rodics,[a] Hajnalka Homoki,a Gábor Bakonyi,[b] Béla Darvas[c] and András Székács[c]

[a]Ministry of Environment and Water, H-1011 Budapest, Fő utca 44–50, Hungary;[11]
[b]Department of Zoology and Ecology, Szent István University, Gödöllő;
[c]Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest

A meeting was held on June 11, 2008 among Hungarian authorities and researchers carrying out scientific environmental studies on *MON 810* maize, as well as certain members of the GMO Panel of the European Food Safety Authority (EFSA). The reason calling for this meeting was the fact that the EFSA GMO Panel assessed the arguments behind the Hungarian moratorium differently from the Hungarian statement. In cases, when significant differences in the opinions exist, it is the obligation of EFSA to carry out conciliation disputes. The researchers held detailed presentations on the

[11] New address: Ministry of Rural Development, Department of Rural Development Strategy, Biodiversity and Gene Conservation Unit, H-1055 Budapest, Kossuth tér 11, Hungary

meeting summarising the Hungarian research results and answering all questions of the members of the GMO Panel. Upon the event, the minutes of the meeting prepared by us have been sent to EFSA, but to date remained without any response. EFSA announced its current opinion on the Hungarian moratorium on June 11, 2008. Regarding this issue, a telephone conversation was held on June 15 between the competent manager of the Hungarian Ministry of the Environment and Water an the Head of the Environmental Directorate of the European Commission, where the Hungarian party stated the following: (*i*) the Hungarian competent authority fully rejects the procedure and the opinion by EFSA; (*ii*) in our view EFSA repeatedly ignores all research on potential risks of GMOs; (*iii*) EGFSA practically reverses the burden of proof regarding the precautionary principle. The subject to be studied, financed by the Member States instead of the developer, is not whether environmental problems exist, but whether new environmental effects, significant by the standards not specified by EFSA, emerge. This completely contradicts the spirit of the corresponding Commission directive.

To answer the opinion of EFSA, an official letter was sent in October, 2008 (see the Annex). The letter refuted in detail the erroneous statements of EFSA. It has been stated, not only we disagree with the content of the EFSA opinion, but have a grievance of the entire procedure. A two hour meeting cannot be sufficient to clarify significant differences in the opinions. We objected to the fact that members of the EFSA Panel expressed no doubt whatsoever and showed no disagreement with the Hungarian results, raised no new questions beyond the previous ones during the meeting. True dispute did not take place during the meeting, EFSA has not assessed at depth our claims. It has also been stressed in the letter of response that the difference in opinions continues to exist, and the below points were proposed: (*I*) the European Commission should not close the issue, but remit it to further scientific dispute regarding the question; (*II*) experts independent from EFSA should be involved; (*III*) the Environmental Directorate of the European Commission should also actively engaged in the issue, as not only scientific, but legal issues have been raised among the arguments of the Hungarian moratorium, and these issues have not yet been answered. To date no response arrived from the European Commission to our propositions.

Similar opinions by EFSA on other Member States also holding moratoria to *MON 810* maize were issued on June 3, 2008, regarding Greece and in October, regarding France. The content of these opinions is practically identical with the opinion on the Hungarian moratorium. As for Austria, a similar meeting among Austrian experts and the EFSA GMO Panel is to be held this December, and EFSA is expected to announce its condemning opinion regarding the Austrian moratorium within this year.

The strategy of the European Commission regarding the lift of these moratoria can only be guessed. We are under the impression that the Commission is going to present again its motion to lift the moratoria of these four Member States, shortly after the EFSA opinion refusing the Austrian arguments is announced. This seems to be very feasible during the Czech presidency (the first half of 2009), as the Czech Republic is engaged in remarkably pro-GM politics, and will put the Commission proposal on the agenda of the Environmental Committee without further ado. It would likely be more expedient to us, if the Commission attempted to lift the moratoria of all four countries together, a sin that case the countries in practically at a national competence level is rather fraught with risks.

Annex

The Hungarian letter of response and its Annexes

Subject: Hungarian comments on the Scientific Opinion of the Panel on Genetically Modified Organisms („Request from the European Commission related to the safeguard clause invoked by Hungary on maize *MON 810* according to Article 23 of Directive 2001/18/EC") (Question No. EFSA-Q-2008-316), Adopted on 2 July 2008)

The opinion of the GMO Panel of the EFSA on the Hungarian safeguard clause regarding the genetically modified maize line MON 810 was published on 11 July 2008.

As you are aware before the adoption of the EFSA opinion a meeting took place between a group of members of the GMO panel and Hungarian scientists who have conducted the studies in Hungary regarding the environmental effects of *MON 810*. The meeting was held on 11 June 2008 in Parma where two representatives from DG ENV – Mr Yannis Karamitsios and Ms Bernadette Murray – also took part.

During this technical meeting, three Hungarian scientists gave presentations:

– Prof. Gábor Bakonyi (Szent István University, Gödöllő) on the assessment of the soil biological effects of the genetically modified maize line *MON 810*;
– Prof. Béla Darvas (Plant Protection Institute, Hungarian Academy of Sciences) on the assessment of ecological impacts of the genetically

modified maize line *MON 810* on Hungarian protected butterflies as well as on the development of insect resistance to maize containing the *MON 810* event; and

- Dr. András Székács (Head of Department, Plant Protection Institute, Hungarian Academy of Sciences) concerning the decomposition of stubble residues of the DK-440 BTY maize (containing the *MON 810* event), and on the estimation of the Cry1Ab toxin output of this maize line.

Following the presentations questions have been put forward by the members of the EFSA GMO Panel (see our recollection of the meeting enclosed). Apart from these questions, no other points have been raised, neither have objections been made, doubts expressed or interpretations challenged.

Through various communications we have, following the meeting learnt with great surprise that in fact the Hungarian presentations have been considered insufficient and incomplete by some panellists. This has been expressed despite the fact that the members of the EFSA GMO Panel have not engaged in any real dialogue with the Hungarian scientist at the meeting, the Panel has failed to express any substantial concern or disagreement for or against any of the findings presented.

We have attended this meeting in good faith hoping that a real discussion can emerge and progress be made. This goal has not been realised as the Panel proceeded without discussion to reject our arguments. In spite of our efforts the EFSA GMO Panel has still concluded that no new scientific data had been presented. The attitude of the Panel seems to confirm a rather pessimistic view expressed by some Member State representatives beforehand that the meeting would be nothing but a formal exercise to comply with EFSA's procedural obligations.

Our firm view is that EFSA's approach to scientific data presented by others than the notifier gives rise to some serious legal concerns as to the application of the precautionary principle, the cornerstone of Directive 2001/18/EC. We do not doubt the adjudication of the novelty or the scientific nature of research methods, findings etc. necessarily involve a degree of subjectivity. Thus, the occasional refusal of some of the scientific arguments as irrelevant may certainly be justified to fall within a broad margin of manoeuvre. However, the consistent line of refusal of all arguments, data, findings, etc. which point into the direction of scientific doubt – as is the record of EFSA in this case – appears to go beyond any justifiable discretion. And in any case, it should be recalled that the precautionary principle tells us to apply a high standard of care where the safety of the release of GMOs can be called into question. Even the most conservative interpretation of such high standards would require the competent authority to halt the proceedings and investigate the matter in full depth until it can fully satisfy itself that negative impacts on the environment and human health can be excluded.

The lack of a real dialogue at the meeting suggests that the EFSA GMO Panel had no intention to investigate the Hungarian findings in merit. With regard to issues of such scientific complexity a two hour long ad hoc meeting is no doubt insufficient to resolve outstanding differences in opinion and most certainly insufficient to come to definitive conclusions. It is highly regrettable that no official minutes have been taken at the meeting that could verify the proceedings and arguments.

Significant differences of opinion remain between the EFSA GMO Panel and the Hungarian authorities, especially in aspects of environmental safety, the uniqueness of the environment in Hungary (Pannonian Bio-Geographical Region), and the interpretation and significance of the data presented in support of the Hungarian standpoint. The Hungarian authorities have, to date, not been given any possibility to discuss or resolve these differences. It also must be pointed out that the level of expertise presented by the EFSA GMO Panel at the meeting appears at times to fall short of that required to adjudicate in substance the Hungarian findings.

In order to make progress to achieve the necessary environmental safety, we suggest that

- further discussion and real dialogue be held in this regard;
- independent experts be involved in the process;
- DG ENV should actively take part in the discussions, as several relevant aspects extend beyond the mandate and nominal expertise of EFSA (whose main responsibility is food safety).

Consequently, we would like to confirm that the Hungarian authorities disagree with EFSA's procedure and statement and insist that all studies carried out by our experts be handled as scientifically relevant and valid. In our view our studies clearly indicate that *MON 810* can have negative effects under conditions prevailing in Hungary's natural environment, justifying the non-release of GMOs in light of the precautionary principle. Our detailed scientific comments are presented in the annex hereto.

We strongly believe that the difficulties experienced by Member States' authorities in the GMO authorisation procedure can only be overcome through real and effective cooperation between the relevant EU authorities and scientific experts or bodies of Member States. The Hungarian authorities remain fully committed to such transparent dialogue.

Sincerely yours,

Gábor Baranyai
Head of Department

Annex I.

Specific scientific comments regarding the EFSA opinion dated 2 July 2008

A further issue of utmost importance is the statement of the EFSA GMO Panel that neither the Hungarian document nor the delegation proved that the "environment" is sufficiently different in Hungary to warrant additional biosafety tests. We strongly believe that this aspect is actually enshrined in EU legislation in the birds and habitat directives. Furthermore, it is the responsibility of EFSA, as specialised, independent expert organisation (in food safety, not European nature or environment) to ask for clarification on this matter from the relevant EU authority (DG-ENV or its appropriate nature protection or legal organisations) or ask for assistance of appropriate experts (ecologists) who are fully aware of the special ecological features and characteristics of the different regions of the EC. In this aspect EFSA failed to follow an appropriate, justified procedure.

I. Effects of maize **MON 810** *on soil biology*

The EFSA GMO Panel did not take into consideration the data and arguments of the presentation by Prof. Gábor Bakonyi. Prof. Bakonyi gave conceptional models to test, summarised published, unpublished and newly obtained data on the effect of *MON 810* on the springtail *Folsomia candida* and the soil nematode community. These include published data, results presented in final reports provided for the Ministry of Environment and Water, as well as results of new analyses. This omission is not understandable.

The EFSA opinion does not make any difference between the effect(s) of Cry1Ab toxin and *Bt*-maize. The claim is not that adverse effect of the Cry1Ab toxin was found, but that in many cases statistically significant differences between the effects of *Bt*-maize and its isogenic counterpart were found (see Report #1). These data should be considered as new scientific results independent of the fact that it in other comparisons (e.g., with other *Bt*-maize line or in other soil type) greater difference(s) may be found. The GMO panel asks for further analysis on page 7, paragraph 8 as well as on page 8, paragraph 3. However, even the consent holder has not carried out those experiments under our specific environmental conditions. It should also be noted that the researchers were not provided access to *MON 810* maize seeds even after the request by the Hungarian Ministry of Environment and Water.

Apparently, the consent holder is not willing to cooperate in clarifying these issues.

Hereby we reiterate the Hungarian position regarding the role and importance of the systematic regional research as well as the independent control studies which could indisputable clarify such outstanding issues. Member States themselves should be enabled to carry out scientific studies regarding the environmental or health risks of particular GMOs which have entered into the authorization process in the framework of their national scientific institutions. In our opinion, exclusively in this way can it be proved and assured that risks of GMOs are studied and assessed in an appropriate manner.

At present, Member States have the opportunity to study the documentation submitted by the notifiers during the authorization process. This is insufficient for Member States to verify whether all scientific data are accurate in the framework of control studies carried out by their national research institutions if notifiers disagree with these experiments and therefore not intend to cooperate in this regard.

The GMO Panel evaluated the data presented by Hungary and agreed with the conclusions drawn by the authors: "In the current stage of our studies and based on the available techniques we have no data at all concerning whether the differences found in some cases in the decomposition of organic material are a consequence of differences in the chemical composition of the two maize strains or of the presence of *Bt*-toxin (Hungarian report #3)." this is not equivalent to the interpretation by the GM Panel that "there are no issues to study". In our view, the right conclusion is that new research is necessary to clarify this issue as soon as possible.

Furthermore, Prof. Bakonyi stated that "the relationships between the food chains based on bacteria and those based on fungi underwent a process of rearrangement" in their nematode experiment. The GMO Panel states in its opinion that "rearrangements of nematode populations occur frequently and are not necessarily an indication of environmental harm" (page 8, paragraph 4). However, we reject the reasoning that "there is no evidence presented supporting the conclusion of rearrangements of nematode populations due to maize *MON 810*" because in our view, this is not the right conclusion. There was a significantly lower density of *Aphelenchus* ($p = 0.00$), *Ecumenicus* ($p = 0.00$), *Eudorylaimus* ($p = 0.01$), *Heterocephalobus* ($p = 0.00$), *Prismatolaimus* ($p = 0.036$), in the number of nematode genera ($p = 0.02$), microbial biomass ($p = 0.00$), fungivorous : bacterivorous ratio ($p = 0.01$) in the soil of the *MON 810* maize . These data do not support the EFSA GMO Panel opinion. Moreover, Panel members did not dispute these data during the Parma meeting.

In the chapter entitled "Non-target organisms: Collembola" the GMO Panel argues: "The different consumption of *Bt*-maize may be due to nutritional differences, as suggested by the C/N ratio" (and text before). We agree with this statement. However, the C/N ratio of *Bt*-maize was favourable for *F. candida*. In spite of this, they preferred isogenic maize. Therefore we can conclude that the Panel's interpretation supports the Hungarian conclusion.

One essential conclusion by Prof. Bakonyi was in Parma that soil biodiversity is an important point for consideration (Bakonyi *et al.*, 2006). Different response of distinct species to GM plants is a key issue in the risk assessment. The GMO Panel of the EFSA has to deal with this particular issue when assessing the environmental risks of different types of GMOs including the maize line *MON 810*.

Reference: Bakonyi, G., Szira, F., Kiss, I., Villányi, I., Seres, A., Székács, A. 2006. Preference tests with collembolas on isogenic and Bt-maize. *European Journal of Soil Biology*, **42**: S132–135.

II. Effects of maize MON 810 *on target and non-target organisms*

The EFSA GMO Panel states that due to the different composition and mode of action of Cry toxins formulated in bacterial insecticides and in *Bt*-maize, it is not possible to conclude on the environmental risks of maize *MON 810* and the Cry1Ab protein from data generated with DIPEL®. In spite of that, DIPEL served as a treated control in the Hungarian experiments. *Inachis io*, which is protected in Hungary, is very sensitive to Cry1 toxin as Prof. Darvas mentioned in his presentation on the informal expert meeting in Parma (which was not cited in the EFSA opinion). The risk analysis is usually based on DIPEL, and this is the reason why consent holders do not repeat several types of experiments with Cry1 toxin producing GM maize. The GMO Panel of the EFSA should clarify its position, whether Cry toxin producing GM plants such as *MON 810* should be seen as different or same with DIPEL-type sprays. If they should be seen as divergent, complete and exhaustive toxicological and ecotoxicological studies and documentations are needed for all different types of "Cry-plants".

The EFSA opinion also states that "Reports #3 and #4 submitted by Hungary summarize data on butterfly species potentially occurring in maize field margins in Hungary, shed maize pollen and on estimated pollen densities on host plant leaves. Data from these Hungarian studies demonstrated a potential hazard for certain non-target caterpillars consuming high amounts of maize *MON 810* pollen on host plants." As Prof. Darvas outlined in his presentation, researchers worked with two types of GM maize pollen originated from the two types of seed of DK-440 BTY. They excluded the low Cry1 toxin contained pollen type which resulted in high pollen density in the Hungarian experiments. The EFSA GMO Panel refers only to these studies. However, the team worked in the last two years with the high Cry1 toxin content pollen type with normal pollen density on the edge of maize field. In the framework of the lecture, this issue has bean clarified for the members of the GMO Panel.

The EFSA opinion states that in all these studies an unspecified number of butterfly larvae were exposed on an unspecified number of stinging nettle (*Urtica dioica*) leaves dusted with maize pollen. We strongly disagree with this statement. In all cases the researchers worked with well-known – carefully counted – numbers of eggs or larvae. In all cases they counted and statistically analyzed the pollen distribution on silicon oil treated glass and *Urtica* leaves as well. They carried out experiments with dusting and spraying. During the presentation in Parma this issue has been clarified for the EFSA GMO Panel experts who had no further questions after the lecture in this regard.

It is also concluded in the EFSA opinion that "Results present mortality rates of butterfly larvae exposed to *Bt*-maize pollen, but do not contain statistical analysis, nor do they discriminate between mortality due to *Bt*-maize or mortality due to other causes (viral diseases and parasites)." We do not share the view of the EFSA GMO Panel. Prof. Darvas' research group distinguishes between the different types of mortalities. Especially in the case of parasitism, this has very different symptoms and is simply to differentiate. As Prof. Darvas indicated, he supposes a link between the effect of Cry1 toxin and natural baculovirus infections. He also mentioned that they used probit analysis in case of mortality.

The GMO Panel also refers to Sears *et al.* (2001) who estimated that the proportion of population exposed to toxic levels was very small and concluded that impacts on *Danaus plexippus* populations were minimal particularly when considered against the wide range of existing environmental and agronomic stressors currently influencing populations. This information is not relevant when assessing the risks of *MON 810* under the Hungarian environmental conditions. It should be taken into consideration that Hungary is the second-third biggest maize producer in Europe. This means, maize is a very frequent plant in our country. *Urtica dioica* is the third most frequent weed occurring on the edges of maize fields in Hungary. *Urtica dioica* populations survive the herbicide treatment commonly used in maize. This means that under this circumstances – different lepidopteran species living on a different plant – data concerning *D. plexippus* caterpillars have no relevance in our case. *Inachis io* and *Vanessa atalanta* are protected species in Hungary, and their larval stages overlap with the pollen shed by maize. The risk is clear, postponed development and mortality of a part of larval population and this has been unambiguously demonstrated.

The GMO panel also concluded that "…high pollen exposure where pollen was synthetically adhered to host plant leaves. This is unlikely to occur in the field where environmental factors (e.g., rain, wind) decrease the exposure of lepidopteran larvae to pollen…" We again have a different opinion. During the Hungarian experiments, average pollen exposures were applied in many cases. In laboratory experiments Prof. Darvas' group worked with standard conditions which were repeated later. In a later stage, field experiments will also be needed to calculate the pollen changes on *Urtica* leaves. Wind (very weak at the edge of maize fields due to plant size) and rain (not very frequent during the Hungarian late summer), but the changes in pollen shed of individual plants should be considered, making a complicated situation. Because the herbicide treatment on the outer 5m of the maize field is usually poor, the edge is almost always very weedy.

Finally, the EFSA GMO Panel claims that the Hungarian submission did not supply scientific evidence that the environment of Hungary was different from other regions of the EU sufficient to merit separate risk assessments from those conducted for other regions of the EU.

Hereby we would like to reiterate our view regarding this particular matter. The underlying principle of the Community regime relating to the release into the environment of genetically modified organisms is the precautionary principle and the principle that preventive action should be taken. Recital (8) of the preamble to the Directive states that "…the precautionary principle has been taken into account in the drafting of this Directive and must be taken into account when implementing it". Application of this principle is a fundamental objective of the Directive (Article 1) and a general obligation of the Member States (Article 3 (1)). Derived from this principle is the basic duty that "Member States shall […] ensure that all appropriate measures are taken to avoid adverse effects on human health and the environment which might arise from the deliberate release or the placing on the market of GMOs." (Article 3 (1)).

Implementation of the precautionary principle presupposes the conduct of adequate environmental risk assessments. Recital (19) calls for a case-by-case environmental risk assessment prior to release while recital (25) specifies that such assessment should include a "…satisfactory field testing at the research and development stage in ecosystems which could be affected…". Article 4, paragraph (3) of and Annexes to the Directive make it clear that a "case-by-case" environmental risk assessment implies that risks have to be assessed according to the nature of the receiving environment and that, as a result, "the required information may vary […] depending on the potential receiving environment" (Annex II, Point B).

It follows from the foregoing that a "competent authority should give its consent only after it has been satisfied that the release will be safe for human health and the environment" (recital 47).

In Hungary's view the wider receiving environment of any genetically modified organisms is the main classification unit of the Community's nature conservation legislation, meaning the biogeographical regions. Consequently, so long as no adequate environmental risk assessment takes place for a specific biogeographical region, any release of the particular GMO in that region would run counter the spirit and letter of the Directive, and the obligations laid down in Article 4, paragraphs (1) and (3) in particular (it must be underlined that the latter obliges not only the Member States but also the Commission to see to it that adequate testing does take place). Insufficient testing in the particular biogeographical region may also lead to a breach by Member States of their obligations under Directive 92/43/EEC2 (hereinafter: the Habitats Directive) or Directive 79/409/EEC3 (hereinafter: the Birds Directive) to maintain and protect animal and plants species as well as habitats enjoying Community protection.

In the context of the present case it should be noted that the environmental risk assessment used as the basis for notification has not been carried out for Hungary and the Pannonian Bio-Geographical Region. In our opinion, EFSA, as the independent scientific advisory body of the European Community should be in possession of appropriate experts (ecologists) who are fully aware of the special ecological features and characteristics of the different regions of the EC or if not, ask for assistance from other experts or authorities. In our view, the EFSA staff must be strengthened in this regard. We provided information on the Pannonian Bio-Geographical Region in one of our previous letters. In this letter we pay attention to the fact that ecological sciences acknowledge and apply the technical term "Pannonian Bio-Geographical Region" to designate a set of clearly distinguishable habitat types and ecosystems having special individual features. They also have been recognised by the Community by way of its inclusion in the Habitats Directive as an independent region as well as the listing in the relevant annexes to the Birds and the Habitats Directive of a large number of new species and habitat types that are endemic in this biogeographical region.

***

Annex II.

Technical meeting between the EFSA and Hungarian national experts on the scientific background of the safeguard clause on **MON 810**

11 June 2008, Parma

Participants: Per Bergman, EFSA GMO Unit; Karine Lheureux, EFSA GMO Unit; Yann Devos, EFSA GMO Unit; Sylvie Mestdagh, EFSA GMO Unit; Niels Hendriksen, EFSA GMO Panel; Jeremy Sweet, EFSA GMO Panel; Gijs Kleter, EFSA GMO Panel; József Kiss, EFSA GMO Panel; Detlef Bartsch, EFSA GMO Panel; Salvatore Arpaia, EFSA GMO Panel; Yannis Karamitsios, DG ENV; Bernadette Murray, DG ENV; Gábor Bakonyi, Szent István University, Gödöllő; Béla Darvas, Plant Protection Research Institute of the Hungarian Academy of Sciences; András Székács, Plant Protection Research Institute of the Hungarian Academy of Sciences, Katalin Rodics, Hungarian Ministry of Environment; Hajnalka Homoki, Hungarian Ministry of Environment.

Per Bergman, Head of the GMO Unit of the EFSA opened the meeting. On behalf of the European Commission, Yannis Karamitsios gave a short summary on the background and history of the Hungarian safeguard clause on the genetically modified maize line *MON 810* and stressed the importance of the scientific cooperation between EFSA and Member States experts.

On behalf of the Hungarian delegation, Katalin Rodics expected that after a fruitful discussion the EFSA's GMO Panel will be ready for the revision of their previous opinions regarding the scientific background of the Hungarian safeguard measure. She asked the EFSA Panel to consider the Hungarian report confidential and treat the data stated accordingly.

Prof. Bakonyi held a presentation on the assessment of the effects of the genetically modified maize line *MON 810* on the soil. The presentation was about (*i*) the results of laboratory experiments with collembolan *Folsomia candida* and (*ii*) about the nematode community structure analyses in the soil of *Bt* and isogenic maize. According to the results of the collembolan experiments a clear figure emerged. It can be summarised as follows: avoidance of *Bt* leaf → less consumption → reduced reproduction → (*a*) decreased feeding activity in the field? → (*b*) lower population density(?). There were not any questions regarding this part of the presentation. Analysis of the soil nematode community structure as well as the CO_2-production and microbial biomass proved a shift from fungal-based to bacterium-based food web in the *Bt*-maize soil. This phenomenon may be a sign of the distribution of *Bt*-maize soil.

Drs. Jeremy Sweet, Niels Bohse Hendriksen and Salvatore Arpaia addressed questions to the presentation. In Jeremy Sweet's opinion, the presentation of results of the food preference tests was not clear. This issue has been explained in detail and accepted that *Bt*-maize (*MON 810* producing Cry1Ab toxin) proved to be a less preferred food source for *Folsomia candida* than the isogenic one. No similar phenomenon was found in the case of *Heteromurus nitidus* and *Sinella coeca*. Niels Bohse Hendriksen raised a question on the calculation methods of Enrichment Index and Channel Index, two important measures of nematode community structure. The question was partly answered during the presentation, and partly later on in an email message. According to the opinion of Salvatore Arpaia, it is a new finding that a shift from fungal-based to bacterium-based food web was observed in the *Bt*-maize soil. No open questions remained after the discussion.

Prof. Darvas held a presentation on the assessment of the ecological impacts of the genetically modified maize line *MON 810* on Hungarian protected butterflies, *Inachis io* as well as on the development of insect resistance (*Plodia interpunctella*). The basis of the lecture was the report from 2006 (80 pages) on the scientific results. The most important statements were as follows: (*i*) at the edge of DK-440 BTY 300–600 pollen/cm^2 were the average; (*ii*) treating *Inachis io* for 12 days (L1-L3) caused a slight larval mortality (20–30%). Survivals had lower larval weight. Moving them to untreated nettle they recovered; (*iii*) treating *Inachis io* for whole larval period (L1-L5) caused a high larval mortality (>90%). Cypovirus-2 played an additional role in high mortality; (*iv*) 2 ppm DIPEL caused similar effects. For the experiments Monsanto gave two different kinds of DK-440 BTY seeds. Plants developed from the normal sized seeds produced 80–130 ng Cry1Ab toxin/g pollen. Plants developed from the half sized seeds produced 2–10 ng Cry1Ab toxin/g pollen. We discarded the results (usually they had no effects) which used this latter pollen.

Salvatore Arpaia asked whether a full risk analysis was performed. According to the Hungarian Act on Nature Conservation, in the case of the protected species, there is zero tolerance. The natural environment and habitat of protected animals should be unchanged and preserved. Detlef Bartsch asked several, mainly technical questions. In his opinion herbicides also change the environment of this species. In his answers Prof Darvas mentioned: (α) they worked on nettle which can survive the Hungarian weed technology used in maize; (β) nettle with perennial roots lives in the field drain system, where herbicide treatment is not effective.

Results on Cry1-resistance are incorporated in the 2005 report (64. pages). Most important findings are the following: (*a*) ten generations needed for the development of Cry1-resistance; (*b*) Cry1-resistance is inherited; (*c*) Cross-resistance has been developed to DIPEL; (*d*) Metabolic basis of Cry1-resistance is supposed. No questions arrived about this part of lecture.

Dr. Székács held a presentation on the estimation of the Cry1Ab toxin production of the DK 440 BTY maize (containing the *MON 810* event), on the studies concerning the decomposition of the stubble residue of this maize line, as well as on the comparisons of the Cry1Ab toxin findings in *MON 810* and DIPEL. The main statements of the presentation included: (*i*) Cry1Ab toxin is being produced both at the highest concentration and amount in the leaves; (*ii*) upon a 16-month monitoring study, the overall toxin amount produced is detectable in the stubble at 1–4% (depending on the harvest technology applied) after 12 months after seedling; (*iii*) considering worst case scenarios, the toxin amount produced on the field, may exceed the Cry1Ab content of the registered amount of the biological pesticide DIPEL by orders of magnitude. As for this last issue, severe fundamental and methodological difficulties in elucidation of the active ingredient content of DIPEL were mentioned. As for corn varieties containing *MON 810* genetic event, the attention of the EFSA experts was also called upon the fact that (*a*) they could not be registered as pesticides or pesticide technologies, as their active ingredient, active Cry1Ab toxin has not been evaluated toxicologically; (*b*) the plan produces the toxin during the entire vegetation period, regardless whether the toxin is needed or not; (*c*) toxin production is not even during this period; (*d*) neither analytical standards, nor standardized and continuously provided analytical methods are provided for monitoring the active Cry1Ab toxin produced by the plant. Székács András also emphasized the fact – which he has already stressed both in front of EFSA and at domestic round-table conferences –, that plants containing *MON 810* genetic event and other genetically modified plants producing pesticide active ingredients or their derivatives should be subjects of pesticide registration requirements.

In their responses, Niels Bohse Hendriksen asserted that the measurement of the active ingredient content of DIPEL has a serious methodological problem: the registration specifications of the preparation require only the proper biological activity, miscellaneous analytical directions were valid only until year 2000. Hereby we draw the attention of the GMO Panel of the EFSA that this statement does not contradict with the Hungarian presentation, as Dr. Székács stressed the fact that severe fundamental and methodological difficulties exist in the scientific praxis in elucidation of the active ingredient content of DIPEL and its comparison with the toxin amount produced by maize *MON 810*. In our opinion, such methodological problems regarding the detection of the active ingredient in the registered reference preparation containing Cry1Ab, along with the facts that the active ingredient of *MON 810* is not the same as that of DIPEL, requires a more severe registration process for this genetically modified maize: plants containing the *MON 810* genetic event and other genetically modified plants producing active pesticide ingredients or their derivatives should be subjects of pesticide registration requirements. As the active ingredient of *MON 810* is not the same as that of DIPEL (*MON 810* produces a truncated, already activated toxin, unlike DIPEL containing Cry protoxin crystals), *MON 810* should undergo a toxicological evaluation that apply to a new pesticide formulation with a not yet registered active ingredient. During the meeting it seemed that according to his comment, Niels Bohse Hendriksen rather agreed with this claim than confronting it.

Jeremy Sweet reflected to the registration issue mentioning that genetically modified plants are requested to be registered in the EU only as new plant varieties, not as pesticides or pesticide technologies. In contrast, such plants are considered in the US as pesticides. The European registration issue is presently being re-evaluated, on which Jeremy Sweet asked the DG ENV legal expert present, Yannis Karamitsios.

Neither during the meeting, nor afterwards have further questions been raised. After the meeting, no minutes has been issued by the EFSA.

Keywords: Per Bergman; Karine Lheureux; Yann Devos; Sylvie Mestdagh; Niels Hendriksen; Jeremy Sweet; Gijs Kleter; József Kiss; Detlef Bartsch; Salvatore Arpaia; Yannis Karamitsios; Bernadette Murray; Gábor Bakonyi; Béla Darvas; András Székács; Katalin Rodics; Hajnalka Homoki; EFSA GMO Panel; *MON 810*; GM maize; Hungarian moratorium; Pannonian Bio-Geographical Region; Gábor Baranyai; *Folsomia candida*; Dipel; DK-440 BTY; *Urtica dioica*; *Inachis io*; *Vanessa atalanta*; *Danaus plexippus*; *Plodia interpunctella*; Monsanto; Cry toxin; Cry1-resistance; Habitat Directive; Birds Directive
Data of publication and link: *GMO Round-table Leaflets*, 2008. **19**: 5–14.

POSITIONS OF THE GMO ROUND-TABLE

Statement regarding the authorization of genetically modified (GM) plants in Hungary – No. A-D

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); László Balla (Hungarian Plant Breeders' Association, Budapest); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő), László Heszky (Szent István University, Faculty of Agricultural and Environmental Sciences, Department of Genetics and Biotechnology, Gödöllő); László Holly (Institute for Agrobotany, Tápiószele); Tibor Hullán (Hungarian Seed Association, Budapest); Zoltán Illés (Committee on Environmental Protection of the National Assembly); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); László Papp (Hungarian Natural History Museum, Budapest); György Pataki (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő; Institute of Business Economics, Corvinus University Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); András Takács-Sánta (Eötvös Loránd University, Faculty of Science, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest)

According to our independent professional opinion, Hungary has no cultivation, plant protection, economic and social interests involved in the production of the current GM plants or of those under introduction, whilst several interests (seed grain or organic production, improvement, apiculture, environment and nature protection, food safety etc.) could be affected. The rejection by consumers is significant due to absent or insufficient nutritional research. Losing our GM free status seriously endangers our domestic and export markets. The authorization of GM plants in Europe currently is in progress with numerous anomalies. We propose the following:

(***A***) Hungary should not to give up her rightful demand to maintain her position to make decisions regarding her territory and her goods. A factor limiting our sovereignty in this question is that the authorization of the release of GM plants is the competence of the European Union (EU) and therefore there is little or no national possibility to influence the decision making mechanism or the decision itself. There is no Hungarian member on the GMO panel of the European Food Safety Authority (EFSA), therefore our national interests are not represented there. This committee makes decisions too rapidly and superficially, is impatient when faced with national worries and is not well prepared for a standpoint on questions regarding environmental sciences. This is why we recommend our politicians who represent Hungary in the EU

(*Aa*) to take steps to have a fully authorized Hungarian member on the GMO panel of the EFSA GMO;

(*Ab*) for the EU to create an independent environmental science specialist committee, which assesses the GM plants on this level (in the United States the authorization of food and medicine is separated, i.e., the FDA from the environmental protection activities of EPA);

(*Ac*) for Hungary to develop those regulatory techniques with which she can take the practical authorization process during or following the EU decision, referring to her own territory, in effect on it's own merits(in the United States the authorization of a specific pesticide is at state level; only the minimal requirements are recorded at federal level).

(***B***) Hungary not to give up the demand to be able to utilize only such tools in agriculture that are safe and are necessary for her. Therefore, with the participation of the Hungarian Academy of Science (HAS), the Agricultural Ethics Committee of the HAS and the GMO Sub-committee of the Committee on Environmental Protection of the National Assembly have to be established, without the approval permissions of which no GM species can be sown, not even the species which already have European authorization. This creates the possibility for a national control prior to the first release, which currently can be evaded with tests carried out in the less strict countries of the EU. For this

(*Ba*) we support the effort of the President of HAS to establish the Agricultural Ethics Committee of HAS, which demands the domestic primary effect tests and we request a legal phrasing in connection with this to be created in the provision of law. It also should be included in the legislation that the owners of the species involved are obliged to supply seed for sowing for the independent domestic primary effect tests. The hindering of this should make the termination of the authorization process possible;

(*Bb*) we support the effort of the Committee on Environmental Protection of the National Assembly which establishes a GMO sub-committee, and we request to record in the provision of law their request, that the release of the GM species even with a European authorisation but without the specific environmental science documentation carried out for the Pannonian Bio-Geographical Region and thus circumventing risk analysis, should not take place in Hungary. It also should be legislated that the owners of the species involved are obliged to supply seed for sowing for the independent domestic side effect tests. The hindering of this should make the termination of the authorization process possible.

(***C***) The coexistence regulation to provide equal opportunity for the organic producers and also the apiarists. As in our case from the perspective of pollution there is no tolerance, when determining their isolation distances the values recommended by them should be used. This means that at every grown plant species two isolation distances have to be determined, one with reference to the traditional producer, which should be effective only in the case if in the wider radius circle there is no organic producer or in the case of entomophilous plants no apiarists with permanent sites. Special rights have to be ensured for seed grain producers, managers of and those improving nature protection areas, who can justify their requirements for exceeding this distance.

(***D***) The intention of local governments and regions has to be strengthened and ensured in legislation to establish areas free of genetic modification. In this case this regulatory form should be in effect for the growers producing within their areas.

We request the Government of the Republic of Hungary and the governmental organizations to kindly bring influence to bear on the recommendations described above through the national jurisdiction and European Union negotiations.

Keywords: genetically modified plants; GMO; GMO Round-table; EFSA GMO Panel; EPA; FDA; HAS; coexistence; isolation; organic agriculture; GMO-free zones

Data of publication and link: *The Position of the GMO Round-table*, 2005. (November 7) **A-D**: 1–2; http://www.bdarvas.hu/english/gmo_roundtable/idn5852

***

Statement regarding the coexistence regulation in Hungary – No. E

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology); László Balla (Hungarian Plant Breeders' Association, Budapest); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); Géza Márai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Zoltán Menyhért (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); László Papp (Hungarian Natural History Museum, Budapest); György Pataki (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő; Institute of Business Economics, Corvinus University Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); András Takács-Sánta (Eötvös Loránd University, Faculty of Science, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen

The version of the coexistence regulation from the Ministry of Agriculture and Rural Development was sent out by the government for a European Union revision, and its debate by the National Assembly is expected for February 2006. We would like to offer the GMO Sub-committee of the Committee on Environmental Protection of the National Assembly (*OKB*) and the Agricultural Ethics Committee of the HAS the following for consideration when forming their opinion:

(*Ea*) The coexistence regulation has to be developed for each of the plant species.[12] In this, the form of pollination, the tendency for seed dispersal (harvest germination- "volunteers") and the ability for vegetative propagation are to be especially treated. Calculations have to always be based on the worse case scenario, taking into consideration the pollen point source

[12] The present position was taken for maize.

without edge rows, the distribution of pollen in the dominant wind direction, the maximum pollen production characteristic of the species and the pollinating of male sterile species. In order to determine the isolation distances only the measured results of domestic tests can be used.[13] During the period of pollination the UV light, the humidity (these influence the life span of the pollen) the wind conditions and further more the pollen-fertility of the species that are in widespread production in Hungary are all significant points. Even the most careful coexistence regulation is only able to slow the spreading of foreign genes released in a large area (pollen distribution – species hybrids, seed dispersal characteristics – volunteer germination, seed transportation – pollution of transport routes, seed storage – accidental pollution of seed grain and food), but cannot prevent it. Therefore the document of the first release is of special importance. This should be drawn up by the *Géntechnológiai Eljárásokat Véleményező Bizottság* (*GEVB*) (Gene Technology Procedure Review Committee) with a qualifying majority refusing or supporting the decision for each of the species and following the approval of the Gene Technology Authority, and of the specialist authority to be made public on the internet.[14] It should compulsorily include: (*i*) the agricultural (primary effect test); (*ii*) the economic-sociological; (*iii*) the nutritional study (these three should be evaluated by the Agricultural Ethics Committee of HAS with a right of veto); and (*iv*) the environmental (reviewed by the *OKB* GMO Sub-Committee with a right of veto) risk analysis, based on which their decision was made.[15]

(*Eb*) The current coexistence regulation regarding maize (wind pollinated, its pollen is collected by domestic honeybees and spread by the Corn Rootworm Beetle)[16] has to clarify the following conditions:

---

[13] This is justified by weather (pollen spreading conditions typical of the species) and species characteristic (e.g., pollen production-ability, proneness to seed loss, etc.) factors.

[14] It is certain that it involves the present structure of *GEVB* (it has to be reorganised for field of research representation and four sub-committees, the economic, social, nutritional and environmental science, which have to be established), in order to have the capacity for this professional work.

[15] The agricultural analysis (*i*) can only rely on the opinion of independent Hungarian organisations. Economic analysis (*ii*) can only be the work of a Hungarian workshop over viewing the main and side effects and the values of the economic operators. The nutritional work (*iii*) needs to be made up of two sub units: forage and nutritional perspectives. The forage work has to refer to the consumer animal (e.g., maize silage – cattle). In this area the consideration of independent work is of special importance. The environmental risk analysis (*iv*) can rely only on the independent tests that were carried out in the Pannonian Bio-Geographical Region.

[16] Regarding the distance and scale of the spread there is no data from Hungary available to us.

We consider the establishment of three examination zones necessary for the strict control:

– in zone one (within a circle of 5 km radius)[17] the relationship between the insect pollinated GM plants (if the pollen is collected by the domestic honeybee for the purpose of food and this way the honey may become contaminated) and of the domestic honeybee has to be examined, also during the pollen dispersion period the permission of the apiarist has to be requested, as the contamination by the transgenic pollen endangers the classification of the honey;[18]

– in zone two (within a circle of 1.6 km radius) the relationship between the production of organic and GM plants, as with the previous zone requires a 100% genetic purity value, therefore is of zero tolerance. It endangers organic production at its very foundations, therefore the appearance of the characteristics of GM plants significantly reduces the value of their products. It is important to know for this, that for example the *cry1A* gene transferred by maize pollen already produces Cry1 toxin in the seeds in the same year, which then cannot be sold as an organic product;[19]

– in zone three (within a circle of 800 m radius)[20] the relationship between traditional and GM plants, for which a tolerance value of 0.9% (labelling threshold value) was determined.[21]

(*Ec*) A farmer,[22] specifically trained in the Hungarian university educational system and having a license, growing GM species has to obtain in every single case in the isolation zones described above the permission of the owners and land users of the areas involved irrespective whether they are maize growers (cf. damage caused by game and seed dispersal during transport); furthermore from the mentioned three zones (irrespective of their

---

[17] *OMMI* has been nominated for the checking but at present has no apparatus to be able to carry out the on-site inspection of such a large area, therefore our recommendation also has an institutional, organisational or supervisory aspect.

[18] The European coexistence regulations are widely forgotten in connection with this relationship.

[19] The appearance of any so called transgenes in the maize crop excludes the possibility of sale as a bio-product.

[20] The 400 meters isolation distance that is widely applied in seed grain production in case of large pollen production pollinators or male sterile or tasselled receiving plants for the determined tolerance value of 0.9% is not sufficient.

[21] The present regulation is attempting to sort out only this system of interconnections. The 0.9% has no scientific base.

[22] We are primarily thinking of the agricultural genetic specialist engineers of the Szent István University (*SzIE*, Gödöllő), and the farmers who completed courses there, but supervised by specialist engineers.

neighbouring areas) the written permissions of the owners and legal land users involved who are registered at the local governments. For example, in the case of maize, within a circle of 5 air km radius the permission of apiarists who are registered according to the law; within a circle of 1.5 km radius the permission of the organic farmers, furthermore of the seed cleaning premises, of seed grain growers, and of nature protection areas; within a circle of 800 m radius the permission of traditional maize growers. The producer has to demonstrate to the permit issuer that their storage is suitable for the separate storage of the GM produce and their equipment appropriate for dispersion free transportation. The permit issuer has to check this by on-site inspection, the fee of which is charged to the GM producer.

(*Ed*) A special financial fund has to be created, the crediting of which, as it is exclusively in their interest, is the common obligation of the species owners and GM growers. The organisation of the GM species owners (e.g., *Barabás Zoltán Biotechnológiai Egyesület* – Barabás Zoltán Federation of Biotechnology) has to create a monitoring and damage prevention fund.[23] This is over and above their annual fees connected with their yearly inspection and registrations fees, and is the full difference between the reduced price of GM seed grain in the initial "sale period" and of the traditional seed grains. The permit holding GM grower and the owner of the species are financially responsible for the economic damage caused by them.[24] The extent of it is determined by the organisations carrying out the quality assurance of agricultural produce. Compensation, in debatable cases, is enforceable according to the practise of the Hungarian law in effect. The legal base for the compensation is enforceable for the objective responsibility[25] existing for damages originating from the operation of dangerous factories, thus for activities with increased danger. (*MKA* – Hungarian Environment Protection Fund) that is proportionate to the size of the sowing area of the seed grain to be sold, from which the monitoring by *OMMI* (National Institute for Agricultural Quality Control) is financed The refinement of the amount is the

---

[23] Consideration should be given to the immediate compensation that has to be financed from the *MKA*, based on the opinion of the quality assurance body, the amount of which will be returned to the fund following court judgement. In case the source of pollution cannot be found, the compensation is charged to the *MKA*, which will relate it back to the amount of the levy imposed by it and will effect the levy charged.

[24] It has to be specified by the state that for the higher price of the seed grain to what proportion the owner of the species should contribute.

[25] According to point (2) of paragraph 345 of the Civil Code: "These rules have to be applied for those who also cause loss to others by their activity that endangers the environment." The public growing of GM plant can also be included within this.

task of the Gene technology Specialist Authority and of the specific authority; however it should include ten rapid tests to be carried out at each neighbouring maize producer. It should also be considered that in debatable cases a detailed, perhaps accredited test is also carried out. The owner of the species has to guarantee a cheap and continuously available measuring methods appropriate for the environmental analytical (soil, plant and animal samples) tracing of their product. Any GM producers, prior to planting have to pay into this fund (*MKA*)

Keywords: genetically modified plants; GMO; GMO Round-table; coexistence; pollen; intraspecific hybrid; interspecific hybrid; isolation, wind pollination; insect pollination; honey bee; organic farming; seed production; monitoring; damage prevention fund
Data of publication and link: *The position of the GMO Round-table*, 2006. (January 14) **E**: 1–3; http://www.bdarvas.hu/english/gmo_roundtable/idn5853

Figure 10: Maize stubble in Hungary –
Kukoricatarló Magyarországon
(Photo: Éva Lauber)

Statement regarding Bill T/826, Amendment of Act XXVII 1998 on gene technology activities – No. F.; Statement regarding the lift of the Hungarian moratorium on *MON 810* – No. G.

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); László Balla (Hungarian Plant Breeders' Association, Budapest); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Zoltán Illés (Central European University, Budapest); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); Géza Márai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); László Papp (Hungarian Natural History Museum, Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); András Takács-Sánta (Eötvös Loránd University, Faculty of Science, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

(F)

The GMO Round-table in its position marked A-E has already published their thoughts in connection with coexistence regulation. From these fundamental principles Bill No T/826 is a long way away. Still, holding to our previous position, we make the following comments:

(*Fa*) In seed grain growing no one has determined before a tolerance value regarding pollution. Due to the male sterile technology or the tasseling however, this is the most vulnerable way of growing regarding cross pollination (due to the formation of species hybrids). As the second most significant maize seed producer in Europe the coexistence regulation under development regarding the isolation distances is disturbing.

(*Fb*) In organic production in connection with the pollution caused by GM varieties there is a zero tolerance policy in effect. The present form of the regulation does not ensure an appropriate guarantee for organic growers.

(*Fc*) The owners of the varieties (Monsanto and Pioneer) deny cooperation with independent environmental science research stations and in this way they make the continuation of this research impossible. In the amendment that is being developed there is no guarantee that from the Seed Grain Fund deposited at the *Mezőgazdasági Géntechnológiai Hatóság – MGH* (Agricultural Gene Technology Authority) the Authority and Specialist Authority would nominate independent inspectors, with whom the cooperation of the owners of the varieties is obligatory. In a merely administrative way the environment and food safety effects cannot be checked.

(*Fd*) Following a potential moratorium-suspension the sowing of *MON 810* is possible from 2007. By offering it at an introductory price the forage maize producers perhaps for their own purposes will grow it. In Hungary at this time the environmental and scientific long term monitoring will have to be solved. For this neither a framework nor a legal regulation (obliging cooperation from the owners of the varieties) has been developed.

(*Fe*) Following a potential release the costs of the tests to be performed in accredited laboratories proving purity will increase the prices of those selling on non-GM markets. Whilst the GM product by remaining at the same price could dominate the forage market. The extra profit of the owners of the GM varieties and the compulsory ecological and economic risk tax payments of the variety users has to be spent on creating the fund for monitoring, quality assurance, and compensation. The solution has to be made part of the coexistence regulation.

(*Ff*) The *Egészségügyi Géntechnológiai Hatóság* (Health Gene Technology Authority) has not yet been formed. In Hungary there is no forum for the worldwide debated nutritional and gastroenterological problems related to genetically modified food. The *KÉKI* (Central Food Research Institute) and the *MÉBIH* (Hungarian Food Safety Office) are established advisory bodies, however in Hungary only laboratory checking takes place (*OÉTI* – National Institute of Food Safety and Nutrition), whilst the nutritional and forage tests performed on mammals has not even started,[26] additionally Monsanto did not provide test material for *KÉKI*.

[26] Tests were carried out on fish however the detailed results are not known.

(*Fg*) The licensing of genetically modified species groups belongs to the authority of the *MGH* (Agricultural Gene Technology Authority) operating under the supervision of the *FVM* (Ministry of Agriculture and Rural Development). According to the present authorising procedures of the EU, the economic benefits of the modified varieties are supported by the owners of the varieties with tests that were carried out in other areas. This at times does not fit with the Hungarian conditions, as is shown by the negligible damage caused by the European corn borer in Hungary. The decision regarding this however takes place more at a Union level rather than for each of the member states. The national characteristics of the decision could be provided by environmental science tests performed in the Pannonian Bio-Geographical Region, without the environmental safety tests and in the absence of the reassuring test results relating especially to the protected species whose habitat is here, the general authorisation of the EU can be denied. The *MGH* therefore has to be under the actual control of the Environment Protection Department, as the essential and specific evaluations take place here.

(*Fh*) We recommend to disregard Article 21/D (6). As the contents of sections 345–346 of the Civil Code make it unquestionable that the public growing of GM plants is an activity concomitant with increased danger. This results in the owner of the variety being liable and having an objective responsibility for any compensation. For exemption they have to prove (the burden of proof falls on them), that the damage was caused by an unavoidable reason, which falls outside the circle of the activity concomitant with increased danger. In comparison with this responsibility rule, it is legally irrelevant that the aggrieved person, in the present case the landowner or user of the land within the buffer zone, has given consent to the production of GM plants in writing. This is only required by the state as a precondition to commence the activity, but not an agreement regarding causing damage. If we accept the wording of the present point (6) (that is if the aggrieved person has supplied written consent in accordance with Article 21/C (1) and (2) to the production of the given GM plant, the objective responsibility of the causer of the damage ceases), this means that the producer is only responsible for the damage caused with an objective (merely based on causing) acceptance of responsibility, if they have no licence for public production. This is also not allowed by law. In reality point (6) excludes the objective responsibility of the owner of the variety, which is entirely opposite to the activity with increased danger carried out by them, therefore to the Hungarian law.

(**G**)

(*Ga*) The dissolving of the moratorium of the genetically modified *MON 810* varieties group resistant to the European corn borer was started by the EU Committee based on the opinion of the GMO Panel of EFSA. This administration that is specialised in food safety expressed a superficial opinion on environment science questions. In reality, the GMO Panel of EFSA has not reacted to the response of the authors published in Hungarian (Darvas *et al*., *Növényvédelem* 2004, **40**: 441–449; 2006, **42**: 313–325), but translated into English for them.

(*Gb*) The administration specialised in food safety (GMO panel) of EFSA levelled a false accusation against the environmental science justification of the Hungarian *MON 810* moratorium. Although it was answered by those participating in the research, officially there was no Hungarian response from the authorities. During the *MON 810* moratorium the *MGH* (Agricultural Gene Technology Authority) did not once make contact with those carrying out the environmental science work, and did nothing to ensure that the owners of the varieties would provide seed grain for their own (*MGH*) moratorium work.

(*Gc*) The *MTA MGKI* (Agricultural Research Institute – Martonvásár, Hungary) started GM hybrid improvement (genes producing Cry3 toxin and causing *glyphosate* resistance) research in accordance with its contract with Monsanto, whilst the *Szent István Egyetem NVT* (Szent István University National Rural Development Plan – Gödöllő) on the "commission" of Pioneer commenced "faunistic" research regarding GM maize. Their results and declarations published so far show that none of the research stations are appropriately prepared for performing environmental science tests; furthermore they are not independent of the owners of the varieties, in so far as they can only publish their results subject to the agreement of their partners.

(*Gd*) The dissolving of the Hungarian *MON 810* moratorium is not justified by the results of the Hungarian environmental science tests that were carried out in the period following it's announcement. The very important microbiological tests were terminated years ago due to lack of support.

(*Ge*) Whilst the administration of the GMO Panel of EFSA has rejected the Hungarian tests, it did not call the owners of the varieties involved to resolve the environment and food safety discrepancies of the *MON 810* documentation. According to this the members of the GMO Panel of EFSA probably can answer the questions that the Hungarian tests raised as cause for concern. These are the following: (*i*) What is the quantity of Cry1A toxin per hectare produced by maize? (*ii*) How does it relate to the quantity of pro-toxin and active toxin, that can be released under permit with the DIPEL product, which in Hungary is a rival plant protection technology? (*iii*) For how long and in what quantity does the toxin enclosed in the cells of the plant remain in the different soil types? (*iv*) What effect do the stubble remains of the *MON 810* maize have on the animals that break it down and on the soil forming micro-organisms of the Carpathian Basin? (*v*) What quantity of toxin is produced in the pollen and what effect does it have on some of the Hungarian protected species, the European peacock caterpillar (*Inachis io*), the red admiral (*Vanessa atalanta*), or on the swallowtail (*Papilio machaon*)? (*vi*) In the knowledge of the pollen production of the *MON 810* varieties, at what distance, what proportion of species hybrid formation is measurable under male sterile or tasselled circumstances that is characteristic of seed grain production? (*vii*) How long does it take for the resistance to the *MON 810* varieties to develop? (*viii*) In Hungary what is the average European corn borer infestation that is observable and what is the effect measurable on the yield as well as the economic impact of it?

(*Gf*) In the variety tests carried out by *OMMI* (National Institute for Agricultural Quality Control) the *MON 810* species resistant to European corn borer did not provide evidence for practical advantages that are measurable in yield terms. In this case, there is no reason to license the inclusion of the *MON 810* maize in public production, as a variety that has no real advantage cannot be permitted as a technology.

Keywords: bill number T/826; seed production; isolation; variety owner; seed fund; organic farming; coexistence; *MON 810*; damage prevention fund; Monsanto; *MTA MGKI*; EFSA GMO Panel

Data of publication and link: *The position of the GMO Round-table*, 2006. (September 14) **F-G**: 1–4. – http://www.bdarvas.hu/english/gmo_roundtable/idn5854

Recommendations for the tests of the first generation GM plants prior to their approval in Hungary – No H.

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Zoltán Illés (Central European University, Budapest); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); Géza Márai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); László Papp (Hungarian Natural History Museum, Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); András Takács-Sánta (Eötvös Loránd University, Faculty of Science, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

The content of the recommendations does not make the internationally required tests unnecessary. The following document contains the outlines of the tests, for which the concrete test plan has to be developed.

Adequate facilities: In the case of varieties that have been submitted for approval in the EU, and also for release in Hungary the owner of the variety is obliged to provide[27] guaranteed quality seed grain,[28] annually in the four years prior to the release, in the quantity deemed necessary by the Gene Technology Authority from the GM variety in question, or from its isogenic line or its line treated as a control, free of charge. At least one month before the optimal sowing date the account has to be settled with the owner of the varieties regarding the use of the seed grain. The distribution of the seed grain in Hungary is possible by tender, for which the experimental plan in the

[27] Failure to cooperate shall entail the cancellation of the licensing procedure

[28] for forage tests

topics mentioned below shall be submitted to the authority involved three months prior to the sowing date. The expert opinion on the plans is carried out within one month by the Gene Technology Advisory Committee, separately examining, whether the planned test is without prejudice the patent interest of the owner of the variety. The recipient authority of the applications shall, in contract if necessary, preserve the independence of the tests from the owners of the variety and ensure the usability of the test results. In case of environmental and health applications this is without prejudice to the publishing of the results.

Financial conditions: In the Hungarian tender system invitations in support of biotechnology, the inclusion of side effects tests into the priorities should be made compulsory. These invitations to tender cannot be linked to contributions (it cannot be company based), as in the field of environmental science there is no entrepreneur with sufficient capital. Furthermore only applicants independent of the owners of the varieties can be supported from public tender financing. The settlement of the financial background is also important as the owners of the varieties do not support this type of independent testing; however Hungary under all circumstances needs this within Europe due to the special, differing characteristics of the ecology of the Pannonian Bio-Geographical Region.

Personal conditions: Any of the investigators of the subdivisions to be mentioned below shall have a PhD at least in the scientific discipline involved. The examination of this is the obligation of the recipient authority of the application, furthermore whether the workplace of the applicant is suitable for fulfilling the safety requirements of the examination. The director of the applicant institute shall officially declare this in the plan.

1. Hybrid formation [for the testing, an agricultural engineer with experience in plant breeding on the given variety + a botanist able for the determination of species + and a zoologist, expert in Hymenoptera[29] are necessary; for the release license only the results of field tests can be accepted]

1.1. Intraspecific[30] hybrid formation

1.1.1. In the case of wind pollinated plants, at 0.5, 1, 2, 3 times the specific distance applied for seed grain production (e.g., for maize at 200, 400, 800, 1200 meters); the biological floral (concurrent) analysis of the trial with and without border rows- East-Central European tests [long term test, monitoring following release] → Agricultural Gene Technology Authority

[29] Hymenoptera
[30] variety hybridization

1.1.2. In the case of insect and wind pollinated plants, at 0.5, 1, 2, 3 times of the distance applied for seed grain production (e.g., for canola at 450, 900, 1800, 2700 meters) also with the assessment of the natural pollinators the biological floral (concurrent) analysis of the vegetation found within the collection distance – Carpathian Basin tests [long term test, monitoring following release] → Gene Technology Specialist Authority

1.2. Interspecific[31] hybrid formation

1.2.1. In the case of wind pollinated plants, at 0.5, 1, 2 times of the specific distance applied for seed grain production (e.g., for sugar beet at 1600, 3200, 6400 meters), the biological floral (concurrent) analysis of the trial – East-Central European tests [long term test, monitoring following release] → Agricultural Gene Technology Authority

1.2.2. In the case of insect pollinated plants, at 0.5, 1, 2 times the distance applied for seed grain production (e.g., for canola on the *Brassica*, *Raphanus* and *Sinapsis* plots established at 2000, 4000, 8000 meters) by the application of honey-bee hives, but with the assessment of other insect species participating in the pollination and the biological floral (concurrent) analysis of the vegetation found within the collection distance – Carpathian Basin tests [long term test, monitoring following release] → Gene Technology Specialist Authority

2. Environmental analytical tests– in all cases the isogenic line of the variety serves as control [for the tests the evaluation of an environmental chemist experienced in the treatment of plant and soil samples and in pesticide chemistry, for the analysis the evaluation of an economist and ecotoxicologist is necessary; for the release permit small-plot tests + the results of chemical laboratory tests may be accepted]

2.1. In the case of insect resistant plants – the tests shall relate to the active substance produced by the plant

2.1.1. For a one-component active substance, the distribution amongst the plastochrones has to be specified for each variety – East-Central European tests → Gene Technology Specialist Authority

2.1.2. For multi-component active substances, their individual distribution and change in their proportions in the plastochrones; has to be specified for each genetic event and variety – East-Central European tests → Gene Technology Specialist Authority

---

[31] species hybridization

2.1.3. A measuring and comparison of a common protein and a common or one specific to the variety or from a nutritional perspective important allelochemical[32] in the parts that are consumed for each genetic event with the change in the active substances – East-Central European tests → Gene Technology Specialist Authority

2.1.4. Preparation of the active substance scale by the measuring of organic production projected per unit of area – East-Central European tests → Gene Technology Specialist Authority

2.1.5. Decomposition of the active substance in the stubble remains, with sampling every two months for each plant part, due to the specificity of the soil microorganisms separately for sandy, adobe and clay soils – Hungarian tests → Gene Technology Specialist Authority

2.1.6. Environment analytical comparison for example in the case of the Cry1 producing[33] plants treatment with DIPEL[34] in case of Cry3 producing[35] plants with NOVODOR FC[36] – East-Central European tests → Gene Technology Specialist Authority

2.2. In case of herbicide tolerant[37] plants – the tests have to relate to the active substance tolerated by the plant, and to the metabolites of this active substance

2.2.1. The ecotoxicological/toxicological analysis of the change in use of the herbicide's active substance (e.g., *glyphosate*, *glufosinate*, etc.) linked with the GM plant (market analysis and its environmental consequences), comparison with rival technologies → Gene Technology Specialist Authority

2.2.2. The description of the metabolites of the herbicide (e.g., *glyphosate*-derivatives) linked with the GM plant and the ecotoxicological impact assessment of its main derivatives → Gene Technology Specialist Authority

2.2.3. The behaviour of the metabolites of the herbicide (e.g., *glyphosate*-derivatives) linked with the GM plant in the environment, with special consideration to the water polluting ability (e.g., the appearance of *glyphosate* and *AMPA* in the surface, ground and untreated water) – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

---

[32] secondary plant matter, the function of which within the plant is not known
[33] *Bt*-plant effective against the caterpillars of Lepidoptera
[34] sprayable preparations containing *Bacillus thuringiensis* var. *kurstaki*
[35] *Bt*-plant effective against the larvae of beetles
[36] sprayable preparation containing *Bacillus thuringiensis* var. *tenebrionis*
[37] herbicide tolerant

3. Microbiological tests– in all cases their own isogenic line of the variety serves as control [for the tests the direction of a soil microbiologist experienced in the treatment of plant and soil samples is necessary; for the release permit small-plot tests + the results of microbiological laboratory tests may be accepted]

3.1. In the case of insect resistant plants – the tests have to relate to the microflora of the soils

3.1.1. In the case of plant produced active substances, the effect of the root secretion in sandy, adobe and clay soils to the colonisation and activity on the most important microorganism's habitat – Eastern-Central European tests [long term test, monitoring following release] → Gene Technology Specialist Authority

3.1.2. In case of plant produced active substances, the examination of the speed of decay of stubble remains at acidic, neutral and alkaline pH – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

3.1.3. The examination of the speed of decay of stubble remains containing residues – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

3.2. In case of herbicide tolerant plants – the tests have to relate to the microflora of the soils

3.2.1. In case of plants producing a new enzyme the effect of the root secreting metabolite in sand, adobe and in clay soils to the colonisation and activity of the most important microorganism's habitat – Eastern-Central Europe tests [long term test, monitoring following release] → Gene Technology Specialist Authority

3.2.2. In case of plants producing a new enzyme the examination of the speed of decay of stubble remains containing metabolites on adobe soil at acidic, neutral and alkaline pH – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

3.2.3. The examination of the speed of decay of stubble remains containing residues – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

4. Botanical tests – in all cases the isogenic line serves as control [for the tests in special cases the direction of a botanist[38] with the ability for the

[38] the name of the identifier is also part of the determination of species

determination of species and a plant protection engineer is necessary; for the release permit the results of large-plot tests can be accepted]

4.1. In case of insect resistant plants – the tests shall relate to the habitat analysis

4.1.1. Uptake of the weed flora of the relevant plant on sand, adobe and clay soils (necessary for the description of habitat of protected animals) – Hungarian tests → Agricultural Gene Technology Authority

4.1.2. The creation of provoked hybrids in case of the possibility of species hybridisation, establishing their probability and their effect on herbivores – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

4.2. In case of herbicide tolerant plants – the tests have to relate to the active substance broken down by the modified plant

4.2.1. Uptake of the weed flora of the relevant plant in sand, adobe and in clay soils (for the examination of the selection of herbicide-tolerant weeds) – Hungarian tests [long term test, monitoring following release] → Agricultural Gene Technology Authority

4.2.2. The creation of hybrids in case of the possibility of species hybridization, establishing their effect as volunteers – Hungarian tests [long term test, monitoring following release] → Gene Technology Specialist Authority

5. Zoological examination– in all cases the isogenic line serves as control [for the tests in special cases the direction of a zoologist is required who is experienced in species determination, for the laboratory work experienced in cultivation, and with entomological expertise]

5.1. In the case of insect resistant plants

5.1.1. Searching for specific effects; ecotoxicological tests, which have to relate to the early stages of development within the sensitive species groups (e.g., Cry1 toxin –Lepidoptera[39] larvae protected in Hungary, L1-L2; Cry3 – the in Hungary protected or useful Coleoptera[40] larvae, L1-L2) (e.g., in case of plants producing Cry1 toxin on specimens containing Cry1 receptor) – Carpathian Basin tests [for the release permit the results of laboratory cultivation can be accepted; long term test, large-plot monitoring following release] → Gene Technology Specialist Authority

[39] Lepidoptera

[40] beetles

5.1.2. Searching for aspecific effects; ecotoxicological tests on pollinating insects (e.g., honey bee) – Eastern-Central European tests [for the release permit the results of small-plot tests + the results of apiarian laboratory tests may be accepted; long term test, large-plot monitoring following release] → Gene Technology Specialist Authority

5.1.3. Searching for aspecific effects in the crop; faunistic analyses[41] connected to green plant parts – the examination shall relate to the herbivore living on the target plants and exclusively to the predator and parasitic organisms connected to it – Carpathian Basin tests [for the release permit the results of large-plot tests + the results of laboratory tests may be accepted; long term test, monitoring following release] → Gene Technology Specialist Authority

5.1.4. Searching for aspecific effects; faunistic tests connected to necrotic plant parts – the tests shall relate to animals living on decomposing stubble remains – Carpathian Basin tests [for the release permit the results of small-plot tests + the results of laboratory tests may be accepted; long term test, monitoring following release] → Gene Technology Specialist Authority

5.2. In the case of herbicide tolerant plants

5.2.1. Searching for aspecific effects; ecotoxicological tests on pollinating insects (e.g., honey bee) – Eastern-Central European tests [for the release permit the results of small-plot tests + the results of apiarian laboratory tests may be accepted; long term test, large-plot monitoring following release] → Gene Technology Specialist Authority

5.2.2. Searching for aspecific effects in the crop; faunistic analyses connected to green plant parts – the examination shall relate to the herbivore living on the target plants and exclusively to the predator and parasitic organisms connected to it – Carpathian Basin tests [for the release permit the results of large-plot tests + the results of laboratory tests may be accepted; long term test, monitoring following release] → Gene Technology Specialist Authority

5.2.3. Searching for aspecific effects; faunistic tests connected to necrotic plant parts – the tests shall relate to animals living on stubble remains – Carpathian Basin tests [for the release permit the results of small-plot tests + the results of laboratory tests may be accepted; long term test, monitoring following release] → Gene Technology Specialist Authority

[41] the name of the identifier is also part of the determination of species

6. Nutritionals tests on vertebral species – in all cases the isogenic line serves as control [for the tests direction of a nutritionist is necessary; for release the minimum requirement is the proven harmlessness on animals; in case of products for human consumption successive tests for ten years shall be specified]

6.1. In the case of insect resistant plants tests focusing on the active substance and the main nutritive materials

6.1.1. Complete forage, nutritional and gastroenterological tests on those developing farmed animals, which consume the plant (e.g., in the case of maize: green plant parts and silage – cattle; grains – carp, chicken, pigs) [for the release permit[42] the data made public and analysable by the owner of the variety, that were obtained in an accredited laboratory can be accepted; long term test, monitoring following release] → Health Gene Technology Authority

6.1.2. Complete forage, nutritional and gastroenterological tests on those developing game, which might have access to the plants (e.g., in the case of maize: green plant parts – roe and deer; grains – wild boar, rodents) [for the release permit the data made public and analysable by the owner of the variety, that were obtained in an accredited laboratory can be accepted; long term test, monitoring following release] → Health Gene Technology Authority

6.1.3. In case 6.1.1. and 6.1.2. are ineffective, then subsequent human tests for ten years [tests of independent group of gastroenterologists; long term test] → Health Gene Technology Authority

6.2. In the case of herbicide tolerant plants tests focusing on residues and the main nutritive materials

6.2.1. Complete forage, nutritional and gastroenterological tests on those developing farmed animals, which consume the plant deliberately (e.g., in the case of maize: green plant parts and silage – cattle; grains – carp, chicken, pigs) [for the release permit the data made public and analysable by the owner of the variety, that were obtained in an accredited laboratory can be accepted; long term test, monitoring following release] → Health Gene Technology Authority

6.2.2. Complete forage, nutritional and gastroenterological tests on those developing game, which might have access to the plants (e.g., in the case of maize: green plant parts – roe and deer; grains – wild boar, rodents) [for the release permit the data made public and analysable by the owner of the

[42] strongly advised in the critical point of this to repeat the experiment with independent Hungarian researchers

variety, that were obtained in an accredited laboratory can be accepted; long term test, monitoring following release] → Health Gene Technology Authority

6.2.3. In case 6.2.1. and 6.2.2. are ineffective, then subsequent human tests for ten years [tests of independent group of gastroenterologists; long term test] → Health Gene Technology Authority

7. Technological tests [for the tests the direction of a plant protection engineer and an economist is necessary]

7.1. In the case of insect resistant plants

7.1.1. Examination of the effect against the targeted pests – tests of the owner of the variety [the results of large-plot examination combined with yield measuring + results of laboratory tests are required for the authorisation] → Agricultural Gene Technology Authority

7.1.2. Examination of the durability of the effect against the targeted pests (e.g., the development of Cry1-resistance) – Carpathian Basin tests [in the laboratory a minimum of a 10 generation examination is required for the authorisation; long term test, monitoring following release] → Agricultural Gene Technology Authority

7.1.3. Examination of the economic primary effect – Hungarian tests [economic analysis (cost – profit and their distribution amongst the social groups), comparison with rival technologies are required for the authorisation] → Economic Gene Technology Authority

7.2. In the case of herbicide tolerant plants

7.2.1. Examination of the effect against the targeted pests – tests of the owner of the variety [the result of large-plot examination joined with yield measurements is required for the authorisation] → Agricultural Gene Technology Authority

7.2.2. Examination of the durability of the effect against the targeted pests (e.g., the following of the selection of weeds resistant to the active substance) – Carpathian Basin tests [on small-plots a minimum of 4 generation tests is required for the authorisation; long term test, monitoring following release] → Agricultural Gene Technology Authority

7.2.3. Examination of the economic primary effect – Hungarian tests [economic analysis (cost – profit and their distribution amongst the social groups), comparison with rival technologies are required for the authorisation] → Economic Gene Technology Authority

Keywords: GM plant; isogenic; seed fund; variety owner; Pannonian Bio-Geographical Region; interspecific hybrid; intraspecific hybrid; wind pollination; insect pollination; canola;

sugar beet; honey bee; environmental chemistry; allelochemical; stubble; soil; microorganism; Dipel; NOVODOR; *glyphosate*; *glufosinate*; *AMPA*; Cry toxin; residue, weeds; Lepidoptera; Coleoptera; predator; parasitoid; monitoring; dietetics; forage science; pig; cow; row; deer; wild boar; carp; chicken; Cry-resistance

Data of publication and link: *The position of the GMO Round-table*, 2006. (November 2) **H**: 1–7; http://www.bdarvas.hu/english/gmo_roundtable/idn5855

***

Statement regarding the *MON 863* maize variety group – No. I

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Lívia Dömölki (National Federation of Associations for Consumer Protection, Budapest); András Horváth (Hungarian Academy of Sciences, Institute of Ecology and Botany, Vácrátót); Zoltán Illés (Central European University, Budapest); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); György Kövics (Department of Plant Protection, Centre for Agricultural and Applied Economic Sciences of the University of Debrecen, Debrecen); Gábor Lövei (University of Aarhus, Faculty of Agricultural Sciences, Department of Integrated Pest Management Flakkebjerg Research Centre, Slagelse, Denmark); Zoltán Menyhért (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); László Papp (Hungarian Natural History Museum, Budapest); György Pataki (Institute of Business Economics, Corvinus University Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); András Takács-Sánta (Eötvös Loránd University, Faculty of Science, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

In the member states of the EU there is a valid authorisation[43] for the import, and the forage and food industry processing of the *MON 863* maize

[43] http://www.gmo-compass.org/eng/gmo/db/53.docu.html

variety group owned by Monsanto that produces Cry3Bb1 toxin. Monsanto has not requested authorisation for European field release. The probable reason for this is that it is the *nptII* (kanamycin-resistance) free of marker gene *MON 88017* variety group that they assigned for this purpose.[44, 45] Over the above tests are carried out in the *MTA MGKI* (Agricultural Research Institute), during which they intend to cross the inbred strains from Martonvásár with the parent strain carrying the *cry3Bb1* gene.[46] The long term purpose of this is to develop a Western corn rootworm resistance variety group based on Hungarian maize varieties in a joint research programme together with Monsanto.

The forage and food safety of the *MON 863* maize variety group was established by EFSA (European Food Safety Authority) mainly relying on the documentation of Monsanto marked MSL 18175.[47] The contradictions of the data and messages of this documentation were pointed out by many, for example also by Árpád Pusztai, a member of Scotland's National Science Academy.[48] The recently published article of Professor Gilles-Eric Séralini and his colleagues, who examined the basic data of the MSL 18175 documentation with several statistical methodologies came to the conclusion that 8% of the calculable data shows significant variance.[49] Taking these into consideration during the evaluation of the document is unavoidable. The results that in many aspects cannot be called consistent with reference to its biological messages primarily questioned the quality of the research work. The kidney disorders observed in male rats probably shed light on the insufficient breeding circumstances, whilst the toxic liver alterations recorded in the females surely deserves more examination with consideration to that in the case of the Cry toxins this problem already occurred earlier. Our position is that the contents of the MSL 18175 documentation are not sufficient for providing a decisive basis for the food safety of the *MON 863* maize variety group for Europe.

[44] http://www.gmo-compass.org/eng/gmo/db/81.docu.html
[45] http://gmoinfo.jrc.it/gmp_report.aspx?CurNot=B/HU/06/11/6; http://gmoinfo.jrc.it/gmp_report.aspx?CurNot=B/HU/06/11/7
[46] http://gmoinfo.jrc.it/gmp_report.aspx?CurNot=B/HU/06/11/8; http://nol.hu/cikk/393705/
[47] http://www.monsanto.com/monsanto/content/products/technicalandsafety/fullratstudy.pdf
[48] http://www.es.hu/pd/display.asp?channel=INTERJU0531
[49] http://www.springerlink.com/content/02648wu132m07804/

Based on the above we think:

(*Ia*) that the GMO Panel of EFSA in the case of the *MON 863* has issued an opinion from a scientific perspective inappropriately based on support of a permit for forage and food industry utilisation without due foresight, therefore we recommend that the operating Hungarian gene technology authorities (Agricultural Gene Technology Authority, Gene Technology Specialist Authority) to make recommendations for the repeat of the food safety tests and for the suspension of the European authorisation, or to join European initiatives of this type;

(*Ib*) we recommend to the Hungarian authorities dealing with food safety to urgently re-examine the import of *MON 863*, probably insignificant in processed products, and initiate the announcement of a moratorium until the repeated food safety tests make the reversal of it possible;

(*Ic*) the Hungarian authorities dealing with food safety to re-examine the safety of forage and food containing Cry toxins, with special consideration to the safety of the *MON 88017* variety group that produces Cry toxin identical that of *MON 863*, for which domestic development test efforts are directed at. The data in connection with its liver damaging effects should be especially checked in accordance with the Hungarian forage and food consuming profile;

(*Id*) the Hungarian National Assembly should ensure that pursuant to its five-party resolution the *Egészségügyi Géntechnológiai Hatóság és Szakhatóság* (Gene Health Technology Authority and Specialist Authority) should urgently be formed, which has to deal with this matter as a high priority and to check after six months what proportion of the contents of the National Assembly Resolution 53/2006 (XI. 29) *OGy* has been fulfilled.

Keywords: *MON 863*; Monsanto; corn rootworm; Cry3Bb1 toxin; *nptII*, *MON 88017*; *MTA MGKI*; MSL 18175; Gilles-Eric Séralini; Árpád Pusztai; kidney problem; liver toxicity; EFSA GMO Panel

Data of publication and link: *The position of the GMO Round-table*, 2007. (June 1) **I**: 1–2; http://www.bdarvas.hu/english/gmo_roundtable/idn5856

***

Statement regarding the planned maize import of Hungary – No. J

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Lívia Dömölki (National Federation of Associations for Consumer Protection, Budapest); András Horváth (Hungarian Academy of Sciences, Institute of Ecology and Botany, Vácrátót); Zoltán Illés (Central European University, Budapest); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); György Kövics (Department of Plant Protection, Centre for Agricultural and Applied Economic Sciences of the University of Debrecen, Debrecen); Géza Márai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); László Orosz (Eötvös Loránd University, Faculty of Science, Department of Genetics, Budapest); György Pataki (Institute of Business Economics, Corvinus University Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

Because of the poor maize yield due to the drought in 2007 Hungary is in need of imports.[50] According to the meeting of the Agricultural Committee of the National Assembly on 5th September 2007 (see the comment from József Karsai)[51] those who trade in Hungary possibly intend to import maize from Brazil for forage purpose.[52] Brazil is amongst the three of the most significant

[50] The estimated shortage: 3 million tons – see the writing of Márai p. 8. http://www.vedegylet.hu/doc/GMkerekasztal13.pdf

[51] "At the most recent auction, when from 215 it dropped back to 202 Euro, if I am correct, at 201 Concordia entered the tender, thus Minister József Gráf went ahead and did everything to try, but he also had his own risks to consider because if he got saddled with it due to the imported Brazilian maize, it would cost him his job, it is his responsibility why he gave 210 Euro for the maize when the imported Brazilian maize was 190 Euro."

[52] The Ukraine also came up, where however there is limited GMO regulation.

countries in the world (USA, Argentina, Brazil),[53] where genetically modified (GM) plants are grown. Although in Brazil the legal sowing of GM maize previously was not permitted,[54] local news however reported on GM maize lots imported from Argentina and of illegal sowings.[55] On the grain market it is mainly the GM maize or one from this not clarified quality that is cheaper to buy, thus the Hungarian traders would probably willingly choose these lots.

The authorisation system of Europe is significantly stricter in regards to GM plants than of South and North America. For example separated storage and labelling on these continents is not compulsory. As a consequence of this, mixing of crops of different quality has to be reckoned with. It is not the case in Europe, where authorisation is at a genetic event level, thus only certain GM variety groups can be bought in as imports as well as for processing.

In Europe currently the following maize variety groups have approval for (A) forage, (B) import and processing, (C) for release in the Table.

In South America *Bt176* maize is also produced and processed, however this variety group (genetic event) is not authorised in Europe. The GMO Round-table because of the above makes the following proposal for the Hungarian decision makers, first of all for the Agricultural Committee of the National Assembly:

– Due to the moratorium in Hungary, those involved in the Hungarian market are not to purchase maize lots with GM labelling (over 0.9%). In the opposite case the Hungarian authorities will be facing an extraordinary situation, as from the lots illegal seed can be released even under the strictest control, just as has already happened in the case of Mexico and Brazil. This only can be avoided by the purchase of the rough ground lots.

---

[53] *Bt176*, *Bt11*, *MON 810*, *T25* was detected in cracked maize grains from Brazil http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T6S-4D1R2HT-4&_user=10&_coverDate=10%2F01%2F2005&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=9271aced8e8c302a8f179e2fe8ad4236

[54] The GM maize varieties authorised in Brazil: *T25* (Bayer CropScience) – authorised from May 2007 – http://www.scidev.net/News/index.cfm?fuseaction=readnews&itemid=3635&language=1; *MON 810* (Monsanto) – authorised from August 2007 – http://www.agenciabrasil.gov.br/noticias/2007/08/16/materia.2007-08-16.6769437960/view; *SYN Bt11* (Syngenta) – authorised from Sept. 2007 – http://agenciact.mct.gov.br/index.php?action=/content/view&cod_objeto=45804

[55] http://www.agbios.com/main.php?action=ShowNewsItem&id=7155

[56] see Roszík's paper – http://www.hungary.indymedia.org/kepek/suaj/GMOK/GMOkiad2.pdf p. 7.

– If there is no other solution, then at the time of the maize import (also when buying from the European Union market) the Hungarian controlling authorities have to demand the documentation of the lots regarding genetic events (in known cases irrespective of content, in case of accidental mixing from 0.9% to be compulsory) The *Mezőgazdasági Géntechnológiai Hatóság* (Agricultural Gene Technology Authority, *FVM* – Ministry of Agriculture and Rural Development) should pay special attention to the Hungarian control with random tests. For the import of the variety groups that are not included in the European approval system the Hungarian authorities are not to be able to issue even individual permits. The Country should carry out independent forage tests with the dominant GM varieties (this is especially relevant in case of maize producing Cry toxin), for which *FVM* should announce an open research application. (This so far did not take place in Hungary due to the absence of test material.) The judges of the applications should be nominated by the *Géntechnológiai Eljárásokat Véleményező Bizottság* (Gene Technology Procedures Advisory Committee).

In South America *Bt176* maize is also produced and processed, however this variety group (genetic event) is not authorised in Europe. The GMO Round-table because of the above makes the following proposal for the Hungarian decision makers, first of all for the Agricultural Committee of the National Assembly:

– Due to the moratorium in Hungary, those involved in the Hungarian market are not to purchase maize lots with GM labelling (over 0.9%). In the opposite case the Hungarian authorities will be facing an extraordinary situation, as from the lots illegal seed can be released even under the strictest control, just as has already happened in the case of Mexico and Brazil. This only can be avoided by the purchase of the rough ground lots.

– If there is no other solution, then at the time of the maize import (also when buying from the European Union market) the Hungarian controlling authorities have to demand the documentation of the lots regarding genetic events (in known cases irrespective of content, in case of accidental mixing from 0.9% to be compulsory) The *Mezőgazdasági Géntechnológiai Hatóság* (Agricultural Gene Technology Authority, *FVM* – Ministry of Agriculture and Rural Development) should pay special attention to the Hungarian control with random tests. For the import of the variety groups that are not included in the European approval system the Hungarian authorities are not to be able to issue even individual permits. The Country should carry out independent forage tests with the dominant GM varieties (this is especially relevant in case

of maize producing Cry toxin), for which *FVM* should announce an open research application. (This so far did not take place in Hungary due to the absence of test material.) The judges of the applications should be nominated by the *Géntechnológiai Eljárásokat Véleményező Bizottság* (Gene Technology Procedures Advisory Committee).

Genetic event	Benefit	Owner of the variety	Authorisation	Hungarian position
1507 (DAS-1507-1)	European corn borer resistance	Pioneer/Dow AS	A	
59122 (DAS-59122-7)	European corn borer resistance	Dow AS/Pioneer	A, B	
Bt11 (SYN-Bt11-1)	European corn borer resistance	Syngenta	A	
Bt176 (SYN-EV 176-9)	European corn borer resistance	Syngenta	withdrawn	
GA21 (MON 21-9)	*glyphosate-*tolerant	Monsanto	A	
MON 810	European corn borer resistance	Monsanto	A, B, C	sowing moratorium (- C)
MON 863	European corn borer resistance	Monsanto	A, B	
NK603 (MON 603-6)	*glyphosate-*tolerant	Monsanto	A	
T25 (ACS 3-2)	*glufosinate-*tolerant	Bayer CropScience	A, B, C	

– The purchased animal food made from maize lots that reaches the labelling threshold should be obliged to be labelled with the genetic event. It should be strictly checked that it has taken place.
– The weighting of multiple modification should be based on the transgene content, thus the 0,5+0,5% pollution of a variety group containing two transgenes should be marked with a value of 1%, thus have obligatory labelling.

As a preliminary for the above we would like to draw attention also to the Hungarian Soya import, according to which only the *MON 40-3-2* genetic event has type 'A' and 'B' license, however despite the regular imports the majority of the Hungarian animal food producing factories have not yet legally solved the distinctive marking of their products.[56]

Keywords: feed; GM soy; *MON 40-3-2*; GM maize; *DAS-1507*; *DAS-59122*; *SYN-Bt11*; *Bt176*; *GA21*; *MON 810*; *MON 863*; *NK603*; *T25*

Data of publication and link: *The position of the GMO Round-table*, 2007. (October 11) **J**: 1–2; http://www.bdarvas.hu/english/gmo_roundtable/idn5857

Statement regarding labelling of multiple times (stacked) genetically modified varieties – No. K.

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Kht, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Lívia Dömölki (National Federation of Associations for Consumer Protection, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); András Horváth (Hungarian Academy of Sciences, Institute of Ecology and Botany, Vácrátót); Zoltán Illés (Central European University, Budapest); Gábor Lövei (University of Aarhus, Faculty of Agricultural Sciences, Department of Integrated Pest Management Flakkebjerg Research Centre, Slagelse, Denmark); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); György Kövics (Department of Plant Protection, Centre for Agricultural and Applied Economic Sciences of the University of Debrecen, Debrecen); György Pataki (Institute of Business Economics, Corvinus University Budapest); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Kht, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

The European Commission on 8th June 2007 (*SCFCAH* sitting)[57] proposed in a document that when labelling food manufactured from the hybrids of the genetically modified (GM) varieties (multiple times modified varieties) the values containing (A+B)/2, (A+B+C)/3 GMO should be used for calculations instead of the A+B…A+B+C transgene used so far, thus the obligatory labelling threshold value would be determined this way. In connection with this, the standpoint of the GMO Round-table is as follows: the GM labelling is necessary in Europe in all cases, even if it below 0.9%, in so far as the action of modification is known. This is called the labelling threshold. If the food or forage contains GM components over 0.9% as a result of accidental or technologically unavoidable mixing the manufacturer is

[57] Standing Committee on the Food Chain and Animal Health

obliged to label it, if they fail to do so they can be fined. The labelling of GM content under 0.9% has already proved legally unmanageable, as the manufacturer only had to declare that they had not been aware of this fact.

The judgement on GM content so far, in cases containing one transgene, took place by adding up the contained transgene proportions (e.g., A+B – 0.3%+0.4% → labelling is not obligatory; A+B – 0.5%+0.4% → labelling is obligatory). According to the recommendation of the document mentioned this would change, in case of an event containing several transgenes. The problems of the official laboratories carrying out the analytical tests based on the simple examples are as follows:

Event	IP	TT	Copy	Measured %	MT	Copy %	Result	Note
X1	1	A	1	0.5	single	0.5	not marked	
Y1	1	B	1	0.5	single	0.5	not marked	
W1a	2	AB	1+1	0.5+0.5	multiple	0.5+0.5	marked	
W1b	2	AB	1+1	0.5+0.5	multiple	(0.5+0.5)/2	not marked	faulty
X1+W1a	3	A+AB	1+1+1	0.3+0.3+0.3	mixed	0.3+0.3+0.3	marked	
X1+W1b	3	A+AB	1+1+1	0.3+0.3+0.3	mixed	0.3+((0,3+ 0.3)/2)	not marked	faulty

Notes: IP – the number of the determined interlocking point; TT – transgene type; MT – modification type; A and B – single type transgene; AB – two transgenes with two interlocking point; A+AB – the physical mixture of one single and one multiple modified variety.

Therefore the result of the determination is awkward from the perspective of official measurement, if the genetic event contains multiple copies (W1a → W1b; X1+W1a → X1+W1b) and we would proceed according to the recommendation. The substantial content of the mixtures is unclear if hybrids containing multiple transgenes together are also found in them.

According to the recommendation of *SCFCAH* as a special example a multiple modified variety is where the occurrence of the 'A' and 'B' transgenes is identical. This is however only a fiction, as the measuring uncertainty is around 20–30%, therefore 35% 'A' and 65% 'B' can still be a multiple modified variety. All this is diluting the legal boundaries of the provision, and provides opportunity for individually tailored measures.

There is also a toxicology problem with the above recommendation, as it treats the effects of the transgenes with differing biological effects as the same. If besides a gene containing Cry toxin, there is one producing an enzyme which induces the metabolism of *glyphosate*, the two cannot be treated as identical, as with one of them a bacterial toxin enters the body (the target organ is potentially the liver), whilst with the other, helping the *glyphosate* tolerance of the plant, there is a chance for chemical residue accumulation, which causes a hormone module effect.

It is a toxicological nonsense to label the two effects as one, as their so called 'biological footprint' is not the same.

Based on the above, the expert community of the GMO Round-table joins the Hungarian initiative, which deeply disagrees with the ill-advised recommendation of *SCFCAH*, and which would allow the increase of the 0.9% labelling threshold (in the case of varieties containing two transgenes to 1.8%, in case of varieties containing three transgenes to 2.7% etc.). The text of the extended *GMO Szakbizottság* (Specialist Committee) meeting of *Magyar Élelmiszer-Biztonsági Hivatal* (Hungarian Food Safety Office – *MÉBIH*) on 29th October 2007 is as follows:

"Position taken in connection with the analysis of the GMO hybrids (»stacked events«) (in connection with the working material of the European Commission labelling threshold for GM food, forage and for the GM hybrids«)

We the undersigned, the representatives of *MÉBIH GMO Szakbizottság*, GMO Round-table operating next to the Environmental Committee of the National Assembly and the Hungarian GMO laboratories (amongst them the official laboratories), publish the following position:

– At present there is no such analytical method with which the GMO hybrids (»stacked events«) can be clearly demonstrable, traceable and identifiable without any doubt in the mixed seed grain, forage and food samples.
– This is also true even if currently gene combinations, that only occur in hybrid forms, do exist (e.g., the cotton with marking 281-24-236/3006-210-23).
– In connection with this we raise attention that this uncertainty has an effect on the work of the analytical laboratories and of authorities, therefore we do not agree to any initiations which is directed towards that these analytical laboratories and authorities should take the consequences of this uncertainty.
– We recommend determining the GMO content of the tested (food or forage) sample, further according to the content of point (2) of Article 12 and point (2) of Article 24 of the Regulation 1829/2003/EC of the

> European Parliament and Council and to the content of point V. 4 of the recommendation (2004/787/EC) on 4th October 2004 of the Commission, according to which »the results of the quantitative analysis should be expressed as the percentage of GM DNS copy numbers in relation target taxon-specific DNS copy numbers calculated in terms of haploid genomes« if such a certified reference is available."

Signed: Klára Dallmann, Béla Darvas, Dénes Dlauchy, Katalin Ertseyné Peregi, Barnabás Jenes, Ágnes Bihari, Béla Maczák, Adrienn Micsinai, Gábor Polgár, Katalin Rodics, Péter Roszík, Ferenc Schmidt, András Székács, Tamás János Szigeti, Éva Táborhegyi, Boldizsár Vajda and Tímea Vértes.

There is a possibility for institutional support joining the initiative of the *MÉBIH GMO Szakbizottság*.[58]

Keywords: GM labelling; *SCFCAH*; stacked events; Hungarian Food Safety Office; *MÉBIH*; analysis; PCR; certified reference
Data of publication and link: *The position of the GMO Round-table*, 2007. (November 29) **K**: 1–2; http://www.bdarvas.hu/english/gmo_roundtable/idn5858

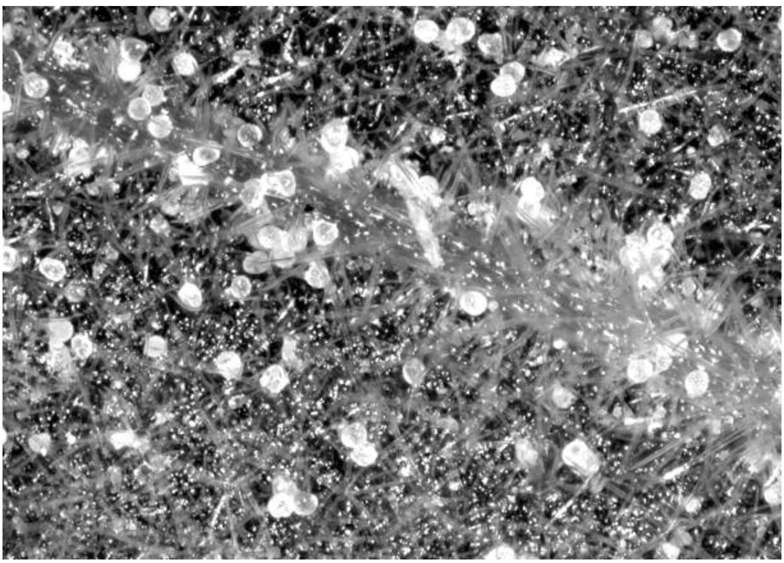

Figure 11: Maize pollen on *Althae officinalis* –
Kukorica pollen Althae officinalis-*on*
(Photo 11: Éva Lauber and Béla Darvas)

[58] for this please contact Béla Maczák – bela.maczak@mebih.gov.hu

Statement regarding the gene bank network of Hungarian cultivated plants – No. L.

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Lea Bauer (Biokontroll Hungária Nonprofit Kft, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Lívia Dömölki (National Federation of Associations for Consumer Protection, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); András Horváth (Hungarian Academy of Sciences, Institute of Ecology and Botany, Vácrátót); Zoltán Illés (Central European University, Budapest); Gábor Lövei (University of Aarhus, Faculty of Agricultural Sciences, Department of Integrated Pest Management Flakkebjerg Research Centre, Slagelse, Denmark); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); György Kövics (Department of Plant Protection, Centre for Agricultural and Applied Economic Sciences of the University of Debrecen, Debrecen); Géza Márai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); Zoltán Menyhért (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); György Pataki (Institute of Business Economics, Corvinus University Budapest); Péter Roszík (Biokontroll Hungária Nonprofit Kft, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

The significant decay in the funding status of the agricultural R&D institutions may lead to mergers of institutions of both the Hungarian Academy of Sciences[59] and the Ministry of Agriculture and Rural Development,[60] and even raises the possibility of their subsequent

[59] Kőmíves T. About the plan of the Agricultural Research Center of the Hungarian Academy of Sciences. (in Hungarian) September 14, 2006. – http://www.vedegylet.hu/doc/GM_kerekasztal8b.pdf p. 25; Darvas B. Where agricultural research is heading? (in Hungarian) March 22, 2007 http://www.vedegylet.hu/doc/GM_kerekasztal11.pdf p. 9.

[60] Ángyán J. and Darvas B. The present status of the reorganization of agricultural research institutes. (in Hungarian) October 11, 2007 – http://www.vedegylet.hu/doc/GMkerekasztal13.pdf pp. 14–15.

privatization. In parallel to the process impoverishing and eventually abolishing agricultural research in Hungary, the gene pool of cultivated plants committed to the care of these institutions may perish or undergo transfer of ownership.[61] The most typical event of this process so far is the abolishment of the independent status of the Institute of Agrobotany at Tápiószele (*TABI*), holding a set of 80 thousand seed varieties, followed by the approach of the new owner (Central Agricultural Office, *MgSzH*) to this heritage.[62]

The GMO Round-table – in concordance with main statements of the October 25, 2007 meeting of the Plant Gene Bank Council – on the basis of the contributions and dispute at its December 6, 2007 meeting[63] states the following and brings it to the knowledge of the President of the Republic of Hungary (László Sólyom), the President of the Hungarian Academy of Sciences (Szilveszter E. Vizi) and the Hungarian Minister of the Environment and Water (Gábor Fodor), with requesting immediate measures from the Minister of Agriculture and Rural Development (József Gráf):

(*i*) The collection of domestic local varieties and species selection playing a key role in the development of sustainable agriculture is a result of the outstanding professional efforts of generations of horticulturists, smallholders and plant-breeders, and as such, has to be treated as part of the national heritage.[64] In our opinion, the conservation of such a natural resource – similarly to the provision of the financial basis sufficient to carry out this work – is an outstanding task of the government.[65]

(*ii*) The Convention on Biological Diversity (Rio de Janeiro, 1992) recognises the genetic diversity of the species found at the given region as sovereign property of the given countries. The Convention specifies it as an obligation of the given countries to protect their biodiversity. Hungary has signed and ratified this Convention, which results in immediate

---

[61] Font S. and Ángyán J. Shall we donate the gene bank, or shall we not? (in Hungarian) (Hungarian Parliament, November 5, 2007) http://www.parlament.hu/internet/plsql/ogy_naplo.naplo_fadat_aktus?p_ckl=38&p_uln=105&p_felsz=74&p_felszig=80&p_aktus=16

[62] Holly L. Does the collection of the national species have a value, and whose disposal it is at? (in Hungarian) March 22, 2007 – http://www.vedegylet.hu/doc/GM_kerekasztal11.pdf p. 10; Gyulai F. The Institute of Agrobotany at Tápiószele is at jeopardy. (in Hungarian) October 11, 2007 – http://www.vedegylet.hu/doc/GMkerekasztal13.pdf p. 16

[63] http://www.vedegylet.hu/doc/GMkerekasztal14.pdf pp. 9–16

[64] We advise our present Statement to the special attention of the Ombudsman of Future Generations.

[65] Act LII / 2003.; Tanka E. Legal regulation of the national gene collection. (in Hungarian) December 6, 2007 – http://www.vedegylet.hu/doc/GMkerekasztal14.pdf pp. 12–13.

consequences. The national gene bank network represents – particularly at times of the incursion of genetic technologies – a prominent original value, as novel local varieties may be developed solely on the basis of this gene pool. This heritage is not protected by appropriately strict laws representing extensively our national interests. The registration and rescue of our heritage of this kind is an urgent task, as the present fate of the institutions providing the gene conservation of field plants, legumes, fruits and grape, as well as forestry cultures is totally uncertain. The uniform governance of the gene banks – harmonised with the genetic preservation of species both on the basis of *TABI* and native – has to be solved. According to the corresponding government decree announced in 2004 and the presently effective FAO agreement, the responsible party for these activities is the Minister of Agriculture and Rural Development.

(*iii*) The professional supervision of the gene bank network of cultivated plants has to be assigned to the Plant Gene Bank Council, to be extended in staff. The Council elects office-bearers (President, Secretary and Leaders of Technical Branch Working Groups) from their own members on the basis of vote majority.[66]

(*iv*) Upon the prompt legislation of the act guaranteeing the security of the gene banks of cultivated plants, separate legal regulations of the gene banks of domestic animals has to be elaborated.

(*v*) Finally, attention is being called to the fact that separate legal regulations of the establishment and operation of microbial gene banks is also needed, as these gene banks are of importance equally from the aspects of agriculture, industry and national security.

Keywords: Agrobotany Institute at Tápiószele; *TABI*; Plant Gene Bank Committee; national heritage; biological diversity; gene bank of cultivated plants; microbial gene bank
Data of publication and link: *The position of the GMO Round-table*, 2008. (January 10), **L**: 1–2.

[66] The Council should be extended primarily by members of the Department of Biodiversity at the Ministry of Environment and Water, of the Division of Natural Resources at the Ministry of Agriculture and Rural Development, and the Committee of Conservation Biology of the Hungarian Academy of Sciences.

Statement regarding the GM contamination of seed batches – No. M.

GMO Round-table

Éva Ács (Kishantos Rural Development Centre, Kishantos; IFOAM); József Ángyán (Committee on Agriculture of the National Assembly); Gábor Bakonyi (Szent István University, Department of Zoology and Animal Ecology, Gödöllő); Zsuzsa Bardócz (GENØK, Norway); Lea Bauer (Biokontroll Hungária Nonprofit Kft, Budapest); László Békési (Institute for Small Animal Research, Department of Honey Bee Keeping, Gödöllő); Béla Darvas (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Lívia Dömölki (National Federation of Associations for Consumer Protection, Budapest); Ferenc Gyulai (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); András Horváth (Hungarian Academy of Sciences, Institute of Ecology and Botany, Vácrátót); Péter Kajner (Hungarian Environmental Economics Centre, Budapest); Zoltán Menyhért (Szent István University, Faculty of Agricultural and Environmental Sciences, Gödöllő); György Pataki (Institute of Business Economics, Corvinus University Budapest); Katalin Pecsenye (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen); Árpád Pusztai (GENØK, Norway); Péter Roszík (Biokontroll Hungária Nonprofit Kft, Budapest); Lajos Rózsa (Animal Ecology Research Group of the Hungarian Academy of Sciences and Hungarian National History Museum, Budapest); Mihály Sajgó (Szent István University, Department of Chemistry and Biochemistry, Gödöllő); András Székács (Department of Ecotoxicology and Environmental Analysis, Plant Protection Institute of the Hungarian Academy of Sciences, Budapest); Endre Tanka (Károli Gáspár University of the Hungarian Reformed Church, Faculty of Law and Political Sciences, Department of Environmental Protection and Agricultural Law, Budapest); Gábor Vajta (University of Aarhus, Faculty of Agricultural Sciences, Department of Animal Nutrition and Physiology, Tjele, Denmark), Zoltán Varga (University of Debrecen, Faculty of Science, Department of Evolutionary Zoology and Human Biology, Debrecen)

Approximately 70000 tons of maize are being produced annually in cultivation areas in Hungary. In addition to the fulfilment of domestic demands, a significant proportion (60–70%) of the seeds produced is sold on international markets, at a value over several ten billions of HUF. The majority of the seed export is directed to France, Germany and Italy.

It is the first occasion that the European Union attempts to establish limit sin purity for the seeds of commercial maize. The proposed values for official limit range between 0 and 0.9%, and a remarkably sharp debate is expected regarding the acceptable limit. The reason behind this issue is the fact that should a limit of any magnitude be allowed, the country in fact loses its GMO-free status, even if remains formally free of GMOs according to the permissive EU regulations. The authorisation of a labelling threshold of even 0.1%

represents the occurrence of a substantial number of individual GM maize plants yielding GM maize seed.

This value also applies to maize fields in GMO-free regions in Hungary. The vast majority of present maize hybrids are owned by international companies. These firms produce a part of the seeds in countries – primarily in South Africa – without GMO-free status. Therefore, the chance of import of GM contaminated seeds from these countries is significant. A permissive requirement level is advantageous for these countries, while substantially deteriorating our present possibilities.

The limit of detection of the transgene is 0.05%, but only 0.1% is routinely achievable. The domestic laboratories (6 labs altogether) analyse approximately 1500 samples annually. The price of qualitative and quantitative analysis is 30000 and 60000 HUF/sample, respectively. This corresponds to an overall annual cost of approximately 60 million HUF/year – today, when production of GM crops is absent. The strictness of the required seed purity value affects sampling by strongly increasing the required number of samples per batch. Due to optimisation of the operation costs, the objective of the seed industry is to avoid zero tolerance. The launch of the passive GM production has to be analysed from the aspect of the government budget as well, as in the case of authorization of the contamination level the number of batches to be analysed and possible to market only with certification will suddenly jump up, and the present laboratory capacity will hardly be capable to cope with. In parallel, the costs of the official inspection and labelling, as well as handling and storage will exponentially grow, because the commercial maize seed produced on 25000 ha will have to be sampled to be able to find 0.1% contamination in it.

It is of utmost importance that genetic modification is not observable on the plant, therefore, manual selection cannot be applied in seed production, either. In contrast, the entire present process of seed production – from the raw material to F1 generation – is built on inspection on the basis of field (sensory) observation and small plot variety production, dismissal of the non phenotypical individuals by manual removal. Seed plots are tested for non phenotypical plants from the 5–6-leaf stage until the end of flowering, and atypical kernels are discarded even on the processing conveyer belt. These manipulations cannot be applied for removal of the non phenotypical hybrids of GM origin.

On the basis of the above mentioned, the community of the GMO Round-table advises the Agricultural Committee of the Hungarian Parliament to have an accurate cost estimation made corresponding to the routine detection level, 0.1%. In addition, we propose that Hungary should only accept seed produced in a GMO-free country.[67] In parallel, broad embracement of the domestic varieties would be required. We also put the notion forward that the Hungarian negotiators join the strictest alternative possible during the EU debate, because in our opinion, the interest of the country requires so. Otherwise Hungary maintains its GMO-free status only formally, leading to the severe territorial restraint in its basic seed production and ecological agriculture (high level isolation requirements, strict separation), where only the complete elimination of GMO-contamination (0%) remain as only acceptable solution.

Keywords: seed; labelling threshold; GM maize; limit of detection; cost of detection; selection; seed production; organic farming
Data of publication and link: *The position of the GMO Round-table*, 2008. (March 8) **M**: 1–2.

Figure 12: *Polygonia* (*Nymphalis*) *c-album* larva –
Polygonia (Nymphalis) c-album *lárva*
(Photo: Polgár A. László)

[67] The present Decree 20/2008. (II. 21.) by the Ministry of Agriculture and Rural Development contains, „…to facilitate traceability of seed lots, the importer is required to inform the Central Agricultural Office (*MgSzH*) about the fact of seed import, regarding seed lots exceeding 2 kg in volume originated from any third country, promptly upon the arrival of the lot. *MgSzH* may take, within a reasonable deadline, official samples to posteriorly inspect variety purity by random sampling."

INDEX – ENGLISH

M

N

O

P

R

ISBN 978-963-9848-44-3

Borítóterv:
Darvas Béla

Nyomdai előkészítés:
Agroinform Stúdió, Budapest

Nyomdai és kötészeti munkák:
Agroinform Kiadó és Nyomda Kft.
1149 Budapest, Angol u. 34.
Felelős vezető: Stekler Mária
Budapest, 2011/38


„…a fajtatulajdonos a bevezetés előtti négy évben köteles évente a szóban forgó GM-fajtából és annak izogenikus vagy kontrollként kezelhető vonalából a géntechnológiai hatóságok által szükségesnek tartott mennyiségű, ingyenes, garantált minőségű vetőmagot/terméket rendelkezésére bocsátani”
“…the owner of the variety is obliged to provide guaranteed quality seed grain, annually in the four years prior to the release, in the quantity deemed necessary by the Gene Technology Authority from the GM variety in question, or from its isogenic lin or its line treated as a control, free of charge”