NGO "ECOSOUTHWEST"

Bulgaria:

The Corporate European Playground for Genetically Engineered Food and Agriculture

A report prepared for EcoSouthWest
and ANPED
The Northern Alliance for Sustainability

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The Northern Alliance for Sustainability (ANPED)

ANPED is a network of NGOs based in the Northern Hemisphere. We strive to change unsustainable consumption and production patterns with an emphasis on the North. ANPED's role is to build sustainable societies by empowering grassroots organisations through sharing information and skills, common campaigns, publications and participation in international governmental conferences. ANPED links groups working on Genetic Engineering, Local Agenda 21, Corporate Accountability, Extended Producer Responsibility and Clean Production. ANPED is a democratic network of NGOs and voluntary organisations, with most of its members in Central and Eastern Europe (CEE) and the Newly Independent States (NIS). Membership is open to any such organisation sharing our aims.

ANPED's work on Genetic Engineering (GE) of Food and Agriculture in CEE and NIS started in 1996. It now includes groups from at least 8 countries in the region working together to raise public awareness of GE food in their countries.

ANPED receives core funding from the European Union's DG Environment and from the Dutch Ministry of Housing, Spatial Planning and the Environment (VROM).

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NGO "ECOSOUTHWEST"

EcoSouthWest is a voluntary, non-profit and non-party political organisation, established in September 1994. Its aims are to collect and disseminate environmental information, undertake environmental education and translate Local Agenda 21 in the south-western region of Bulgaria. To this end, we have undertaken 11 projects on issues such as environmental legislation and education.

EcoSouthWest has also been working on waste issues and has organised a nationwide campaign against waste incineration. In May 1997, we stopped a project to reconstruct cement kilns to burn municipal waste in SW Bulgaria.

On genetic engineering, we have been lobbying the various ministries and the Bulgarian parliament to introduce changes to the current Bulgarian regulation on GE plants. We have also been working with the Hygiene Epidemiological Institutes in several cities to build awareness of GE foods.

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Prologue

This is a story of corporate exploitation of Bulgaria's unaccountable and chaotic State administration by companies, such as Monsanto, in order to commercialise the growing of genetically engineered (GE) maize. The release of genetically modified organisms[1] (GMOs), such as maize, into the environment, poses potential threats to biodiversity and to human health, when this maize enters the food chain. In the short term, however, the commercial cultivation of GE maize, the lack of segregation of GE maize from non-GE and thus traceability, threaten to destroy Bulgaria's export market for maize derivatives and fodder.

The key players in this story are: the transnational corporations (TNCs), such as Monsanto and Pioneer, who have been pushing their GE seeds in Bulgaria, the passive and irresponsible State administration and Bulgarian scientists, who are either colluding with the TNCs or remaining silent despite their concerns about this technology. The lead role in this story goes to a Bulgarian genetic engineer, Prof. Atanas Atanassov, head of the Institute of Genetic Engineering in Kostinbrod, who prepared and regulates GE policy on behalf of the Ministry of Agriculture and whose institute undertakes projects for Monsanto.

The absence of interviews with the key players in this story – TNCs, State departments and Prof. Anatasov – means that we have had to piece together this story from press articles and interviews with people, some of whom have refused to be quoted.

[1] In this report, the terms 'genetically engineered' (GE), 'genetically modified' (GM) and transgenic are used synonymously. Thus GE food means genetically engineered food and GMO means genetically modified

Executive Summary

In 1999, Bulgarian farmers harvested the first crop of genetically engineered (GE) herbicide-tolerant and pest-resistant maize. That year, Monsanto's GE maize was grown on at least 12,000 hectares. Farmers bought the GE maize seeds from local seed distributors, after aggressive marketing campaigns by the transnational companies that produce them - Monsanto and Pioneer. In 2000, Bulgaria is to increase the area under GE maize to 20,000 hectares. But how is this area to be controlled? Genetically engineered maize seed hybrids are being offered to Bulgarian farmers by seed distributors, with no limitations on the quantities they want to buy. While this is the reality, the official line of members of the Council giving permits for releases of GMOs remains that Bulgaria has been undertaking only field trials of GE maize and other plants over the last 2 years.

These 'field trials' were approved by the Council for the Safe Use of Genetically Modified Higher Plants, established on the basis of a 1996 regulation, which itself was based on a law from 1958 on Seeds and Seed Material, thus by-passing parliament. It provides for an authority, namely the Council, with the power to issue permits, which is not under the control of the Council of Ministers. Hence no one in the government is responsible for GE activities. Despite the dubious legal status of this Council, it is empowered to give approvals not only for field trials, but also for commercial cultivation of GE plants, as well as the import and export of GE plants, seeds and planting material. Although the Council maintains registers of releases of GMOs both for research and commercial purposes, this information is considered an administrative secret.

The Executive Secretary of the Council is Prof. Atanassov who is head of the Institute of Genetic Engineering, which undertakes projects for Monsanto. Is there no conflict of interest? The fox is guarding the hen house.

GE Food on the Bulgarian market

Food products containing GMOs are already highly likely on the market. Most of the GE maize harvested in 1999 was probably used for animal feed and thus entered the human food chain, via meat and dairy products. The GE maize was not kept separate from the conventional crop. Meanwhile, foreign food-processing companies and grain handlers in Bulgaria wanting to buy maize and maize derivatives, such as starch, are starting to request GE-free certificates of purity, which cannot be guaranteed.

Bulgaria is today caught in a war between the corporate seed producers, like Monsanto and Pioneer, and the corporate food processors and commodity traders who want to buy GE-free products for the EU market. If Bulgaria wants to stop the corporations from playing Russian roulette with its agriculture, the Government needs to take control of the situation.

Agriculture plays an important role in the economy of Bulgaria. In its rush to 'modernise' agriculture, Bulgaria must reject agro-biotechnology in order to retain the option of farming organically. Organic and GE agriculture are incompatible. For example, GE crops threaten organic farming due to the high rate of cross-pollination, and by undermining the future use of its environmentally friendly pest control tools, such as *Bt* formulation. The commercialisation of GE crops could also have important socio-economic impacts as Bulgaria loses it export markets for agricultural products in the European Union (EU), where consumers are demanding GE-free food.

Conclusions

- Bulgaria's regulation of the use and release of GMOs into the environment lacks any transparency and indeed, is considered an administrative secret. There is no legislation to ensure public access to information on issues concerning genetic engineering and releases of GMOs or labelling of GE food. There are no procedures to enable the public to participate in decisions concerning genetic activities.
- There is no public awareness of genetic engineering or the dangers of releasing GMOs or eating GE food.

- Foodstuffs produced in Bulgaria are highly likely to be contaminated with GMOs and thus might be subject to severe market constraints. The 20,000 hectares of GE maize to be grown in 2000 may contaminate the Bulgarian maize harvest - through pollen flow and absence of segregation of GE maize from conventional crop. Buyers in the EU and Asia will become aware of this and may reject Bulgarian products.
- Although the 1996 Regulation provides for civil and administrative liability, no one is monitoring the cultivation of GE crops for environmental impacts. In practical terms, it is difficult to show with absolute certainty whether GMOs have already escaped into natural ecosystems.
- Although transnational companies publicly advocate a policy of not releasing GMOs in countries with no GE regulations, once a minimum regulation is in place, they will sell their GE seeds wherever they can. The situation in Bulgaria - minimal regulations not passed by parliament, not providing for public control and with an inadequate risk assessment procedure - is the perfect structure for TNCs to introduce GE seeds that are rejected in other parts of the world.

In the light of these findings, EcoSouthWest urges the government to take all necessary measures to safeguard the environment and Bulgarian people from the possible risks posed by GMOs in Bulgaria. The Bulgarian Government must immediately:

- Introduce a moratorium on all environmental releases of GMOs until a national biosafety law is in place which implements the provisions of the Biosafety Protocol and the Århus Convention (See Annex 2: The Elements of a Model National Law on Biosafety). If Bulgaria is serious about EU membership, the moratorium should ideally stay in place until the revision of Directive 90/220 on Deliberate Release of GMOs is complete. Making Bulgarian agriculture GE-free would also be a sensible market decision, given the rejection of GE food in Western Europe.
- Revoke any permits for the import or sale of GE seed, and for the undertaking of field trials or cultivation of GE crops. Any GE seed already in Bulgaria must be destroyed.
- Immediately prohibits the import of products derived from GE-crops containing antibiotic resistance marker genes
- Ensures traceability of all imports of GE-crops or products thereof. They must be labelled and handled separately from conventional crops from plot to plate, or (for imports) from the port of entry to the plate.
- Repeals the 1996 regulation, dissolves the Council on Safe Use of GE Higher Plants and secures its registers of GMO releases, which should then be made public.
- Ratifies the Århus Convention on Access to Information, Public Participation and Access to Justice in Environmental Matters, which the Bulgarian government signed in June 1998. This Convention gives the public the right to have information about GMOs and will help ensure transparency and public participation by guaranteeing citizens' access to information on all genetic activities. The Government must establish processes and procedures for public participation in decision-making.
- Introduces legislation requiring mandatory labelling of GE food. The labelling regime must be process and not product-based
- Establishes an Advisory Body representative of society, which includes NGOs, political scientists, the churches, natural scientists and officials.
- Provides support for organic farming by stimulating demand for organic food through education, public procurement policies and by providing economic incentives

1. Introduction

In 1994, for the first time ever, a genetically engineered (GE) plant was grown commercially. The introduction of FlavrSavr tomatoes in the USA was the beginning of a global change in agriculture - or so the big transnational companies - Monsanto, AgrEvo, Pioneer and DuPont - had hoped. However, when in 1996 the first harvest of GE soybeans was about to be shipped to Europe, European consumers refused to be force-fed GE food. Consumers demanded the right to know what they were eating and asked for the labelling of GE food.

Several food scandals in Europe in recent years, including BSE beef and dioxin-laced pigs and poultry – both symptoms of industrialised food production – have sensitised people to food quality. Public consultations on releases of GMO in field trials and the introduction of GE foods in imported products - well documented by environmental and consumer groups, created a mistrust of the bad science and the big money behind the GE push.

In many EU countries, the introduction of genetically engineered food onto the market failed, and the major EU food producers now guarantee a GE-free food supply. Corporate food processors, such as Nestle and Unilever, made public commitments to source only GE-free ingredients in their products. For the Bulgarian market however, "*some Nestle Sofia products may contain ingredients derived from GM raw materials, depending on the type of products and the origin of raw materials*".[2] Since 1999, there is an increasing awareness about the dangers of genetically engineered crops even in the USA, and the acreage planted with GE crops is expected to drop this year.

Only Spain, and to a very limited extent France and Germany, were growing GE maize in the past two years. EU approvals for growing AgrEvo's herbicide tolerant[3] maize and importing Monsanto's *Bt* maize are both being challenged by France. Novartis' herbicide tolerant and insect resistant maize has been banned by Austria and Luxembourg. Austria has also banned the growing of Monsanto's *Bt* maize. Monsanto's Roundup[4] tolerant maize has still to receive market approval for import into the EU.

Another nail in the coffin for GE food is the Biosafety Protocol, finally agreed in Montreal at the end of January 2000. It clarifies the issue of international trade in GMOs. The Protocol agreed by 130 countries world wide, including Bulgaria, allows countries to apply the 'precautionary principle' and reject imports of GE foodstuffs, if they think there is a safety risk. For Bulgaria's GE harvest, this means enforced and controlled segregation of crops and crop storage to ensure that no cross-contamination occurs, which implies additional costs in terms of grain storage capacity and labelling. For the EU, where consumer opposition to GE food is greatest, the Protocol gives the right to reject food imports contaminated with GMOs.

Corporate food processors and grain handlers operating in Bulgaria are already starting to demand certificates of purity of Bulgarian maize and its derivatives, like starch and corn syrup. Can Bulgaria, with its weak economy, afford to play "Russian roulette" with its customers worldwide? Why is Bulgaria offering itself as the European playground for GE experiments to corporations, like Monsanto and Pioneer?

The key difference between the situation in Bulgaria and that in Western Europe is that the latter has a high degree of public access to information and participation. For example in the UK, the sites of field trials of GE plants are posted on the Internet. Citizen participation requires environmental awareness and a working participatory democracy. In Bulgaria, releases of GMOs are kept secret by law, the State Administration is totally unaccountable and there is no governmental control of GE activities.

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[2] Fax from Nadine Deswasiere, Nestle Sofia, dated 2 March 2000

[3] The trade names of AgrEvo's glufosinate-based herbicides are Liberty, Basta, Challenge, Harvest and Dash

During the last year, EcoSouthWest, a Bulgarian environmental NGO based in Blagoevgrad in south western Bulgaria, have been campaigning in their region to raise public awareness of genetic engineering in food and agriculture by doing outreach to journalists and organising public meetings.[5] The purpose of this report is to alert Bulgarian citizens to the threats posed by the growing of GE crops, including potential impacts on the environment, human health and access to the EU markets. The commercialisation of GM crops and food, which have not been approved by the EU, could hamper Bulgaria's accession to the EU.

The report will help to close the widening gap in public awareness with respect to GE food and agriculture between Western and Eastern Europe. In this way, we want to stop Bulgaria becoming a dumping ground for GE seeds and GE food that are unwanted in the West.

Agriculture in Bulgaria

Bulgaria, with a population of some 8.5 million, lies on the Balkan peninsular of South-East Europe. Its neighbours include Romania to the North, Serbia and Macedonia to the West and Greece and Turkey to the South.

Agriculture plays an important role in the economy of Bulgaria. The country is favoured by five climatic zones and a wide variety of soils. In the North the black soils support the cultivation of corn, vines and fruit trees, while in the more mountainous regions potatoes, tobacco and flax are grown. Along the Danube plain, the most important crops are corn, sunflowers, sugar beet and grapes.

The main export crop is maize. In 1998, Bulgaria exported 108,000 tons of maize.[6] Bulgaria also imports agricultural produce, the key commodities being soya meal and maize, probably for animal fodder.

During the authoritarian rule of the communist regime, all agriculture was managed by State collective farms. However, since 1991, the collectives are being privatised and land is being returned to former owners. Many former collectives are now owned by farmers' co-operatives.

The Prospects for Organic Farming

"*Eco-agriculture is our niche in the European market*" – Vencislav Verbanov, Minister of Agriculture[7]

After the political changes, the use of agro-chemicals in Bulgarian agriculture decreased substantially, due to the elimination of subsidies. However, the potential for organic or ecological agriculture is only now being explored. In August 1999, a new regulation was introduced under the Plant Protection Act setting out standards for organic agriculture, creating a certification body and introducing requirements for labelling of organic produce.[8] A recent survey of soils undertaken by an Italian agency revealed that 70-90% of Bulgarian agricultural land is suitable for eco-agriculture. This led the Minister of Agriculture, Vencislav Verbanov to declare that the future of agriculture in Bulgaria is organic.

However, the concept of organic agriculture is still almost unknown. Many environmental groups and scientists misguidedly regard organic agriculture as simply replacing synthetic fertilisers with organic, farmyard manure.[9] However, there are some moves to promote organic farming, including a Swiss programme, FISL, which since 1999 is training farmers who want to convert to ecological agriculture. Today, some 80 farmers are being trained within this FIBL programme.[10] Another possibility for

[5] Interviews with Kalin Anastasov and Dian Deyanov in Sofia, 3 March 2000
[6] Data from National Statistics Institute, 1998
[7] Interview with Minister Vencislav Verbanov by Daniela Kazandzjieva, published 15 February 2000 in Bulgarian newspaper (title unknown)
[8] Regulation No. 15 on Biological production and labelling of agricultural and food products, passed 3 Aug '99
[9] Interviews with DymitarVasilev from "Ecoclub" 2000 and Petko Kovachev from the Centre for Environmental Information and Education, 28 February 2000; interview with Prof. Ralchev, retired scientist from IGE, Kostinbrod, 2 March 2000

organic farming, according to Verbanov, is to use the EU pre-accession SAPARD programme to promote organic agriculture. Over a 7-year period, Bulgaria will receive some 52 million euros from SAPARD to boost the agriculture sector, upgrade infrastructure and correct the inequity between the most developed and the poorest rural areas.[11]

Clearly, the Agriculture Minister sees no conflict between the promotion of organic farming and the cultivation of GE crops. But, organic and GE agriculture are incompatible. For example, GE crops threaten organic farming due to the high risk of cross-pollination, and by undermining the future use of its environmentally friendly pest control tools, such as *Bt* formulation. According to IFOAM,[12] genetically engineered food cannot be considered organic. (See Section 8: *Environmental Risks: Plants out of Control*)

Part A: Genetically Engineered Crops and Food in Bulgaria

2. Field Trials and Commercial Cultivation of GE Crops

No one is sure exactly what is being grown in Bulgarian fields. The official line is that there is no commercial cultivation of GE crops, and specifically GE maize in Bulgaria.[13] The reality is that in 1999, farmers grew GE maize commercially in at least two maize-growing regions of Bulgaria.

The First Releases of Genetically Engineered Organisms in Bulgaria

Bulgaria has a history of tinkering with genetic engineering. Already in 1991, the first geneticially modified organisms (GMOs) to be released in the Balkan region were transgenic tobacco plants. In the mid-1990s, extensive field trials of virus- and bacteria-resistant tobacco were being undertaken at the Institute of Genetic Engineering in Kostinbrod, and Bulgarian scientists were talking about marketing this tobacco in 1998. At this time, Bulgaria was also undertaking field trials of transgenic alfalfa.[14]

No one knows or is willing to say exactly what happened to the field trials of tobacco and alfalfa that have been taking place since 1991 at the Institute for GE (IGE) in Kostinbrod. However, in 1999 Greek customs in Thessaloniki refused to accept a shipment of Bulgarian tobacco on the grounds that it may be contaminated with GMOs.[15] At a recent seminar, Atanassov claimed that in Bulgaria most progress in genetic engineering had been achieved in GE tobacco experiments, whose traits include resistance to viruses, including the mosaic virus, fungal and bacterial diseases, extremes of temperature and tolerance to herbicides and heavy metals.[16]

Our failure as journalists to get interviews with Prof. Atanassov, or indeed anyone from the IGE, suggests that scientists believe that by withholding of information, they can prevent a rejection of Bulgarian agricultural exports by EU buyers on the grounds of GMO contamination of its products. On the contrary, the lack of information could lead to greater scepticism on the part of grain traders,

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[11] Article "*Bulgaria seeks funds to reform farming*", in New Europe15-21 November 1999

[12] International Federation of Organic Agriculture Movements

[13] Interview with Atanas Kimaktchiev, Secretary General of Ministry of Environment and Water, 1 Feb 2000 and Paper: "*Biosafety and Regulation of GMOs in Bulgaria*", by Prof. Atanas Atanassov, Institute of Genetic Engineering in Kostinbrod, from Proceedings from the 5th Central and Eastern European Conference for Regional and international Co-operation on Safety in Biotechnology, 12 -14 December 1999, Sofia

[14] Source: Greenpeace report: "*Playing God – Genetic Engineering of Food and Agriculture in Central and Eastern Europe*", November 1996. Original source: Attanas I. Atanassov, Institute of Genetic Engineering (IGE), Plant Biotechnology Research Centre, Kostinbrod, prepared for meeting "*harmonisation of biotechnology regulations in CEE*" 22-23 September 1994. Summary of paper reprinted in "*Biotechnologia*" 2 (29) 1995; also interview with Pawlin Petrinsky, IGE in Kostinbrod during seminar "*Strengthening Institutional Capacity in Biosafety*", Moscow 27 Feb-1 March 1996

[15] Interviews with Prof. George Russev, Director of Institute of Molecular Biology, 28 February 2000 and Prof. Roumen Tsanev, member of Bulgarian and European Academy of Science

animal feed producers and the food derivatives and processed food industry, specialising in the export of Bulgarian food products. Indeed, without information, all Bulgarian food becomes suspect.

What is Genetic Engineering?

Genetic engineering is a relatively new branch of science, often misleadingly called the new biotechnologies in an attempt to liken it to the centuries-old industrial use of biological processes, as in bread-making and beer brewing. The term 'biotechnology' refers to the science of using living organisms, for example, the use of yeast cells to make bread and wine. The term is also used to describe the careful breeding of plants or animals to produce a particular, desired result. Traditional biotechnologies have given us hothouse roses with unique colouring and cows with higher meat or milk yields.

Genetic engineering, on the other hand, involves taking genes out of an organism's cells and altering them in some way. It enables scientists to transfer genes between different species to produce genetically modified organisms (GMOs) with new characteristics.

Genetic engineering has been seized upon by scientists and industry as a way redesigning and 'improving' living organisms. Genetic engineering in agriculture focuses on conferring new properties on commercial crops, like herbicide resistance, nutritional change, insect resistance or stress tolerance. Industry claims that these 'improvements' will increase efficiency and productivity. In fact, their main motive is increased profits.

The Official Line

Official information reveals that since 1998, three companies: Monsanto, Pioneer and Novartis, have all applied for permits to commercialise transgenic crops which are either herbicide tolerant (to Roundup and Basta), resistant to corn borers (with *Bt* genes) or combined herbicide and corn borer resistant.[17] Although it is not stated if permits for commercialisation were subsequently granted, one can assume that they were, because farmers were already growing GE maize in 1999 and companies were featuring GE seeds in their 1999 seed catalogues and are already advertising GE maize seeds in the catalogues for 2000.[18]

In an interview for the newspaper 'Capital', Prof. Atanassov, head of IGE in Kostinbrod and Excecutive Secretary of the Council for Safe Use of GE Higher Plants, which regulates releases of GMOs, claims that in 1999, Monsanto made contracts with Bulgarian farmers to sow 12,000 hectares with GE maize, resistant to insects or spraying with herbicides. The same article claims that in 2000, Monsanto intends to contract farmers to sow 25,000 hectares of transgenic maize. Atanassov is quoted saying "*The Council will decide how many decars*[19] *and what part of the corn region in Bulgaria will be permitted*".[20]

The official line remains that these were just field trials taking place over 2 years, since 1998. But, according to Prof. Atanassov, in mid-March 2000, the Council for the Safe Use of GE Higher Plants is to decide whether to permit commercialisation of transgenic maize.[21] Imminent commercialisation is also reported in a newspaper article, which claims that field trials of GE seeds are complete and the Council will soon approve them for commercial cultivation.[22] However, the representative of the Environment Ministry on this Council, Mr. Kaimakchiev, believes that the Council may call for a moratorium on all planting of GMOs, until a new law is approved. He believes that there is no commercialisation of GE crops in Bulgaria and that there will be no commercialisation until a new law

[17] Paper: "*Biosafety and Regulation of GMOs in Bulgaria*", by Prof. Atanas Atanassov, Institute of Genetic Engineering in Kostinbrod, from Proceedings from the 5th Central and Eastern European Conference for Regional and international Co-operation on Safety in Biotechnology, 12 -14 December 1999, Sofia

[18] Pioneer Seed Catalogue for 1999

[19] One decar is one tenth of a hectare or 1000m^2

[20] Article: "*The Biotechnologies War – Bulgaria's choice between EU rejection and American appeal for GM products*" by Miglena Manchieva, in the weekly newspaper '*Capital*', 29 January-4 February 2000

[21] ibid

[22] Article: "*Genetic War in Our Country? Bulgarian farmers wait in line for mutant maize*", by Konstantin

on GMOs is passed.[23] Indeed, a recent edition of the newspaper 'Capital', reports that the Council refused to allow the commercialisation of GE maize, but allowed for the area under GE maize to be increased from 12,000 to 20,000 hectares.[24] According to members of the Council, only herbicide tolerant varieties of GE maize have been approved for field trials - Monsanto's Roundup tolerant and Pioneer's Liberty Link maize - but not the insect-resistant *Bt* varieties.[25]

Trials of other GE plants mentioned in interviews and newspaper articles include Monsanto and Novartis herbicide tolerant wheat[26] and Monsanto's *Bt* potatoes. Trials of the latter are to start in 2000.[27] Other GE plants being developed include: alfalfa, grapes, sunflowers and tomatoes.[28]

The Reality

In February 2000, the national TV in its weekly programme for farmers, "*Brasdi*" (Eng. Furrow) attempted to open the discussion on GE farming with a report about the growing of Monsanto's Roundup-tolerant maize in North Eastern Bulgaria.[29] It featured interviews with a farmer from the Sevlievo region who had grown Monsanto's GE maize and a businessman, Isperich, from the company Agrotime, who warned that the adoption of GE in agriculture could hamper exports. However, the programme finished with a journalist warning viewers that Bulgaria should not listen to the West who just want to keep Bulgarian agriculture backward.[30]

We tracked down the farmer, Mityu Mitev, interviewed in the TV programme on his co-operative farm near Sevlievo. 1999 was the first year that he bought Monsanto's sowing package, which included 5 packets of Roundup-tolerant maize seeds and 30 litres of Roundup herbicide. He bought this seed and herbicide package from his local seed distributors, 'Panacea' in Sevlievo, who have a contract with Monsanto. His co-operative has no contract with Monsanto. The co-operative subsequently sowed 30 hectares with this maize.[31]

A third of the co-operative's GE maize harvest went to the seed distributor to be sold for animal feed. A third of the harvest was used to feed animals on the co-operative farm. The remaining third was sold to people outside the collective to use as animal feed.[32]

A visit to the seed distributor, 'Panacea' in Sevlievo, confirmed that they were selling Monsanto's GE maize seeds last year, and have just a small amount left from last year. They were not sure if they could sell us any, as all they had was last year's stock. They confirmed that Monsanto's GE seed-herbicide package – sufficient for some 37 hectares – costs around $120 per hectare. The yields that farmers were getting for GE maize both in the Sevlievo region and further north in the Pleven region were some 6 tonnes per hectare.[33] Panacea has a contract to sell seeds for both Monsanto and Pioneer, and presumably keeps records of who bought this seed. It is understood that Monsanto has a list of all the farmers growing their GE maize, but this information is regarded as confidential.[34] It is outrageous that this information is not publicly available. In the EU and North America, these companies accept that extensive lists of their field trials are publicly available on the Internet.

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[23] Interview with Atanas Kaimaktchiev, Secretary General of Ministry of Environment and Water, 1 Feb 2000
[24] Information from the weekly *'Kapital*', 1-7 April 2000
[25] Conversations with Atanas Kaimaktchiev and Gantcho Armianov, members of the Council for Biosafety of GM Higher Plants during meeting of Århus Taskforce on GMOs, held 6-7 March 2000 in Sofia. Armianov works at the Institute of GE in Kostinbrod
[26] Interview with Atanas Kimaktchiev, Secretary General of Ministry of Environment and Water, 1 Feb 2000
[27] Article by Miglena Manchieva: "*The Biotechnologies War – Bulgaria's choice between EU rejection and American appeal for GM products*", in the weekly '*Capital*', 29 Jan-4 Feb 2000
[28] Seminar: "*21st Century Biotechnology Seminar*", Sofia, 28 March 2000; see: www.bfia.org
[29] This programme was aired on Sunday, 20 February 2000, Channel 1
[30] Interview with Vladimir Dvoretzky, Head of Foreign News, *Novinar Daily* newspaper
[31] Interview with Mityu Mitev, farmer at the Co-operative farm "ZPPK Edinstvo" (Eng. Unity) in Bogatevo village, near Sevlievo, 2 March 2000
[32] ibid.
[33] Interview with worker at Panacea seed distributors in Sevlievo, 2 March 2000
[34] Monsanto's list was promised to us by Prof. Spetzov from Dobrich and by others, but finally Spetzov decided

It was from 'Panacea' seed distributors that we acquired the 1999 and 2000 seed catalogues of Pioneer. The 1999 catalogue introduces GE maize hybrids and shows results of yields from farm-scale trials on 8 different GE hybrids, including Clarica, Evelina[35] and Cecilia, which had taken place on the farm of Todor Todorov in Dobrich. Pioneer's 2000 seed catalogue offers at least three varieties of GE maize seed (see Annex II: Selected pages from Pioneer's Seed Catalogue):

- Clearfield – tolerant to Imidazolinon-based herbicides, whose trade names are 'Pivot' and 'Escort';
- Liberty Link maize – tolerant to the glufosinate-based herbicide, Liberty made by AgrEvo
- Maisgard – *Bt* corn which is resistant to the corn borer. A note in the catalogue warns farmers to provide 'refuges' of *Bt*-free maize[36] and suggests that they attend seminars to learn more;
- Combined Maisgard and Liberty-Link maize seed also seems to be offered, but carries a warning that herbicide-resistance may not always be evident.

A recent follow-up call to Panacea to enquire about the availability of GE seeds for this year revealed that Monsanto's Roundup-tolerant maize seeds are to arrive within a week. The saleswoman assured us that we could buy any amount we wanted.[37] Indeed, the price list from a seed distributor confirms that Monsanto's Roundup Ready maize seed is being offered to farmers at a price of US$ 907 for a package containing 5 packets of seeds (each containing 80,000-100,000 seeds) and 30 litres of Roundup. Pioneer maize seed hybrids: Clarica, Stira, Rezeda, Evelina and Kolomba, are being offered for a prices of 132 DM (US$ 66) for a packet containing 80,000 seeds. Clarica and Evelina are thought to be GE maize hybrids. (See Annex III: Seed Offers for 2000)

Who gave a permit to release GMOs?

Clearly, somebody in the State Administration gave companies, like Monsanto and Pioneer permission to import GE maize seeds and to sell them via seed distributors to Bulgarian farmers. Otherwise, these companies would not be so bold as to advertise their sales in seed catalogues. Indeed export records from the US show that in February 1999, one shipment of some 164 tons of maize seed was shipped from the USA to the Bulgarian Black Sea port of Varna.[38] Was this the GE seed that farmers, like Mitev sowed in their fields that year?

So who gave the permit to import GE seeds and grow them in Bulgaria? The only body empowered to grant such a permit is the Council for the Safe Use of GE Higher Plants. However, information regarding GE permits is handled as top secret and is not publicly available.

This Council was established on the basis of 1996 regulations,[39] which are based on a law from 1958 on Seeds and Seed Material, and thus did not need to be passed by parliament. The regulations gave this body the power to issue permits. The Council is chaired by the Deputy Minister of Agriculture and the Executive Secretary is Prof.. Atanassov. Other members include officials and scientists.[40] Environmental experts, NGOs and members from important social groups in Bulgaria are not involved in the approval process.

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[35] Clarica *Bt* and Evelina *Bt* hybrids are insect resistant; Clarica Glu is tolerant to a glufosinate-based herbicide, whose trade names are Liberty, Basta, Challenge, Harvest and Dash

[36] The notion of 'refuges' - areas of field with non-*Bt* plants - is to delay the time taken by insects to develop resistance to so widespread a use of *Bt*. In *Bt* plants, each plant cell is continuously producing this toxin. For more detailed information, see Section 8: *Bt-resistance: an environmentally friendly insecticide in danger*

[37] Phone call from a maize-seed buyer to Ms. Laleva at Panacea, 30 March 2000

[38] PIERS, the US Customs database

[39] *Regulations on the Deliberate Release into the Environment of GE Higher Plants obtained by Recombinant DNA Technology* were passed 16 August 1996, by the then Minister of Agriculture and Food-processing Industry, Krastio Trendafilov

[40] Paper: "*Biosafety and Regulation of GMOs in Bulgaria*", by Prof. Atanas Atanassov, Institute of Genetic Engineering in Kostinbrod, from Proceedings from the 5th Central and Eastern European Conference for

According to these regulations, releases of GE plants are controlled by the Ministers of Agriculture and Environment. But, it is the Council which issues permits for the release of GE plants, maintains registers of the releases both for research and commercial purposes, evaluates the environmental risk assessments submitted by the applicant and supervises compliance with the permit. The registers contain data on the people who have been granted permits, details of the host plant and the genetic modification, the place, purpose and period of release and the environmental impact. In addition, the register of commercial release of GE plants requires the name of the product and the licensed use, namely agriculture or trade in seeds or planting material. However, in Bulgaria, information contained in these registers is considered a State secret. Council members and anyone else involved in the work of the Council is required to sign a statement of administrative confidentiality. So, although GE plants are being released into the public domain, namely into the common environment, Bulgarians are not allowed to know about these releases.

The regulations require buyers and users of GE plants – presumably seed distributors, farmers and consumers – to be informed about their GE nature, by labelling provided in the Bulgarian language. Although there is labelling for farmers, there is no labelling for consumers. Since there are no controls on the destiny of GE plants already being grown, and no segregation of GE crops from non-GE ones, it is impossible to trace the origin of the food products on the market. The absence of labelling means that the public is not allowed to know what they are eating.

Who is Prof. Atanas Atanassov?

Prof. Atanassov is Director of the Institute for Genetic Engineering and Executive Secretary of the Council for the Safe Use of GE Higher Plants. He seems to be the linchpin in this story. When we tried to get interviews with the Ministry of Agriculture officials, we were invariably referred to him. This was also the case with interviews with scientists – all lines of inquiry inevitably led to Prof. Atanassov - but we were unable to gain an interview with him.

Prof. Atanassov is a busy man. On the one hand, his Institute undertakes projects for companies, like Monsanto and Pioneer.[41] On the other hand, Atanassov, as Executive Secretary of the Council, plays a key role in the granting of permits, to companies, like Monsanto, to release GMOs.

It is understood that Prof. Atanassov was also involved in the preparation of the draft of a new law on GMOs[42] which was prepared by Dr. L Mechkarov from Sofia University. The draft law covers all GMOs, including GE animals and micro-organisms, and their use not just in agriculture and food, but also in pharmaceutical production. As might be expected when the fox is guarding the hen house, the law is permissive based on a 'wait and watch what happens' attitude, rather than the precautionary principle, which dictates that caution be applied in the face of scientific uncertainty.

Instead of the precautionary principle advocated in the recently negotiated Biosafety Protocol and increasingly used as the basis for decision-making on GMOs in the EU, Bulgaria's draft law prescribes that GMOs should be released when contemporary knowledge of science and technology presumes no negative impacts. Another principle embraced by the draft law states that research in genetic technologies must not be subject to illegitimate restrictions. One of the principles of the draft law is sufficient public access to information to enable them to influence decision-making. Although the draft gives the public three weeks to comment on any proposals (presumably to release GMOs), it provides no mechanisms for how this will be achieved.

Is there no conflict of interest here? Is Prof. Atanassov serving the public interest to ensure biosafety and public health, or is he serving Monsanto?

[41] Article by Miglena Manchieva: "*The Biotechnologies War – Bulgaria's choice between EU rejection and American appeal for GM products*" in the weekly newspaper '*Capital*', 29 January-4 February 2000; also interview with journalist 29 Feb 2000, who refused to be quoted

There is also no democratic control of GE activities. The Council comprises officials and scientists who are bound by secrecy. No one has responsibility for informing other interested parties, from other sectors of society who are not only unaware of what is going on, but also have no way of influencing decisions. Environmentalists, church and consumer groups, and the public at large are excluded from participating in an informed debate, despite the fact that these new biotechnologies can have an immense impact on their health and environment.

What is the legal status of the Council giving permits for releases of GMOs?

The situation in Bulgaria with respect to regulatory oversight of GE activities is confusing. This is because the status of the Council for Safe Use of GE Plants is poorly defined in Bulgarian legislation. On the one hand, this Council seems to be a separate authority, whose responsibility includes the issuing of permits, but on the other hand, it is not listed as a separate agency within the government. So, if one was to submit to this Council a demand for access to information, it could refuse on the grounds that it is not explicitly a State institution and is not on the list of Ministries that should provide information to the public. A direct appeal for information to the Minister of Agriculture could also be turned down, because he does not hold this information and indeed, does not issue the permits.[43]

Moreover, the Bulgarian Constitution provides for all administrative decisions to be appealed, unless otherwise provided by a law. On the question of whether the decision to grant or refuse a permit to release a GMO could be appealed against and which court should hear the case, the double status of the Council could again lead to confusion. If the Minister of Agriculture had made that decision, an appeal could be lodged in the Supreme Administrative Court. However, appeals on decisions of a Council are normally heard in the Regional Court.[44]

In most countries, the role of Councils is to provide recommendations to a Ministry who then takes the decision to grant or refuse a permit. But, in Bulgaria, the Council is empowered to give permits, even though it is not under the control of the Council of Ministers. This leads us to conclude that no one in the government is responsible for GE activities.

Swiss Authorities Refuse Permit for Trials of Herbicide-Resistant Maize

In Bulgaria, the Council for Safe Use of GE Higher Plants most likely approved the growing of herbicide-tolerant maize. But, an application for field trials of glufosinate tolerant maize, similar to Pioneer's Liberty Link maize grown in Bulgaria, was recently turned down by Swiss authorities. In April 1999, the Swiss Agency for the Environment, Forests and Landscape refused approval for Plüss-Staufer AG to undertake a release test using genetically modified glufosinate tolerant T25 maize.[45] The reasons for the refusal are:

- Although maize originates from Central America and there are no related plants in Switzerland, pollen dispersal between various maize fields is a problem. As a result, a product could arise on a third party's plot, which has not been approved. No tolerance value for the contamination of maize, either as foodstuff or animal feed, by genetically modified material currently exists. "*The hybridisation of genetically modified inherited material must therefore be prevented. This could be greatly reduced by removing male blossoms from T25 maize prior to flowering. Even with such sterilisation, it cannot be guaranteed that the pollen will not end up on a neighbouring maize field or will be gathered by bees and end up as honey.*"
- The possibility of the transmission of genetic material, even from dead plant material from GE plants to soil micro-organisms.
- The T25 maize also contains a disrupted sequence from an antibiotic resistance gene. "The presence of active antibiotic resistance genes in GMOs which are to be released into the environment, in view of the high level of complexity of the soil microflora and the low level of

[43] Interviews with Alexander Kodjavashev, an attorney, 28 and 29 Feb 2000, also electronic communication
[44] ibid
[45] Verfuegung vom 16 April 1999 betreffend das Gesuch der Pluess-Staufer AG, 4665 Oftringen vom 10 November 1998 um Bewilligung eines Freisetzungsversuchs mit gentechnisch veraendertem Maiz T25 in Oftringen/AG, BUWAL. In English: Order of the Swiss Agency for the Environment, Forests and Landscape dated 16 April 1999 regarding the application by Plüss-Staufer AG, 4665 Oftringen dated 10 November 1998 for

knowledge of their composition and cross linkages constitutes a presumably low, but difficult to assess and above all, unnecessary risk".

Why was Bulgaria targeted by the corporations?

From research undertaken in countries, such as Poland, Hungary and South Africa, it is known that transnational corporations (TNCs), like Monsanto and AgrEvo, were reluctant to undertake GE experiments in the complete absence of any laws. In addition, countries in the first round of EU Accession, such as Poland and Hungary, were protected from the worst corporate excesses by the fact that they would be expected to harmonise their regulations with those of the EU.

Bulgaria, by contrast has only recently been invited to join the EU. While Bulgaria boasts that in 1996, it became the first country in Central and Eastern Europe to establish regulations for biosafety of GE higher plants,[46] this was most likely the very cue that the corporations were waiting for. This gave them a legal basis for starting field trials of transgenic varieties of plants, which generally last three years, and after which they would expect approval for commercialisation.

The Bulgarian Government plays into the hands of the TNCs by excluding the public from information and participation in decision-making on GMOs.

3. Genetically Engineered Foodstuffs[47] on the Bulgarian Market

One of the first Bulgarian newspaper articles to report on GE food and crops, opened with the mistaken statement "*In 2000, foods with genetically modified (GM) ingredients are expected to appear for the first time in Bulgarian shops*". The reality is that since the 1996 harvest of GE soybeans and maize in North America, Bulgarians have in all probability have been eating food with GE ingredients, imported from abroad. In 1999, over 50% of soybeans and over a third of maize grown in the USA were genetically modified.[48] In general, no segregation of traditional and GE crops takes place in the USA and Canada, and thus almost every shipment of maize, soybeans and oilseed rape from the US and Canada will contain large amounts of GE products.

GE food products would arrive in Bulgaria as maize and soya meal to be used as animal fodder or as derivatives, like soybean lecithin or rapeseed oil, which potentially may be found in 60-70% of processed food. Bulgaria has no labelling of foods that would require the labelling of foodstuffs containing either GMOs, such as unprocessed maize or potatoes, or products thereof, such as soybean lecithin, maize starch or the sugars derived from corn (maize) syrup, used in soft drinks.

Since the 1999 harvest of GE maize in Bulgaria, there is now a local source of genetic contamination of food. Bulgarian GE maize is now finding its way into the food chain mainly through animal feed and possibly maize derivatives. This could have long-term implications for food safety, but more immediately Bulgaria's ability to export it GE harvest to the EU. In Western Europe, consumers have rejected GE food and food retailers and producers are sourcing GE-free products. For more information about health concerns, see Section 8: Health Risks. For information about market concerns, see Section 9: Socio-Economic Impacts.

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[46] Paper: "*Biosafety and Regulation of GMOs in Bulgaria*", by Prof. Atanas Atanassov, Institute of Genetic Engineering in Kostinbrod, from Proceedings from the 5th Central and Eastern European Conference for Regional and international Co-operation on Safety in Biotechnology, 12 -14 December 1999, Sofia

[47] 'Genetically Engineered Foodstuffs' are:

- food organisms that have been genetically engineered, such as crops,
- foodstuffs that contain an ingredient of a genetically engineered food organism or
- foodstuffs that have been produced using a processing aid made with the use of genetic engineering e.g. enzymes for cheese, soft drinks and bread

[48] Reuters, 8 October 1999: *USDA issues first estimates of GM crops*. According to this source, 57% of all

4. Bulgaria – The Corporate European Playground for GE Food and Agriculture

Bulgaria is today caught in a war between the corporate seed producers, like Monsanto and Pioneer, and the corporate food processors and commodity traders who want to buy GE-free products for the EU market. When two elephants fight, the grass gets trodden down, and that grass is Bulgaria.

There seems to be growing realisation among some of the stakeholders – perhaps politicians, corporate food processors and commodity traders – that something needs to be done to pressurise the Government to take control of GE activities. There are moves to initiate a public debate on GMOs in Bulgaria with press articles and TV programmes. However, many articles promote the US line on GE agriculture, such as an article on the Biosafety Protocol by David Sandalow, the US Assistant Secretary of State.[49]

But, the media are key to opening up a balanced and informed debate. The arguments will need to be sufficiently strong to counter the marketing strategies of the corporate GE seed producers and ensure that the agenda does not continue to be skewed by corporate interests. After all, companies like Monsanto have spent a lot of money sponsoring agricultural publications and organising seminars and discos to persuade farmers to sow GE seed.[50]

The difficulty in Bulgaria, is that four decades of authoritarian government, has created a public afraid to speak out, who fear to stand out and be counted, and this includes scientists, church groups and environmentalists. Moreover, the unaccountable style of government inherited from the previous era means that no one feels responsible for what is going on.

Pro-biotech propaganda initiatives

There seem to be some moves to start a public pro-biotech propaganda campaign. A paper by Prof. Atanassov identified a list of '*Gaps and Needs*'.[51] The paper urges a closer relationship between the media and scientific organisations to avoid the impression of secrecy or "*closed door policy*". At the same time it recommends "*continuous dialogue with the industry and respective governmental people responsible for the development of the biotechnology and for the environment*". [52]

Clearly, the media campaign has already started. Examples include the '*Brasdi*' TV programme featuring a series on GE food and agriculture. Other examples are newspaper articles that started appearing since early 2000. An exception to the otherwise limited reporting on this issue was a feature in the newspaper '*Capital*', whose title summed up Bulgaria's situation: "*The Biotechnological War – Bulgaria's choice between EU rejection and American Appeal for GE products*".[53]

Bulgaria is caught between the Western corporate seed and agrochemical producers pushing their GE seeds on the one hand, and the corporate food processors, exporters and grain traders demanding certificates of purity of Bulgarian food and animal feed, on the other.

Public Participation and Access to Information is urgently needed

If Bulgaria wants to stop the corporations from playing 'American roulette' with its agricultural economy, it is important that the Government takes control of the situation. This means introducing a moratorium on all releases of GMOs. The 1996 regulations must be revoked and the Council

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[49] "*Biotechnologies can work for the People – The Biosafety Protocol: Possibilities and Shortcomings*" in 'KESH', 25 Feb 2000

[50] ibid

[51] Paper: "*Biosafety and Regulation of GMOs in Bulgaria*", by Prof. Atanas Atanassov, Institute of Genetic Engineering in Kostinbrod, from Proceedings from the 5th Central and Eastern European Conference for Regional and international Co-operation on Safety in Biotechnology, 12 -14 December 1999, Sofia

[52] Quoted verbatim from above paper

[53] Article by Miglena Manchieva: "*The Biotechnological War – Bulgaria's choice between EU rejection and*

dissolved, so that government can access whatever information has already been collected. This information, including names of permit holders and details of the permits, such as the type of GMO, place and period of release must be made available to the public, ideally by posting on the Internet.

In 1998 Bulgaria signed the Århus Convention on Access to Information, Public Participation in Decision Making and Access to Justice. Under the Convention, the Bulgarian Government will be obliged to disclose governmental files, containing environmental information, including data about genetically modified organisms.

Information should also be sought from third parties, like Monsanto, who allegedly has a list of all the farms in Bulgaria that sowed their GE seeds.[54] The present 1996 regulations cannot be used to impose obligations on third parties, such as the release of data. A new law is urgently needed.

Bulgaria is just a pawn in the corporate biotech war, torn between corporations that want to sell their unwanted GE seed and those that want to export GE-free food. Yet, the only active Bulgarian player in the game is a genetic engineer. Where is the agriculture Ministry to defend Bulgarian agronomic interests? Where is the environment Ministry to protect biodiversity or the health Ministry to protect public health? Unless there is some Government intervention and democratic control of this technology, all Bulgarians stand to lose – farmers, food processors, exporters, consumers and the environment.

5. What Type of Agriculture for Bulgaria?

Agriculture plays an important part in the economy of Bulgaria. The large monocultures of collective farms are being broken up and privatised, but the mentality of industrial food production still prevails in the minds of officials and scientists. Both the general public and politicians tend to rely on "experts" for decision making and trust new technologies and science.

This provides a very favourable climate for the Western biotech industry. But, in its rush to 'modernise' its agriculture and prepare for eventual EU membership, Bulgaria needs to reject genetic engineering technologies in food production. This would not only destroy its opportunities for organic agriculture, but also could destroy its chances for exporting GE-free food to Western European markets.

The reduced use of agro-chemicals during the last decade and agricultural land ownership changes provide an excellent base on which to build organic or other forms of sustainable agriculture. Despite some official support for ecological agriculture, such as the new regulation on the production and labelling of organic food and statements supporting organic agriculture by the Minister of Agriculture, official support for organic farming is mainly verbal.

If the Agriculture Ministry is indeed serious about transforming Bulgaria's agriculture to organic food production, then they need to reject the use of GMOs. Genetically engineered food production is the antithesis of organic farming. It violates the principles of organic agriculture. According to IFOAM,[55] GE food cannot be considered organic. Moreover, cross-pollination is likely to genetically contaminate the organic crop. See Section 8: *Plants out of control.*

[54] A journalist who does not wish to be named, claims to have the list of farmers growing Monsanto's GE maize, interviewed 29 Feb 2000. We were also promised a list by Prof. Spetzov from Dobrich, but he later claimed that this was confidential information. Lists of farmers buying Monsanto's seeds are probably prepared by the seed distributors and forwarded to Monsanto.

[55] International Federation of Organic Agriculture Movements

Monsanto sues Canadian Farmer
Percy Schmeiser, a farmer in Saskatchewan is being sued by Monsanto for growing Roundup-tolerant oilseed rape (Canola) seed without a licence, after samples were taken from around his fields. The farmer says that he has been growing oilseed rape for years and freely admits to saving his seed, but denies that it belonged to Monsanto. He claims that there are a lot of GE crops being grown in the neighbouring area and pollen from them is blowing everywhere. "*It's in the ditches, and the roadsides… it's all over….We're just touching the tip of the iceberg in contamination of fields by this Roundup genetic canola [oilseed rape]….It just opens up a vast area of uncertainty*"[56]

If Bulgaria ever hopes to find a market in Western Europe for its agricultural produce, it needs to stay ahead of the game, by supplying the EU's insatiable demand for organic food.

- In the UK, demand for organic products, which has accelerated since the debate about GE foods hit the headlines,[57] is growing so quickly that 75% of the organic produce sold has to be imported;
- In France, according to the Minister of Economy and Finances, farmers can hardly keep up with a consumer demand that rose by 25% in 1996 alone.
- In the EU, growth rates of organic farming are 25%. In the period 1993-98, the area under organic production methods more than trebled from 890,000 ha. to 2.9 million ha.[58]

The new law on GMOs must be based on the precautionary principle
The draft law on GMOs prepared by the Institute of Genetic Engineering has serious shortcomings, if it is to harmonise with the EU Directives 990/219 and 90/220 on Contained Use and Deliberate Release of GMOs, respectively. Bulgaria is in a difficult position, since Directive 90/220 is currently under review and its replacement is unlikely to be passed by the European Parliament until 2001. In addition, there is a virtual moratorium on all new approvals of GMOs. Moreover, the current public furore over GE foods in the EU suggests that the new Directive is highly likely be more restrictive that the present one.[59] In addition, the new Biosafety Protocol will allow countries to apply the 'precautionary principle' and close their markets to GE crops and food, without conclusive evidence of harm. The EU is likely to take advantage of this provision.

EcoSouthWest, a Bulgarian environmental NGO, believes future generations should not have to inherit a nature that has been catastrophically redesigned for the sole purpose of profit. We believe that Bulgarians do not need GE food. Who benefits from herbicide-tolerant corps? Certainly, not consumers whose food will become further contaminated by agro-chemical residues. Who will bear the costs if things go wrong?

The release of GMOs into the environment presents unknown hazards. Their release into the environment may cause irreversible harm to the biological diversity of ecosystems as well as to animal and human health. No risk assessment can ultimately ensure against such irreversible harm, and no one can therefore, predict the full and long-term consequences of releasing GMOs to nature.

As more of such organisms are created and released, the more complicated cause and effect linkages become. For these reasons, EcoSouthWest advocates the precautionary principle and condemns the current 'wait and watch what happens' attitude. The precautionary principle dictates no releases of GMOs into the environment and no use of GMOs as food. The lack of predictability of the long-term behaviour of such organisms runs contrary to the precautionary principle. Therefore, EcoSouthWest is opposed to all releases of GMOs into the environment.

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[56] Quote from Percy Schmeiser in 'Western Producer', November 1998. Taken from a series of quotes '*Will GM crops deliver benefits to farmers?*" on the Natural Law Party Wessex website: www.*Bt*internet.com/-nlpwessex/Documents/contentsfall.htm

[57] Jane Meriman, "*Euro stores cash in on 'Frankenstein food' fears*", Reuters, London 20 April 1999, from: Luke Anderson, "*Genetic engineering, Food and Our Environment - A Brief Guide*", Green Books, Devon, UK, July 1999, Chapter Two, pp. 23-27

[58] "Conference Summary Statement" from European Commission and Austrian Government Conference "*Organic farming in the European Union - Perspectives for the 21st Century*, 27-28 May 1999, Baden, Austria

Today's approach, advocated both by industry and international bodies such as UNIDO and UNEP, is to use risk assessments and risk management plans, in the belief that this will make the risk disappear. There are, however, considerable problems in undertaking risk assessments.

Firstly, there is limited knowledge about the nature of the hazards involved, given the complexity of the environment and ecological processes, and our lack of knowledge of how they function. Secondly, it is not just individual GMOs being introduced that have to be considered, but the extent to which they may be able to pass on their new genes to closely-related organisms, and what kinds of unforeseen and unpredictable effects and genetic combinations might result in the long term. In addition, the risk management approach does not aim to prevent harm. The opposite is true. Risk management plans are prepared on the strong probability that harm might occur (otherwise why do them) to mitigate harm when disaster strikes.

EcoSouthWest demands that all releases of genetically engineered organisms into the environment be prohibited immediately before the survival of numerous species is put at further risk. For some, it may already be too late.

6. Conclusions and Recommendations

Bulgaria is already growing GE crops, such as maize, which is entering the human food chain mainly through animal feed and maize derivatives. Permits for growing GE crops are given by a body that is not accountable to anyone, not even the Government. There are no procedures for public access to information, consultation or participation in decision making, no monitoring of environmental impacts, no risk management plans and no requirements for labelling of foods already containing GE ingredients.

Based on the information compiled in this report, we draw the following conclusions:

- Bulgaria's regulation of the use and release of GMOs into the environment lacks any transparency and indeed, is considered an administrative secret. Although transgenic organisms are released into the public domain – the environment – it is deemed that the public has no right to know about these releases, nor about the food that they are eating. There is no legislation in place to ensure public access to information on issues regarding genetic engineering and releases of GMOs or labelling of GE food. There are no procedures to enable the public to participate in decisions concerning genetic activities.
- There is no public awareness of genetic engineering or the dangers of releasing GMOs or eating GE food in Bulgaria. Indeed, there is also little awareness, or at least input from environment and health officials, who should be heavily involved in decision-making regarding releases of GMOs and their entry onto the market as animal feed or food.
- The fox is guarding the hen house: there is no independent control of GE activities
- Foodstuffs produced in Bulgaria are highly likely to be contaminated with GMOs and thus might be subject to severe market constraints. The 20,000 hectares of GE maize to be grown in 2000 may contaminate the Bulgarian maize harvest - both through pollen flow and absence of segregation of GE maize from the conventional crop. Buyers in the EU and Asia will become aware of this and may reject Bulgarian products.
- Although the 1996 Regulation provides for some civil and administrative liability, no one is monitoring the cultivation of GE crops for environmental impacts. In practical terms, it is difficult to show with absolute certainty whether GMOs have already escaped into natural ecosystems.
- Although TNCs publicly advocate a policy of not releasing GMOs in countries with no GE regulations, once a minimum regulation is in place, they will sell their GE seeds wherever they can with no concern for the **safe** introduction of GMOs or adequate risk assessments. The situation in Bulgaria - minimal regulations, not passed by parliament, not providing for public control and with an inadequate risk assessment procedure - is the perfect structure for TNCs to introduce GE seeds that are rejected in many parts of the world.

There is a serious threat that Bulgaria is becoming a dumping ground for GE seeds and products, as EU farmers and consumers reject them. With their lower purchasing power, the cheaper GE products will prove attractive in Bulgaria. More public awareness and pressure on the Bulgarian government and on producers and retailers is needed to stop this development.

In the short term, if Bulgaria chooses to go the route of GE agriculture, there is the increasingly real threat that it will close itself off from EU markets. The lack of any regulations to ensure segregation and labelling of GE foods, plus the threat of genetic contamination will undermine consumer confidence in agricultural products from Bulgaria. Even EU consumer suspicion of GE contamination of foods imported from Bulgaria will be sufficient to destroy this market for Bulgarian farmers. This would have disastrous impacts on the Bulgarian economy, given its reliance on agriculture. It would indeed be ironic, that having exported GE seeds and crops to Bulgaria, the West would then refuse the GE imports, causing further economic problems. This irony has already been played out in the US. There, ADM, the biggest US grain dealer, sold GE seeds to American farmers in spring 1999, but at harvest time, this same company publicly announced that they have a preference for sourcing GE-free crops. Like the US farmers, Bulgarian one will have to pay the price for the unscrupulous activities of transnational corporations.

Recommendations

The Bulgarian environmental NGO, EcoSouthWest demands that the Government

- Introduces a moratorium on all environmental releases of GMOs until a national biosafety law is in place which implements the provisions of the Biosafety Protocol and the Århus Convention (See Annex 2: The Elements of a Model National Law on Biosafety). A national biosafety law should include the following:

  => a ban on releases of genetically modified organisms into the environment,
  => a comprehensive assessment, based on the precautionary principle, of all other applications of genetic engineering regarding their direct or indirect impacts on the environment, human health, and socio-economic conditions,
  => a rule of absolute liability on the producer as well as an obligation for adequate insurance.

If Bulgaria is serious about EU membership, the moratorium should ideally stay in place until the revision of Directive 90/220 is complete. Making Bulgarian agriculture GE-free would also be a sensible market decision, given the rejection of GE food in Western Europe.

- Immediately revokes any permits for the import or sale of GE seed, and for the undertaking of field trials or cultivation of GE crops. Any GE seed already in Bulgaria must be destroyed.
- Immediately prohibits the import of products derived from GE-crops containing antibiotic resistance marker genes
- Ensures traceability of all imports of GE-crops or products thereof. They must be labelled and handled separately from conventional crops from plot to plate, or (for imports) from the port of entry to the plate.
- Repeals the 1996 regulation, dissolves the Council on Safe Use of GE Higher Plants and secures its registers of GMO releases, which should then be made public.
- Ratifies the Århus Convention on Access to Information, Public Participation and Access to Justice in Environmental Matters, which the Bulgarian government signed in June 1998. This Convention gives the public the right to have information about GMOs and will help ensure transparency and public participation by guaranteeing citizens' access to information on all genetic activities. The Government must establish processes and procedures for public participation in decision-making
- Introduces legislation requiring mandatory labelling of GE food. The labelling regime must be process and not product-based
- Establishes an Advisory Body representative of society, which includes NGOs, political scientists, the churches, natural scientists and officials.
- Provides support for organic farming by stimulating demand for organic food through education,

We call on all concerned social organisations - environmental, consumer, church groups - to join our campaign and support our demands. In the countries of the European Union, public pressure has resulted in an announcement by the governments of France, Italy, Denmark, Greece and Luxembourg that they would block any attempt to approve new GE crops in the EU,[60] leading to a de facto moratorium in the EU.

Part B: The Environmental and Health Risks of GMOs

7. The Difference between Traditional Biotechnology and Genetic Engineering

GE crops are more than just the next generation of high-tech varieties. They feature two specific characteristics that could make them a special threat to human health and to the environment:

- Firstly, GE plants contain genes and traits that are completely new to the target species, its environmental context, and its genetic background. While traditional breeding can move genes only among related varieties or closely related species, genetic engineering allows for a movement of genes across radically different species. No traditional breeder is able to cross a carp with a potato, or a bacterium with a maize plant. There is no history of bacterial genes in maize. There was no evolution or selection over thousands of years that would have qualified the bacterial gene to be an integrated part of the maize population. The effect of newly introduced genes and gene fragments under real world conditions, in different climates or in reaction to different pests or diseases, is completely unpredictable, posing a threat not only to the crop, but also to related species and the ecosystem.
- Secondly, the process of genetic engineering is neither targeted nor precise but a rather crude intervention or bombardment. The newly introduced genes could end up being integrated anywhere in the plant genome. It can neither be directed to a specific site within the plant's genes, nor is the site of integration necessarily known afterwards. Because the expression of a given gene or gene fragment depends heavily on the site of integration and the genetic background, it is merely a matter of luck if the newly introduced gene works as expected and no major changes in the plant performance are induced. Several natural mechanisms are known (e.g. **pleiotropy**, **epistasis**, or **position effects**) to influence the specific outcome of a foreign gene transfer and these cannot be anticipated.

These are the two fundamental differences between conventional plant breeding and genetic engineering. Either can have unforeseen consequences when GE plants are released into the environment.

8. Environmental Risks

Genetic engineering and its products have only emerged over the last 20 years. It is almost impossible to evaluate the potential impact of transgenic species on the environment. However, based on what they have observed in similar situations with naturally-occurring species, scientists have suggested the following effects[61]:

- **creating new pests**: a crop which has been genetically engineered to be salt tolerant could escape cultivated fields, invade estuaries, stifling the natural estuarine vegetation.
- **increasing problems with existing pests**: crop plants are capable of transferring genes, via wind or insect pollination, over several kilometres to related plants, some of which may be weeds. Thus the foreign genes of crops with engineered traits, such as tolerance to herbicides or drought, could be transferred to weeds, making them even more difficult to control.
- **harming non-target species**: viruses, microorganisms or plants engineered to kill insect pests could also affect beneficial insects. In experiments, bacteria engineered to convert plant residues, such as

[61] C.A. Hoffman, "*Ecological Risks of Genetic Engineering of Crop Plants*", Bioscience, Vol. 40, No. 6, 1990, p434; Also: T. Klinger and N.C. Ellstrand, "*Engineered Genes in Wild Populations: Fitness of Weed-Crop Hybrids of Raphanus sativus*", Ecological Applications, 1990, Vol. 4, No. 1, pp. 117-120; Also: T.R. Mikkelsen, B. Andersen and R.B. Jorgensen, "*The Risk of Crop Transgene Spread*", Nature, Vol. 380, 7 March 1996; Also: R.B. Jorgensen and B. Andersen, "*spontaneous Hyybridization between Oilseed Rape (Brassica napus) and Weedy B. Campestris (Brassicaceae): A risk of growing genetically modified oilseed rape*", American Journal of

leaves, to alcohol for use as fuel decreased the populations of beneficial fungi. In some cases, it also killed nearby grasses from alcohol poisoning.[62]

- **destroying biodiversity by replacing native species**: GE crops with a survival advantage could escape fields, invade other ecosystems and replace other species. This type of loss of biodiversity could severely impair the ability of an ecosystem or species to successfully respond to sudden stresses, such as drought or disease.
- **squandering valuable biological resources**: the bacteria *Bacillus thuringiensis* (*Bt*) is currently used as a natural pesticide. Scientists, however, are genetically engineering many crops with *Bt.* This may speed up the process by which large numbers of insects adapt and become resistant to *Bt*, rendering it ineffective.

Plants out of control: Outcrossing of genetically engineered plants[63]

Once released into the environment, GE plants cannot be contained or confined. Like all living organisms, GE plants reproduce and this is an opportunity for gene escape beyond the designated area of growth. Seeds can be picked up by birds and dropped elsewhere, potato tubers can be removed by bigger mammals, or reproducible plant parts could just be dislocated by wind. The major pathway of escape of the newly introduced gene into the wild is via pollen transfer.

When a GE plant flowers, the pollen contains the newly introduced genetic material and can carry it to another plant, fertilise it, resulting in seeds that will also contain the engineered gene. It has been proven that oilseed rape, maize, sunflowers, potato, sorghum, and many other crops can crossbreed with wild plants that grow near agricultural land in many parts of the world. .

The example of rape seed: An array of oilseed rape relatives grow in Europe. Some of them are cultivated as crops, others are known as weeds. Spontaneous hybridization between oilseed rape and at least four weedy relatives has been proven in several scientific experiments. For example, *Brassica campestris*, also known as turnip, bird rapeseed or *B. rapa*[64], *B. juncea*, *B. adpressa* and *Raphanus raphanistrum*[65] are all known as weeds at least in some areas of Europe, and they can form fertile offspring with cultivated oilseed rape under natural conditions.

Danish researchers found that genes that have been introduced into oilseed rapeed by genetic engineering can easily introgress into a weed population. In an experiment, one backcross was sufficient to obtain plants that resemble the weedy *B campestris* but contained the transgene from rapeseed.[66] There is no doubt that any genetically engineered oilseed rape grown commercially in Europe - its centre of diversity - will forward the newly introduced genes to wild and weedy relatives.

Oilseed rape has a moderate ability to outcross, with a selfing rate between 70 and 90 percent, i.e. 70-90 percent of all seeds are the result of a pollination within one flower, and only 10-30 percent of the seed result from cross-pollination, where the pollen comes from another plant. As oilseed rape was one of the first major crops to be genetically engineered in Europe, several experiments to assess its ability to pollinate plants in the vicinity were performed during the past decade. The aim was to determine a „safe“ distance for field trials with genetically engineered oilseed rape plants. However, the results differed by orders of magnitude, some researchers found only 0.1% outcrossed seeds at 1 meter distance from a field with genetically engineered rapeseed, whilst others found 1.2% outcrossing even at a distance of 1.5 **kilo**meter.

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[62] T.M. Holmes & E.R. Ingham, “*The effects of genetically engineered micro-organisms on soil foodwebs*”, in Supplement to Bulletin of Ecological Society of America 75/2, Abstracts of the 79th Annual ESA Meeting: Science and Public Policy, Knoxville, Tennessee, 7-11 August 1994

[63] Parts of this section is taken from Luke Anderson, “*Genetic engineering, Food and Our Environment - A Brief Guide*”, Green Books, Devon, UK, July 1999, Chapter Two, pp. 48-50

[64] Mikkelsen TR, Andersen B, Jörgensen RB (1996) *The Risk of crop Transgene Spread*. Nature 380:31

[65] Eber F, Chèvre AM, Baranger A, Vallée P, Tanguy X, Renard M (1994) *Spontaneous Hybridization Between a Male-Sterile Oilseed Rape and Two Weeds*. Theoretical and Applied Genetics 88:362-368

There are probably two reasons for these contradictory results: First of all the experimental design differed significantly. Some of the experiments were designed like field trials, with border rows surrounding the genetically engineered plants. These resulted in low outcrossing rates. Other experiments had no border rows but an isolation area around them. These led to larger outcrossing rates at higher distances. A second explanation for the big differences might be the different localities. It is well known that pollination effectivity is strongly influenced by environmental parameters - insect pollinator abundance, food and water sources for insect pollinators in vicinity, weather conditions, wind etc. - which could cause big differences in outcrossing rates.

There is no „safe" distance: The conclusion that can be drawn from the multitude of experiments is the lack of any „safe" distance for oilseed rape in a field trial. Depending on environmental conditions, pollen can travel even over large distances and pollinate plants far away from the experimental plot. Similar multiple trials are lacking for most other crops.

In Summer 1998, France decided to stop for two years any commercial growing of genetically engineered plants that have the ability to pass their genes to wild relatives, namely oilseed rape and beet. No approvals for transgenic lines of these two crops will be granted by the French Government. The decision for this moratorium was taken by France in view of the fact that any release of genetically engineered oilseed rape or beet would be irreversible due to the high probability of outcrossing and hybridization with wild relatives.

Bt-Cotton in the USA: 'Do not plant south of Tampa'[67]

'*In Florida do not plant south of Tampa (Florida Route 60). Not for commercial sale or use in Hawaii'*. This label is on every seed bag of Monsanto's genetically-engineered Bt-cotton sold in the US. What is special about Hawaii and the south of Tampa? What makes the USA prohibit the commercial growing of a GE crop in a specific region, while the very same variety is grown on more than 2 million hectares (1998) in the rest of the country?

In Hawaii, the reason is called *Gossypium tomentosum* – a wild plant related to cotton. In southern Florida, feral cotton (*Gossypium hirsutum*) occurs in the Everglades National Park and the Florida Keys. In both cases, free exchange of genetic material with cultivated cotton is possible. The US Environmental Protection Agency was concerned about gene transfer from the GE varieties to the wild relatives and asked Monsanto to keep the Bt cotton out of the areas where close relatives grow.

Selective advantage and competitiveness

While it is commonly agreed amongst the scientific community that gene escape is a likely event, its impact is debatable. One major fear is the possibility that the newly introduced gene will confer a selective advantage and will thus enable the plant to out-compete and overrun other natural vegetation. The risk is greatest when a wild relative of a GE plant is already considered a weed. Should this weed acquire – via pollen transfer – new genetic material conferring a selective advantage, it might wreak havoc in both agriculture and natural habitats. Genetically engineered 'super-crops' could transfer their foreign genes to other plants and in time, could totally displace other varieties and accelerate the disappearance of native cultivars on which organic agriculture relies. The impacts are unknown and irreversible.

Many crop species – such as oilseed rape, potato, tomato, or beans – have close relatives that are already considered major weeds. It is obvious that many of the traits favoured by genetic engineers would confer a fitness advantage, especially resistance to pest and diseases or tolerance to drought and salinity.[68] Researchers at the University of North Carolina found recently that insecticidal oilseed rape containing a bacterial gene (*Bt*) had a higher fitness than the conventional oilseed rape. The GE plants produced significantly more seeds than their natural counterparts. The researchers concluded that '*insecticidal oilseed rape could pose an ecological risk upon environmental release. Since oilseed*

[67] "*Centres of Diversity: Global heritage of crop varieties threatened by genetic pollution*" Greenpeace report, September 1999

[68] Ellstrand NC, Hoffman CA (1990) Hybridization as an avenue of escape for engineered genes. Bioscience

rape is already a minor weed in certain areas, the ability to strongly resist defoliation may allow it to selectively persist to a greater extent by replacing non-transgenic naturalised populations.'[69]

If GMOs survive and flourish, they could displace natural wild species and those plants and animals that depend on them. The drive to create 'super-crops' designed to protect themselves against their main enemies, such as insects and disease, could result in their proliferation at the expense of native plants. The biodiversity of ecosystems located near fields of 'super-crops' could be threatened. In time, the engineered plants could entirely replace the native flora and threaten the survival of the wildlife that depend on them.

History has already taught us that introducing non-native species into new habitats can have catastrophic results. Predicting all the long-term impacts of exotics has proven to be impossible. A famous example is the introduction of Nile perch into Lake Victoria in the 1960s which has decimated the native fish species, with over 200 species disappearing. As a further side effect, deforestation and erosion of the shoreline has occurred because Nile perch - unlike the native fish - cannot be sun dried and have to be smoked on wood fires.[70]

The dangers of releasing GMOs could be even greater than releases of radioactivity and toxic chemicals into the environment. Unlike the products of nuclear and chemical pollution, GMOs can reproduce. Once released into the environment, they can multiply, spread, mutate and transfer their genetic material to other, often related, organisms. Once released, GMOs cannot be removed.

The Killing fields: Insect resistant plants may affect non-target species

Insect resistance is one of the key traits currently engineered in the laboratories of the big seed companies. Through genetic engineering, toxins are introduced into crop plants that kill insects that thrive on the plants. The most often used toxins are the so-called *Bt* toxins, from the soil bacterium *Bacillus thuringiensis*, which includes a whole array of different *Bt* toxins, with different toxic properties. The toxins are selective in that they do not ill any insect, but only a specific selection of some insects. There are *Bt* toxins that are said to be specific for flies, others for butterflies or beetles. For decades, bacterial formulations have been used in agriculture - especially in organic agriculture - to fight insect pests.

A series of scientific studies have now disproved the presumption that the *Bt* toxin in transgenic crops has the same favourable characteristics as the *Bt* toxin in its natural state. There is now awareness among scientists that the *Bt* toxin in transgenic crops – as opposed to the *Bt* toxin in its natural form in bacteria - can harm species higher up the food chain, and may become accumulated in the environment.

In its interaction with bacteria, the natural *Bt* toxin will occur in a crystalline inactive state. However, in transgenic *Bt* crops, such as Pioneer's maize, the toxin will occur as a soluble pre-activated plant protein, which is produced throughout the entire plant life. Genetically engineered insect resistance crops may therefore prove harmful to many non-target species, and may further disturb ecological balance:

- Last year, a study by researchers at Cornell University, USA, received considerable public attention, as it showed the deleterious effect of genetically engineered maize on the monarch butterfly. Milkweed dusted with pollen from *Bt* maize led to reduced survival and growth rates in the monarch butterfly.[71]

[69] Stewart CN (1997) Transgenic insecticidal oilseed rape on the loose. In: Proceedings of the workshop 'Commercialisation of transgenic crops", Canberra, 11-13 March 1997

[70] Anon, "*Fishing out the gene pool*", Appropriate Technology, Vol.18, No. 4, March 1992, p.8; also: M. Toner, "*Are Test-Tube Fish such a Hot Idea?*", International Wildlife, Nov-Dec 1991, p.34

- A recent laboratory study in Switzerland found that when lacewings (beneficial insects that prey on crop pests) were fed corn borers raised on *Bt* maize, the lacewings suffered from disruption to their development and increased mortality.[72]
- In a laboratory experiment at the Scottish Crop Research Institute, it was shown that potatoes that had been engineered to be resistant to insect pests could also harm beneficial insects further up the food chain. Female ladybirds were fed on aphids that had been eating transgenic potatoes, and when compared to ladybirds fed on a normal diet, they laid fewer eggs and lived half as long.[73]
- In laboratory experiments at New York University, researchers found that active forms of *Bt*, like those found in some types of transgenic crops, do not disappear when added to soil, but instead become rapidly bound to soil particles. Unlike the naturally occurring forms of *Bt*, they are not degraded by microbes, nor do they lose their capacity to kill insects. The accumulation of these toxins, which could be released into the soil as farmers incorporate plant material into the ground after harvest, could represent a serious risk to soil ecosystems.[74]
- Very recently laboratory studies have shown that *Bt* toxin can leak from the roots of *Bt* crops into the soil.[75] Thus, beneficial non-target insects in the soil could be exposed to higher levels of *Bt* than previously thought.
- It is known that Novartis transgenic *Bt* maize is harmful to Collembola (springtail), a flightless insect, which feeds on fungi and debris in soil, and which is generally considered a beneficial insect.[76]

These studies raise major concerns about the impacts of transgenic *Bt* crops on non-target species As a result, species further up the food chain, such as birds, could face reduced food supplies.

In addition, the threat to predatory species also threatens to undermine modern pest management. The preservation of predatory fauna associated with crop pests is one of the most important tools for modern pest management. For example, the green lacewing and the ladybird are the most important beneficial predatory species to control pest insects.

Bt-resistance: an environmentally friendly insecticide in danger

Bacillus thuringiensis (*Bt*) is a soil bacterium that produces a toxin that is highly valued by organic farmers. These bacteria have been sprayed on crops for more than 50 years as a safe form of biological pest control. *Bt* targets particular species of insect, such as caterpillars, and the sprays are especially valuable to organic farmers in instances where there is a serious pest infestation.

Crop plants, such as maize, have now been engineered with the gene for the *Bt* toxin to give then an in-built insecticide. These transgenic 'insect-resistant' crops were grown on 7.7 million hectares worldwide in 1998.[77] In marked contrast to the occasional application of the *Bt* toxin in organic farming, the transgenic *Bt* toxin is produced in the plants all the time they are growing. This means that insects are continually exposed to the toxin, and are therefore under constant pressure to develop resistance.

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[72] A. Hilbeck, W.J. Moar, M. Pusztai-Carey, A. Filippini & F. Zigler, "*Toxicity of Bacillus thuringiensis CrylAb toxin to the predator Chrysoperla carnea (Neuroptera:Chrysopidae)*". Environmental Entomology, Vol. 27, No. 4, August 1998

[73] A.N.E. Birch et al, (1999) "*Tri-trophic Interactions involving pest aphids, predatory 2-spot ladybirds and transgenic potatoes expressing snowdrop lectin for aphid resistance*", Molecular Breeding 5: 75-83

[74] "*Buildup of Bt toxins in soil*", the Gene Exchange - A Public Voice on Biotechnology and Agriculture, Union of Concerned Scientists, Fall/Winter 1998 <www.ucsusa.org/publications/index.html>; Also,
C. Crecchio and G. Stotzky, "*Insecticidal activity and biodegradation of the toxin from Bacillus thuringiensis subsp. Kurstaki bound to humic acids from soil*", Soil Biology and Biochemistry, Vol. 30, pp. 463-70, 1998

[75] Saxena, D, Flores, S. & Stotzky, G. (1999) *Insecticidal toxin in root exudates from Bt corn*, *Nature* 402:480.

[76] EPA MRID NO 434635, Bt maize (corn) leaf protein (LP176-0194) - 28 days survival and reproduction study in Collembola (Folsomia candidia).

[77] C. James, "*Global Review of Commercialised Transgenic Crops: 1998*", ISAAA Briefs No. 8, ISAAA: Ithaca

There is overwhelming scientific data showing that resistance to *Bt* toxin will develop with the use of GE *Bt* crops. This is a most serious concern as it may jeopardise the further use of natural *Bt* formulation in environmentally friendly farming systems. *Bt* resistance has already been noticed among some insect populations,[78] and the US Environmental Protection Agency (EPA) has predicted that most target insects could be resistant to *Bt* within 3-5 years.[79]

Insect resistance to natural insecticides, such as the *Bacillus thuringiensis* (*Bt*) toxin, is a major problem for organic farming. Organic farmers have been using natural preparations of *Bt* toxin as an environmentally friendly pest control tool for decades. For example, in the USA, potato farmers have been using the natural *Bt* formulation to control the Colorado potato beetle (CPB). In some areas where there was widespread resistance of the CPB to synthetic insecticides, the natural *Bt* sprays saved the potato industry.[80]

Natural preparations of *Bt* toxin are composed of natural crystals of toxin contained in spores. These are simply sprayed on the crop but then are rapidly inactivated by sunlight and other environmental factors. The crystals have a half-life of around 2.7 days and although spores can remain viable in soil for two years, they are inactivated within a few days on leaves.[81] In contrast, the *Bt* toxin from genetically modified crops is produced on an on-going basis in the crop and herbivores are therefore likely to be exposed to it for long periods.

In the USA, all field populations of the Colorado potato beetle (CPB) are still susceptible to *Bt* toxins. However, a *Bt* resistant CPB has been detected in a laboratory experiment.[82] This selected CPB strain could survive for two generations on the transgenic *Bt* plants.[83] Moreover, the development of resistance of an insect to one *Bt* toxin often leads to cross-resistance with other *Bt* toxins. For example, insects selected for resistance to CryIA(c) *Bt* toxin also developed resistance to CryIA(a), CryIA(b), CryIB, CryIC, and CryIIA *Bt* toxins.[84]

Herbicide use on herbicide resistant plants

"*The ability to clear fields of all weeds using powerful herbicides which can be sprayed onto GE herbicide-resistant crops will result in farmlands devoid of wildlife and spell disaster for millions of already declining birds and plants."*
-- Graham Wynne, Chief Executive of the UK's Royal Society for the Protection of Birds[85]

Until now, most of the research by the biotech industry has focused on making crops resistant or tolerant to their own 'broad spectrum' herbicides. These herbicides are non-selective, they kill every green plant. This means that a field can be sprayed with chemicals and nearly all plants will die except the resistant crop. Of the 27.8 million hectares of GE crops planted worldwide in 1998, 71% were

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[78] B.E. Tabashnik, "*Evolution of Resistance to Bacillus thuringiensis*", Annual Review of Entomology, Vol. 39, 1994, pp.47-49; Also, B.E. Tabashnik, U-B Liu, N. Finson, L. Masson, and D.G. Heckel, "*One gene in diamondback moth confers resistance to four Bt toxins*", Proceedings of the National Academy of Sciences, USA, Vol. 94, 1997, pp.1640-4

[79] EPA, Pesticide Fact-Sheet 4/98, *Bacillus thuringiensis Cry IA(b) delta-endotoxin and the genetic material necessary for its production (Plasmid vecor pcIB 4431) in corn. OPPTS, 1994*

[80] Whalon M. and Ferro D. (1998) Bt-Potato Resistance Management, in: Now or Never, Serious New Plans to Save a Natural Pest Control, Union of Concerned Scientists, USA, edited by Mellon M. and Rissler J.

[81] Cannon, RJC (1996) Bacillus thuringiensis use in agriculture: a molecular approach. Biological Reviews 71: 561-636

[82] Whalon M. E., Miller D.L., Hollingworth R.M., Grafius E.J. and Miller J.R. (1993) Selection of a Colorado potato beetle (Coleoptera: Chrysomelidae) strain resistant to *Bacillus thuringiensis*. J. Econ. Entomol. 86: 226-33

[83] Whalon M. and Ferro D. (1998) Bt-Potato Resistance Management, in: Now or Never, Serious New Plans to Save a Natural Pest Control, Union of Concerned Scientists, USA, edited by Mellon M. and Rissler J

[84] McGaughey WH, Whalon ME (1992), Managing Insect Resistance to Bacillus thuringiensis Toxins, Science 258:1451-1455

[85] Quoted in Lyke Anderson, "*Genetic engineering, Food and Our Environment – A Brief Guide*", Green Books

herbicide-resistant.[86] Herbicides themselves are known environmental polluters found in food, soil and water. By developing herbicide-tolerant plants, it is clear that the intention is to use them in agricultural systems that include the use of herbicides.

Last year, a study on herbicide use in herbicide resistant plants revealed that US-farmers growing RoundupReady soybeans used 2 to 5 times more herbicide measured in pounds applied per acre, compared to the other popular weed management systems used on most soybean fields not planted to RR varieties in 1998.[87] A grower survey in Missouri revealed that most if not all fields planted to RR soybeans received at least one herbicide application.[88]

Margaret Mellon, from the Union of concerned Scientists believes that many farmers may be turning towards GE herbicide-resistant crops because they are becoming desperate for new weed control tools. Farmers growing monocultures of maize and soybeans are facing serious weed problems. Many weeds have become resistant to chemical herbicides and multiple applications of herbicide are no longer effective as new weeds emerge.

Some Health Consequences of Roundup Poisoning[89]

Symptoms of acute poisoning in humans following ingestion of Roundup, include gastro-intestinal pain, swelling of the lungs, pneumonia and destruction of red blood cells. Eye and skin irritation has been reported by workers mixing, loading and applying glyphosate, the chemical name for Roundup. Between 1966 and 1980, well before Roundup came to widely used, the US Environmental Protection Agency's Pesticide Incident Monitoring System had 109 reports of health effects, including nausea, diarrhoea and fever, associated with exposure to glyphosate.[90]

Roundup is 100 times more toxic to fish than to people, toxic to earthworms, soil bacteria and beneficial fungi. Scientists have measured a number of direct physiological effects of Roundup in fish and other wildlife, in addition to secondary effects attributable to defoliation of forests. Breakdown of glyphosate into N-nitrosoglyphosate and other related compounds has heightened concerns about possible carcinogenicity of Roundup products.[91]

A 1993 study at the University of California at Berkeley's School of Public Health found glyphosate was the most common cause of pesticide-related illness among landscape maintenance workers in California, and the third most common cause among agricultural workers.[92]

A 1996 review of the scientific literature by members of the Vermont Citizens' Forest Roundtable revealed updated evidence of lung damage, heart palpitations, nausea, reproductive problems, chromosome aberrations and numerous other effects of exposure to Roundup herbicide.[93]

But, herbicide tolerant plants could themselves pose environmental risks:

- Herbicide-tolerant plants may themselves become weeds;
- Weeds which are resistant to herbicide may evolve, in the same way that 'super-rats' have evolved which are resistant to rodenticide and bacteria have become resistant to antibiotics;

[86] C. James, "*Global Review of Commercialised Transgenic Crops: 1998*", ISAAA Briefs No. 8, ISAAA: Ithaca, NY, 1998

[87] Charles Benbrook, Benbrook Consulting Service, July 1999, full text of the study at www.biotech-info.net

[88] Are Roundup Ready weeds in your future? by Bob Hartzler, November 3, 1998, full text at: http://www.weeds.iastate.edu/mgmt/qtr98-4/roundupfuture.htm

[89] Information in this box is by Brian Tokar, and is reprinted from article: "*Roundup: The World's Biggest-Selling Herbicide*", by Joseph Mendelson, 'The Ecologist', Vol. 28, No. 5, Sept/Oct 1998

[90] "*Glyphosate Fact Sheet*", Carolyn Cox, Journal of Pesticide Reform, Vol 11, No. 2, Spring 1991

[91] ibid.

[92] "*Glyphosate, Part 2: Human Exposure and Ecological Effects*", by Carolyn Cox, Journal of Pesticide Reform, Vol 15, No. 4, Autumn 1995

[93] "*Glyphosate, Roundup and Other Herbicides – An Annotated Bibliography*", Vermont Citizens' Forest

· The GE plants may transfer the 'foreign' genes for herbicide tolerance via pollen to other plants, encouraging the emergence of herbicide resistance, requiring new generations of herbicides. This will perpetuate the dependence on polluting agro-chemicals.

Clearly, the solution to weed control lies not in GE technologies, but in restoring more sustainable farming practices, such as crop rotation and smaller plots, which reduce the weed problem in the first place.

9. Health Risks

Concerns over Food Safety

To assess the food safety of genetically engineered foodstuffs (GEFs), consumer experts are concerned about four major areas:[94]

· The existing analytical tests and databases of natural toxicants and nutrient that are present in traditional foodstuffs are not adequate to assess unintended changes in GEFs;
· Genetic engineering can have a large impact on the toxins, allergens and nutrients in foods;
· Food allergies could be exacerbated by genetic engineering;
· The use of antibiotic resistance market genes in some GEFs poses health concerns.

The Notion of 'Substantial Equivalence'[95]

Consumers in Western Europe first became aware of GE food in 1996, when Monsanto's herbicide-tolerant soybeans grown in the US started to arrive in Europe. Over 40% of the US soybean harvest is exported and the GE soybeans are mixed in with the conventional harvest. The American Soybean Association rejected calls to segregate the GE soybeans on the basis that they are 'substantially equivalent' to ordinary soybeans.[96]

The concept of '*substantial equivalence'* has been at the root of the international safety assessment and testing of GE food. According to this principle, selected chemical characteristics are compared between a GE product and any variety within the same species. If the two are grossly similar, and if the introduced GE traits are not thought to be toxic and allergenic, the GE product does not need to be rigorously tested on the assumption that it is no more dangerous than the non-GE equivalent.

The use of '*substantial equivalence'* as a basis for risk assessment is seriously flawed, and cannot be depended on as a criterion for food safety. It focuses on risks that can be anticipated on the basis of known characteristics, but ignores unintended effects, known as 'pleiotropic' effects, which may arise.[97] Genetically engineered food may, for example, contain unexpected new molecules that could be toxic or cause allergic reactions. A product could not only be 'substantially equivalent', but even identical to its traditionally produced counterpart in all respects bar the presence of a single harmful compound. It has also been argued that substantial equivalence acts against rigorous scientific inquiry because it prevents testing of the assumption that GE does not cause changes that are more dangerous than traditional breeding.[98]

A recent lawsuit against the US Food and Drug Administration (FDA) has forced the release of government documents showing that FDA scientists had expressed grave doubts about the safety of GM foods, even as the agency was publicly declaring such foods 'substantially equivalent' to

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[94] "*Genetic Engineering & Food Safety - The Consumer Interests*", Consumers International (undated) Address: Consumers International, Global Policy and Campaigns Unit, 24 Highbury Crescent, London N5 1RX, UK; Tel: +44 20 7226 6663; E-mail: <gpcu@consint.org.uk>

[95] Parts of this section are taken from: Luke Anderson, "*Genetic engineering, Food and Our Environment - A Brief Guide*", Green Books, Devon, UK, July 1999, Chapter One, pp. 15-16

[96] "*European Response to Genetically Modified Soybeans*", Press Release from American Soybean Association, November 1996 <www.oilseeds.org/asa/news.htm>

[97] J. Fagan, "*Importation of Ciba-Geigy's Bt maize is scientifically indefensible*", <www.psrast.link.de/gen/BTCorn.htm>

traditional crops.[99] It seems clear from these documents that the scientific integrity of the US regulatory system has been compromised for political purposes, to provide a 'fast track' for the rapid, large-scale introduction of GM foods. Internal memos make it abundantly clear that FDA's own scientists believe pleiotropic effects will occur when new genes are inserted into food crops. Commenting on the FDA's proposed biotech regulations in early 1992, Louis Pribyl, an FDA microbiologist wrote 6 March 1992: "*It reads very pro-industry…This is industry's pet idea, namely that there are no unintended effects that will raise the FDA's level of concern. But time and time again, there is no data to backup their contention, while the scientific literature does contain many examples of naturally- occurring pleiotropic effects. When the introduction of genes into [a] plant's genome randomly occurs, as is the case with the current [genetic modification] technology (but not traditional breeding), it seems apparent that many pleiotropic effects will occur*".

Instead of heeding the concerns of its scientific staff, FDA issued GE food rules that assume no pleiotropic effects will occur, therefore no safety testing is required. All GE foods are assumed to be safe.[100]

***The Example of Tryptophan*[101]**

Food supplements, such as amino acids, are often manufactured by fermentative processes, in which large quantities of bacteria are grown in vats, and the food supplement is extracted from the bacteria and purified. One amino acid, tryptophan has been produced in this way for many years. In the late 1980's the Japanese company Showa Denko K.K. decided to use genetic engineering to accelerate and increase the efficiency of tryptophan production. They genetically engineered bacteria and altered the cellular metabolism substantially, leading to greatly increased production of tryptophan. These genetically engineered bacteria were immediately used in commercial production of tryptophan, and the product placed on the market in the USA in 1988.

Showa Denko was allowed to sell the tryptophan produced in genetically engineered bacteria without safety testing because they had been selling tryptophan produced in non-genetically engineered bacteria for years without ill effects. It was considered that the method of production (whether via natural or genetically engineered bacteria) was immaterial. In effect they considered it **substantially equivalent** to the tryptophan that had been sold for many years.

This product was placed on the market, and within a few months it caused the deaths of 37 people and caused 1500 more to be permanently disabled.[102] It took months to discover that the poisoning was due to toxin present in the tryptophan produced using Showa Denko's genetically engineered bacteria. The disease caused by this toxic product was called eosinophilia myalgia syndrome or EMS.

It was later shown that the tryptophan produced in genetically engineered bacteria contained one or more highly toxic contaminants. The most prominent of these, called E*BT*, was identified as a dimerization product of tryptophan. It comprised less than 0.1% of the total weight of the product, yet that was enough to kill people. This compound was probably generated when the concentration of tryptophan within the bacteria reached such high levels that tryptophan molecules began to react with each other. Thus, it appears that genetic manipulations led to increased tryptophan biosynthesis, which led to increased cellular levels of tryptophan. At these high levels, these compounds reacted with themselves, generating a deadly toxin. Being chemically quite similar to tryptophan, this toxin was not

[99] The FDA documents are available at http://www.bio-integrity.org/list.html Also Marian Burros, "*Documents Show Officials Disagreed on Altered Food*", New York Times, 1 Dec 1999, p. A15

[100] Source: Rachel's Environment & Health Weekly #685, "*Review of 1999, part 6 -Trouble in the Garden*", 3 Feb 2000

[101] This section is an extract of a briefing paper prepared by Dr. John B. Fagan from Genetic ID, USA, in November 1997

[102] Mayeno, A.N. and Gleich, G.J., Eosinophilia-myalgia syndrome and tryptophan production: a cautionary tale

easily separated from tryptophan, and contaminated the final commercial product at levels that were lethal to some consumers.

This example highlights the danger that a genetic alteration in an organism can shift the metabolic pathway and cause the production of toxins that might not be detected during some superficial safety tests.

Antibiotic resistance marker genes[103]

Most of the currently marketed GE crops contain antibiotic resistance marker genes, in addition to the desired trait like insect or herbicide resistance.

There is the risk that the gene can be transferred from the plant to disease causing germs, whether the transgenic maize is used as animal fodder or as a food product for humans. These bacteria would then be immune to antibiotic treatment.

Research on if and to what extent such gene transfer can happen has only recently started, so the available scientific data is incomplete. A recent study published in La Recherche 309, May 1998, indicates that the preconditions for such transfer are now present. In this paper, Professor Patrice Courvalin of the French Pasteur Institute points to the likelihood that antibiotic resistance will transfer from transgenic plants in the environment, and to the potential for transfer in the digestive tract. Widespread cultivation of transgenics, warns this report, will significantly add to already problematic issues of resistant bacteria. There is sufficient scientific proof that

- genes can be relatively stable in the intestine;
- bacteria can in principle take up genes in mammalian intestines;
- horizontal gene-transfer from genetically modified microorganisms to bacteria has been observed in the intestines of insects (e.g. spring-tails);
- soil bacteria are known to take up genes in the soil.

Given the above, current scientific knowledge strongly supports the assumption that antibiotic resistance genes can be taken up from bacteria in the intestines of animals and humans. Experience in normal agricultural practice shows that antibiotic resistances can move from animal pathogens to bacteria that are also harmful to humans.

The risks of the use of antibiotic resistance genes in genetic engineering is often trivialised by the industry, with the argument that a large proportion of the bacteria in our environment is already resistant to antibiotics. In their opinion, occasional gene transfers from genetically modified plants to pathogens is statistically insignificant. Several research results contradict this argument. Novartis often states that about 40-60% of intestinal bacteria are already resistant to Ampicillin and related antibiotics. But they present no scientific data for these figures. An analysis of scientific literature shows that the frequency of antibiotic resistances varies considerably. Depending on the variety of bacteria, and also depending on the country where the research has been carried out, the results are completely different. The percentage of antibiotic resistant germs in samples of one variety of bacteria (Bacteroides fragilis) varied between 3 and 30%, in samples of another bacteria (Shigella) between 5,9 and 80,7%. A general statement of 40-60% is completely unfounded. It also has to be assumed that not every human being carries antibiotic or Ampillicin resistant germs. Each antibiotic therapy is based on the bacteria being and staying sensitive to the chosen antibiotic. Ampicillin antibiotics are widely used in the treatment of human illness as well as on animals. In 1994, for example, 40 million courses of ampicillin were prescribed in the USA (that is, an average of 1 in 6 of the population). Furthermore, the resistance gene present in the transgenic maize confers resistance also against the antibiotics Ampicillin and Amoxy(pen)icillin. To maintain the effectiveness of antibiotics for as long as possible, it is simply irresponsible to put further resistance genes into circulation.

Antibiotic Resistance markers are an unnecessary, obsolete technology

[103] *"Antibiotic Resistance Genes in transgenic plants, in particular Ampicillin resistance in Bt maize"* (1997)

Antibiotic resistance genes do not serve any purpose in transgenic crops. Such resistance genes are used as markers in the laboratory by genetic engineers, to distinguish cells where their engineering of other traits has been successful from those where they failed. If the cells are treated with antibiotics after the gene transfer, only those containing the resistance gene survive - those cells also will be the only ones containing the desired genes, like insect- or herbicide-resistance. Today, it is possible to use other markers instead. It is also possible to remove antibiotic resistance genes after the genetic engineering event.

Because they are unnecessary and dangerous, many regulatory authorities in Europe oppose the use of antibiotic resistance markers. The German GE advisory commission (ZKBS) recommends the rejection of clinically-important antibiotic resistance genes. The French Committee of Prevention and Precaution recommends a ban of all transgenic crops containing antibiotic resistance genes. The US Biosafety Advisory Committee says that antibiotic resistances should not be trivialised. Norway prohibits all transgenic plants with antibiotic resistance. The French government will not allow such plants (other than Novartis's maize, which has already been approved). Several EU-member states such as the United Kingdom, have announced their opposition to the approval of the Novartis maize in Europe.

10. Socio-Economic Impacts

In the long term, the commercialisation of GE crops could have important socio-economic consequences. For example, the control of the entire domestic seed market by just a few Western-based corporations has implications for national food security. Whole food production chains may find themselves under monopolistic control - from delivery of agricultural inputs (seeds, fertilisers, chemicals, machinery etc.) via the growing of plants up to the harvest and throughout processing. Producers may find themselves obligated to the increased use of specific agro-chemicals necessary to grow specific GE seeds. They may be crushed by transnational corporations supplying increasingly-expensive inputs and purchasing their agricultural outputs at ever lower prices.

Producers may be played off against each other as powerful vertically-integrated firms manipulate markets. Finally, production may shift from small farms to large estates, and from large estates to bio-reactors, with attendant job losses.

Market Concerns

Bulgaria has no laws to regulate imports, exports or domestic trade in GE foodstuffs. Until very recently, there was no international agreement requiring segregation of GE-free crops from GE ones and to label bulk commodities to enable traceability. This situation is going to change following agreement on a Biosafety Protocol, under the Convention on Biological Diversity, in late January 2000.

The Biosafety Protocol, agreed by 130 countries, including Bulgaria, gives them rights, for the first time, to restrict imports of GE crops without breaking international trade rules. Until now, it is not politicians, but the EU market – food retailers, like supermarkets and food processors, like Nestle and Unilever – that has responded to consumer concerns about eating GE food and sought to source GE-free crops. To date, the EU and its Member States were unable to block shipments of GE crops and food, for fear of creating barriers to free trade and being taken before the World Trade Organisation Dispute Panel by governments, such as the US, wanting to export GE crops.

With its language on the ‘precautionary principle’, the Biosafety Protocol could set the stage for countries, such as the EU, to close their markets to GE crops without conclusive scientific evidence of harm. Once the Protocol comes into effect, which could take a couple of years, commodity shipments that may contain GMOs will have to be labelled “*may contain*” genetically modified organisms.

In the meantime, it is likely that the market in the EU will continue to reject GE crops and food, by looking for sources of GE-free commodities in countries like Brazil and Western Europe. Indeed, since

for banning these imports. Monsanto's Roundup tolerant maize has still to receive market approval for import into the EU, and hence any contamination of Bulgaria's maize exports with this maize could be refused.

The countries where most of the GE crops are being grown are the US, Canada, Chile and Argentina. However, the Chief Executive of the American Corn Growers Association recently predicted, on the basis of conversations with farmers and seed salesmen, that GE sowing could fall as much as 25% in 2000.[104] Farmers are worried that the export markets in Europe and Asia are rejecting GE foods, and this may reduce prices and demand for American agricultural products. They are also coming under pressure from environmental and consumer groups in the US who are demanding labelling of GE foods.[105] For example, in July 1999 Gerber (owned by Novartis) and Heinz removed GE ingredients from their baby food in the USA.[106]

Meanwhile, the public debate in the EU is now examining the use of GE animal feed in meat production. Indeed, in late 1999 several UK food retailers, such as Iceland and Tesco, announced that they intend to phase out the use of GE ingredients in animal feed.[107] This is bad news for Bulgarian farmers growing GE crops, like maize, and feeding it to their animals, or selling the GE maize on to produce animal feed.

The tacit acceptance of the cultivation of GE crops by the Bulgarian Government and its administration, could have severe economic repercussions not only on Bulgarian farmers, but also on animal feed producers, the animal husbandry industry, the starch and processed food industries and traders. The latter include grain traders and those specialising in the export of Bulgarian food and animal products.

If Bulgaria continues on the route of GE agriculture, but wants to meet the demands of the EU market by providing GE free crops and food, segregation of crops after harvest and during storage must be ensured to avoid cross-contamination of GE and non-GE. As outlined above, even small scale field tests could contaminate the harvest on neighbouring fields. Segregation would need to be enforced and controlled by an authority with sufficient credibility to satisfy buyers of GE-free, especially those exporting to the EU. Any suspicion of contamination could result in a shipment being tested for GE contamination. The requirement for segregation of GE and GE-free crops would require additional investment in farm and grain storage capacity as well as for certified laboratories capable of detecting GE contamination with the PCR test.

But Bulgaria does have another choice. The Government needs to take control of the situation and announce an immediate moratorium on all releases of GMOs into the environment. This might seem a drastic step, but one that seems to be the only option for Bulgaria. The alternative worst-case scenario is that, due to the absence of adequate segregation and control measures and testing and labelling infrastructure, Bulgarian food products may be altogether banned from most EU markets, and possibly also the domestic market, due to EU harmonisation. This would lead to an economic downturn due to loss of EU markets, bankrupt farmers and difficulties in meeting the requirements of EU Accession.

The Questions to Ask about Genetic Engineering Technologies[108]

- What is the purpose of the technology? Does it address a legitimate need? If so, does it address the cause of the problem or just the symptoms?
- Is this technology the only way to solve a given problem or are there alternatives? What are the benefits and disadvantages of each?

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[104] "*US farmers warned of dangers of sowing genetically modified crops*" by Michaela Wrong, Financial Times, 26 November 1999

[105] "*USA decreases number of plantations with GM cultures*", Paris Daily Newspaper, 17 January 2000

[106] "*Baby Food giant cuts out GM products*", The Times, 31 July 1999

[107] Genewatch UK, Briefing No. 9: "*GM Crops and Food: A Review of Developments in 1999*", January 2000

[108] Adapted from: "At the Crossroads", July 1992, from "The Citizen's Guide to Biotechnology", Canadian Institute

- Does it improve the quality of life for humans and animals?
- What are the environmental impacts? Does the technology reduce biodiversity? Does it detract from or contribute to environmentally sustainable development? Does it replace one danger with another, e.g. synthetic chemical pesticides with biochemical pesticides?
- Is it safe for humans today and for our descendants?
- Does it create undue reliance on one product, thereby increasing dependence on large corporations and discouraging the use of alternatives?
- Does this technology have indirect environmental, economic, or social impacts, either locally or globally?
- Does the technology raise ethical/moral concerns?
- Who motivated the development of this technology and why? Who would benefit and who would lose the most from the development, manufacture, possible patenting, and use of this technology?
- Was this technology developed with citizen participation and/or supervision? To what degree has the public paid for development of this technology? How much will we benefit?

Annex 1: The Elements of a Model National Law on Biosafety[109]

This draft document has been prepared by Third World Network to provide the governments of the South with a legislative tool to protect themselves against the import of GE seeds, crops and food. The countries of Central and Eastern Europe, including Bulgaria, are in the same weak position and faced with similar threats to those in the South.

Introduction

Nations of the South are increasingly faced with the prospect of the introduction into their countries of genetically modified organisms (GMOs) as, or in, products. These will enter countries of the Third World in greater abundance as the movement by consumers, manufacturers and retailers in the North to reject these GMOs and products gains momentum. It is now widely acknowledged that serious potential risks are presented by this technology. This prompted the international community to commence negotiations for a biosafety protocol under the Convention on Biological Diversity. But these negotiations have been stalemated. Consequently, there are no regulations in place to deal especially with the movement across boundaries of these GMOs and their products. Also, there are several aspects that need to be addressed exclusively by national laws.

This model law has been drafted to present one possible option.

The scheme of the law

1. Authorization needed for all activities and for all GMOs and derived products

The scheme of the law is to subject every activity in relation to GMOs to the regulatory control of the State. There must be formal authorisation before the GMO can be imported, introduced into the environment, placed on the market, or used in contained conditions. Without such an authorisation, the activity is illegal and penalties apply.

2. All GMOs covered

All GMOs, as well as products made from GMOs, come within the law. This would cover genetically modified fruits and plants, seeds, commodities, such as soya bean, maize and corn whether for human or animal consumption, fruits modified to be vaccines for humans or animals, transgenic fish, any organism intended for production of food enzymes, or pharmaceuticals, or imported for sewage treatment, propagating material for breeding purposes/green house cultivation, and products from transgenics, such as flour from transgenic corn.

3. Application must be made with complete information

There has therefore to be an application for approval. This has to be accompanied by very comprehensive information supplied by the applicant to allow for an adequate evaluation of any foreseeable risks from allowing the activity in relation to the GMO or derived products.

4. Risk Assessment essential

Before approval is given, there has to be a risk assessment by an independent body of experts chosen from a wide range of disciplines. The risk assessment is comprehensive, on a case by case basis, and intended to deal with all the potential risks to the environment and animal and human health. The risk assessment is based on the precautionary principle, that is, the absence of scientific evidence or certainty does not preclude the decision makers from denying approval of the introduction of the GMO or derived products if this may cause, or have a proven or theoretical potential to cause harm to biodiversity, ecosystems, or human, plant or animal health.

5. Other factors essential

Factors in addition to risk assessment must also be taken into account before authorization is given. Thus there must a cost benefit assessment of the introduction of the GMO or derived product as well

[109] This Annex is taken from the website of Third World Network: http://www.twnside.org.sg/southbureau/title/law-en.htm: "*An introduction to the model national law on Biosafety*"

as an assessment of its contribution to sustainable development. Any adverse socio-economic effects must also be considered.

6. Firm evidence of no risk essential; precautionary principle applied as well.
No authorization may be given unless there is firm evidence that there are no risks posed to the environment and human and animal health.

This is a very stringent requirement. As a fall back position the decision can be based on the precautionary principle as set out in paragraph 4 above.

7. Approval with or without conditions
When approval is given, it may be with or without any conditions.

8. Step-by-step approval
Any approval given is on a step by step basis. That is, it progresses from activity that is contained, then to trials that are in the open before fully-fledged release is authorised. At each stage, the risks are monitored.

9. Approval may be revoked
Any approval given shall be revoked if new evidence, or a review of existing information, shows potential risks based on the precautionary principle. Alternatively, fresh or additional conditions may be imposed. There is an obligation on the applicant to provide information of any possible risks that become known to him at any time.

10. Public consultation
The public must be given adequate notice of any application. They should also be given all information supplied by the applicant to the national competent authority. Public consultation should precede the making of a decision. Sufficient time before a decision is reached should be given to the public to allow for such consultation. Comments given by the public must be taken into account in the decision-making.

11. Risk management measures
After the approval, and at all times generally, the State may take measures to manage any risks posed by GMOs and derived products. These include: subjecting the activity to adequate periods of monitoring (e.g. commensurate with its life-cycle or generational time) before its allowed to be released, prohibiting any product (example, those that contain antibiotic resistance markers), ordering the cessation of any activity so that measures may be taken to prevent or limit harm, and taking emergency measures.

12. Identification and labelling
All GMOs must be identified in a particular manner; and derived products are required to be labelled in a prescribed manner. Further, the label must forewarn of any allergy that the GMO or derived product may cause.

13. No confidentiality of business in some situations
No confidentiality of business information can be claimed for information that is required for evaluation of foreseeable risks; nor can any information be with-held which will impede the State in its monitoring, supervision or enforcement work.

14. No export without prior informed consent
There can be no export of GMOs or derived products unless the State is satisfied that the country of import gives its prior informed consent.

15. Liability
The liability provisions impose strict liability for any damage caused by the introduction of the GMO

than one person responsible, then liability is joint and several. Liability extends to environmental damage caused/ the person or entity responsible must bear the costs for the clean-up and consequential damage.

16. Punishable conduct and penalties

There is a section in the law that identifies conduct that is illegal and punishable. This includes: carrying out any activity without any approval; or in violation of conditions imposed; or false, misleading or deceptive labelling; or exports without the prior informed consent of the importing country; or sells any GMOs or derived products without approval. Punishment includes imprisonment and this can be imposed on the responsible officer of a corporation as well.

17. Institutional arrangements

The law also provides for institutional arrangements: the Ministry (and the Minister) who is to be in charge, the designation of the competent authority, the functions of this authority, and the appointment of the independent body of experts.

18. Regulations

The Minister is given power to make regulations for the effective implementation of the law.

19. Transitional provisions

There is also a transitional provision. It subjects the introduction into the country of GMOs or derived products prior to the coming into force of the law to the same procedure and requirement for approval.

Annex II: Selected Pages from Pioneer's 2000 Seed Catalogue

Annex III: Seed Offers for 2000

Seeds for the Spring Campaign
Pioneer hybrids

Maize

Hybrid	Packet	Instant Payment	Payment by 15 October 2000
Clarica	80,000 seeds per packet	132 DM	149 DM
Stira	80,000 seeds per packet	132 DM	149 DM
Rezeda	80,000 seeds per packet	132 DM	149 DM
Evelina	80,000 seeds per packet	132 DM	149 DM
Kolomba	80,000 seeds per packet	132 DM	149 DM

Sunflowers (not GE)

Hybrid	Packet	Instant Payment	Payment by 15 October 2000
Beril	150,000 seeds per packet	167 DM	189 DM
Nibil	150,000 seeds per packet	167 DM	189 DM

Prices are exclusive of VAT (sales tax)

Seed Offers - 2000

Monsanto Products	Packet - No. of seeds	Decars [110]	Instant Payment	Payment by 25 Sept 2000	Payment by 25 Oct 2000
Sunflower AC 503; AC 5303; AC 6305; AC 6310; AC 7307; SC 602; Rigasol/SC 673/Kalisol	150,000	27-30	$ 89	$ 97.90	$ 106.80
Maize AW 043; DK 493; RX 670 Senegal/; RX 633/ Trebia	80,000	13-15	$ 74	$ 81.40	$ 88.80
Packet of Maize Roundup Ready /includes 6 containers of Roundup bio-strength x 5*l* = 30*l*	5 packets	75	$907	$ 998.25	$ 1089
Pioneer Sunflower **Pioneer Maize**	150,000 80,000	27-30 13-15	DM 167 DM 132	DM 175 DM 140	DM 189 DM 150
Sunflower Albena **Sunflower Luka** **Maize** KH 509; KH 530;KH 611; KH 613; KH 614 PC 424; PC 464; PC 555			7 leva[111] 8 leva 2.4 leva	8 leva 9 leva 3 leva	9 leva 10 leva 3.5 leva

Prices are exclusive of VAT (sales tax)

Annex IV: Resources[112]

There are hundreds of groups around the world campaigning on genetic engineering issues. While some choose to focus on the genetic engineering of crops, others focus on patenting. Some want complete bans, some the labelling of GE products, some want moratoriums, while others are simply focused on raising public awareness. Listed below are just a few of these groups and organisations.

Campaign for Food Safety
Minnesota, USA
Tel: +1 218 226 4164
Fax: +1 218 226 4157
E-mail: <alliance@mr.net>
Website: www.purefood.org/index.htm
Dedicated to healthy, safe and sustainable systems of food production. Acts as a global clearinghouse for information on GE; offers grassroots technical assistance

Council for Responsible Genetics
Cambridge, Massachusetts, USA
Tel: +1 617 868 0870
Fax: +1 617 419 5344
E-mail: <marty@gene-watch.org>
Website: www.gene-watch.org
Focuses on human genetics issues including genetic discrimination and patenting. Also active on biosafety and consumer 'right to know' issues. Produces and distributes educational materials.

Genetic Resources Action International (GRAIN)
Barcelona, Spain
Tel: +34 93 301 1381
Fax: +34 93 301 1627
E-mail: grain@bcn.servicom.es>
Website: www.grain.org

Greenpeace International
Berlin, Germany
Tel: +49 30 30 889914
Fax: +49 30 30 889930
Website: www.greenpeace.org/~geneng/
International environmental organisation that lobbies and takes non-violent direct action. Opposed to the release of GMOs into the environment. Their website includes information on a range of issues, as well as press releases, info about actions etc.

Pesticide Action Network (PAN) North American Office
San Francisco, USA
Tel: +1 415 981 1771
Fax: +1 415 981 1991
E-mail: panna@panna.org
Website: www.panna.org/panna
Has campaigned to replace pesticides with ecologically sound alternatives since 1982. PANNA is one of 5 PAN regional centres, the others being in Africa, Asia/Pacific, Latin America and Europe.

Research Foundation for Science, Technology & Natural Resource Policy
New Delhi, India
Tel: +91 11 696 8077
Fax: +91 11 685 6795
E-mail: twn@uvn.ernet.in

Website: www.indiaserver.com/betas/vshiva

Rural Advancement Foundation International (RAFI)
Winnipeg, Canada
Tel: +1 204 453 5259
Fax: +1 204 925 8034
E-mail: rafi@rafi.org
Website: www.rafi.org
An international NGO dedicated to the conservation, sustainability and improvement of agricultural biodiversity, and to the socially responsible development of technologies useful to rural societies. RAFI is an important contact for info on patenting, terminator technology, the biotech industry, loss of genetic diversity, relationship of these issues to human rights, agriculture and world food security.

Third World Network
Penang, Malaysia
Tel: +60 4 226 6728 or 226 6159
Fax: +60 4 226 4505
E-mail: twn@igc.apc.org
Website: www.twnside.org.sg/south/bio.htm
Network of organisations and individuals involved in issues relating to development, the Third World and North-South. Their website is useful source of info about biopiracy, patents, the World Trade Organisation (WTO) and GE.

ANPED
The Northern Alliance for Sustainability
PO Box 59030
1040 KA AMSTERDAM
The Netherlands
Tel. +31 (0)20 4751742
Fax +31 (0)20 4751742
Website: www.anped.org
ANPED works to build capacity among NGOs in Central and Eastern Europe and the Newly Independent States to undertake campaigns to build public resistance to GE food and agriculture.

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