

GREENPEACE

**WHY THE WORLD NEEDS A STRONG A STRONG
BIOSAFETY PROTOCOL:**

**MONSANTO'S GE POTATOES ON THE LOOSE
IN UKRAINE (1997-1999):**



Larva



Adult

COLORADO POTATO BEETLE

**A report prepared by Greenpeace
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MONSANTO'S TRANSGENIC POTATOES ON THE LOOSE IN UKRAINE (1997-1999): THE NEED FOR AN INTERNATIONAL BIOSAFETY PROTOCOL

Executive Summary

"Foreign companies are exploiting the very poor economic situation and the absence of instruments of control in Ukraine"

Yuri Samoilenko, Ukrainian parliamentarian, Chairman of the Environment Committee¹

Imports and Cultivation in Ukraine

This report describes how Monsanto carried out field trials of genetically engineered "Naturemark" NewLeaf potatoes, in Ukraine, without either prior environmental assessments of the potential adverse impacts of these transgenic crops, nor the consent of either the Environment or Health ministries.

No comprehensive assessments were carried out in Ukraine on the environmental, health or indirect agricultural impacts of these transgenic potatoes, even though Ukrainian law requires an environmental impact assessment to be undertaken for new technologies, which could breach the environmental law or create dangers. Nor, did the Canadian government suggest an environmental impact assessment be undertaken prior to planting. From the report, it is clear that in the process, Monsanto was able to benefit from the lack of state control on genetic engineering.

The import and cultivation of these potatoes formed part of a co-operative agreement between the governments of Ukraine, USA and Canada. The agreement was struck in 1996, following a visit of the Ukrainian president to North America. The North American partners are US company Monsanto, and the Canadian Solanum-PEI (Prince Edward Island). Solanum-PEI is an arms-length company of the Canadian provincial government of Prince Edward Island, which works to develop export markets for genetically engineered seed potatoes and potato systems.

Monsanto was able to exploit the lack of state control on genetic engineering and the lack of knowledge of the risks involved in the deliberate releases of genetically engineered organisms. This resulted in uncontrolled field tests and deliberate releases of their transgenic potato in Ukraine without proper regard to the environmental and other impacts of these activities on the Ukrainian environment. No valid or comprehensive rules were in place to regulate the imports into Ukraine of genetically modified seeds. No special safeguards were taken to prevent farm workers from collecting any remaining GE potatoes from the fields after the harvest for use as food or as seeds for their private plots.

Environmental threats posed by Monsanto's Bt potato

Monsanto's "Naturemark" NewLeaf potatoes are designed to kill the Colorado Potato Beetle. These genetically engineered potatoes contain a modified gene² of the natural toxin, *Bacillus thuringiensis*

¹ Interview with Yuri Samoilenko in Kiev, 10 August 1999

² The cryIIIa gene from *Bacillus thuringiensis* subsp. *tenebrionis* (Btt)

(Bt) and have been designed to provide a built-in pesticide against the Colorado Beetle. However, Bt toxins in transgenic plants, unlike the Bt toxin in its natural form, has been shown to harm species higher up the food chain and risk to accumulate, due to poor biodegradation. For more information, see Annex 1: Potential Negative Impacts of Deliberate Releases of the Bt Potato in Ukraine. Monsanto's Bt potatoes also contain another foreign gene³ that induces resistance to the antibiotic, Kanamycin, and has no function other than to be used as a marker. There is concern that antibiotic resistance genes may be transferred to disease-causing germs, rendering the use of common antibiotics ineffective. More information in Annex 1.

In 1998, fields trials took place at a total of 3 breeding stations and 6 collective farms. In the field, Monsanto's NewLeaf potatoes were found to be more susceptible to the fungal disease, Phytophthora. Of those potatoes which were harvested, 1300 tons were destroyed in June 1999, because Monsanto had not succeeded in getting them registered as a recognised variety - a first step to commercialisation. The Ministry of Health had refused to approve them for human consumption. However, because the potatoes were composted, there remains the risk of the Kanamycin antibiotic resistance gene in the *Bt* potatoes being transferred to soil bacteria. There are also reports of other *Bt* potatoes being in circulation in Ukraine.

The release and dissemination of Monsanto's transgenic *Bt* potato in Ukraine are likely to have serious negative impacts on the environment and the potential for environmentally sustainable farming methods⁴. Ukrainian farmers may never have the chance to apply the natural *Bt* formulation to control the Colorado Beetle in an environmentally sustainable way. Recent scientific studies confirm that transgenic *Bt* crops, such as Monsanto's potato, may harm non-target species in the food chain. Thus, the dissemination of transgenic *Bt* potatoes may have a potential negative impact on the Ukrainian ecosystem and further disturb the already precarious ecological balance, a legacy of Chernobyl and Soviet-era heavy industry development. This would be particularly unfortunate given the valuable and fertile chernozem (black earth) soils. Further, the controversial use of an antibiotic resistance marker gene in Monsanto's potato may place human and animal health at risk as a result of the possible build up of resistance in disease-causing germs to commonly used antibiotics.

Greenpeace's demands

Greenpeace would expect the Ukrainian, Canadian and US governments to require Monsanto and Solanum to:

- immediately take all measures needed to find and recall the transgenic potatoes circulating in Ukraine
- immediately provide comprehensive and relevant information to all farmers affected in Ukraine, on the risks this transgenic potato poses to the environment, and environmentally sustainable agricultural practices
- create a compensation fund to enable the Ukrainian Environment Ministry to restore any potential damage to the environment.

The need for international biosafety rules

³ The nptII gene (neomycin phosphotransferase type II)

⁴ See Annex I for a summary of the potential negative impacts

This case is relevant to the current U.N. negotiations for a Biosafety Protocol under the Convention on Biological Diversity. Greenpeace considers that international rules are needed to control the proliferation of genetically engineered organisms (GEOs) to protect biodiversity and human health.

One of the main points arising from this case is that the lack of international rules setting out obligations for comprehensive environmental, human health and agro-socio-economic impact assessments meant that neither Monsanto, the Canadian company, Solanum Prince Edward Island nor the governments of Canada and US were obliged to provide relevant information to the Ukrainian authorities to take an informed decision on the imports.

If international biosafety rules had been in place, Monsanto and Canada would have made sure that Ukraine received all the relevant information about potential adverse impacts, before the imports of the seed and field trials were carried out. If international rules included trade in commodities, Ukraine would have had to give its explicit consent before releases of GEOs were undertaken in Ukraine, which would have required specific procedures and consultation.

There was also no obligation on Monsanto to trace and recall any missing genetically engineered (GE) potatoes that are likely to have been collected after the harvest and planted in the private plots of farm workers and residents. Although the Ukrainian government has imposed a moratorium on the commercialisation of all GE crops and field trials of *Bt* potatoes until legislation is in place, field trials of other GE crops - AgrEvo's herbicide-tolerant sugar beet and rape, Novartis' insect-resistant maize, Monsanto's herbicide-tolerant maize - are still underway.

The case also exposes the lack of legal and financial remedies available to Ukraine whose biological diversity will be threatened from the potential impacts of the transgenic *Bt* potato in the food chain and the unknown impacts of the other GE commodities.

1 Ukraine

Agricultural land in the Ukraine covers some 41 million hectares, or 70% of the country. Almost 80% or 30 million hectares is arable, although the amount of fallow land has increased since 1985, due to the break up of the Soviet Union and economic downturn, and is some 2.3 million hectares.

Most of the agricultural areas are very fertile, composed of black soils or chernozems, whose humus content is between 3 and 7 %. Ukraine is mainly flat, since it is situated on the European plains. The climate is continental with average highs of 20-25°C and average lows of -3 to -10°C in winter.

Due to its natural fertility, Ukraine was one of the Soviet Union's main suppliers of grain, meat, milk and sugar beet. This led to the intensive use of land for agriculture and the development of farming in areas not suitable for that purpose, such as slopes, wetlands and arid lands.

Since the breakdown of the Soviet Union, the problem of erosion, already aggravated by inappropriate farming practices, has increased due to a lack of finances, which forced the curtailment of anti-erosion measures. Irrigated areas suffer from erosion, flooding, and increased salinity. At the same time, 43% of drained land has become more acid, over 10% too moist and nearly 13% is now waterlogged. Other problems include soil pollution due to both heavy metals and pesticide residues.

There are broadly four types of farms in Ukraine. These are: State farms, Collective farms, Private farms and Private plots. Following the collapse of the Soviet Union, Ukraine underwent a period of rapid privatisation. During the period 1991-1996, the area managed by State farms has halved; the areas farmed by collectives and privately have each increased by 6 %. During this period, the number of private farms increased from 2687 to 38,988, with a doubling in area. The number of private plots has grown from 9,7 million to 11,4 million between 1991 and 1996, and their area now covers 14% of agricultural land⁵.

In 1996, although private farms represented just 16% of agricultural land, they were responsible for over half (53%) of agricultural production in monetary terms. Collectives occupying 73% of agricultural land were responsible for just 36 % of agricultural production.

A legacy of industrialised agriculture and today's lack of investment to restructure farms has led to a situation where Ukraine does not produce enough food to feed itself. Decades of mismanagement and large-scale monocultures has resulted in a country with some of the most fertile soils in the world, but a lack of technical know-how and organisational structures to produce low-input food.

The potato forms an essential part of the Ukrainian diet and is known as '*the second bread*'. The potato market in Ukraine is 11-18 million tons per year. 12 million families grow potatoes, 98% of them on very small plots and mainly for their own consumption. The Colorado beetle is the scourge of potato growers. According to Monsanto Ukraine, every year the Colorado beetle eats 40% of the potential potato harvest, resulting in a potato yield of just 11 tons per hectare, as compared to 30-40 tons per hectare in the US⁶. The results of a Socis-Gallup opinion poll conducted in Ukraine indicate

⁵ State Committee of Statistics of Ukraine

⁶ Interview with Nikolai Boyko, head of Registration of New Products, Monsanto Ukraine, in an article "*The NewLeaf Potato - Unafraid of the Colorado beetle - is hampered in its efforts to reach Ukrainian Fields: Those behind the story hide in the shadows*", by Yigory Osipchiuk, in the newspaper 'Fakty', 17 February 1999

that, 81% of dacha owners are willing to grow genetically engineered potatoes resistant to the Colorado beetle and 51% of them believe this pest to be their worst enemy⁷.

The concept of organic agriculture is almost unknown and where it is, is scorned as being a luxury for countries already producing food surpluses. Hence, the Ministry of Agro-Industrial Complex - as its name suggests - provides no institutional support for organic food production. There is no organic certification body in Ukraine.

2 How Monsanto's *Bt* potatoes came to Ukraine

Monsanto's "Naturemark" NewLeaf potatoes are designed to kill the Colorado Potato Beetle. These genetically engineered potatoes contain a modified gene⁸ of the natural toxin, *Bacillus thuringiensis* (*Bt*) and have been designed to provide a built-in pesticide against the Colorado Beetle. Monsanto's *Bt* potatoes also contain another foreign gene⁹ inducing resistance to the antibiotic, Kanamycin, and has no function other than to be used as a marker. For detailed information about the negative impacts of *Bt* potatoes, see Annex I.

In 1997, 37,8 tons of Monsanto's genetically engineered (GE) Newleaf potatoes were imported to Ukraine.¹⁰ A year later, a further 367 tons were imported. The GE seed potatoes were exported from Prince Edward Island, in Canada, in April 1997 and April 1998 and consisted of three varieties of GE *Bt* potatoes: Atlantic, Superior and Russet Burbank.

Ukrainian Authorisation Procedures

In 1997, there were no laws in Ukraine to regulate the imports of genetically engineered organisms. However, a Committee on Biosafety was established already in 1991 under the Ministry of Science and Technology due to the concerns of scientists about how GMOs would be used in Ukraine. This Committee has drafted several versions of a law to control genetic engineering activities, but to-date, this law has never been passed¹¹.

1. Resolution of Cabinet of Ministers on Provisional Procedure

"In the absence of any official body to grant authorisation, inter-departmental commissions were set up where no one is responsible for anything."

Alexander Sirenko, Head of National Association of Nature Reserves¹²

⁷ "NewLeaf: Much Ado about Nothing" article by Michail Romatsov, in the paper 'Segodnia' (Today), Friday 26 February 1999, p. 19

⁸ The cryIIIa gene from *Bacillus thuringiensis* subsp. *tenebrionis* (*Btt*)

⁹ The nptII gene (neomycin phosphotransferase type II)

¹⁰ Website of Prince Edward Island Government: <http://www.gov.pe.ca/af/index.asp>

¹¹ Interview with Yaroslav Blume, Head of the Committee on Biosafety at the State Committee for Science and Intellectual Property, Friday, 6 August 1999

¹² Interview with Alexander Sirenko, Head of National Association of Nature Reserves, 5 August 1999

On August 17 1998, the Cabinet of Ministers of Ukraine, adopted a Resolution "*On the approval of the Provisional Procedure of import, state testing, registration and usage of transgenic plant varieties in Ukraine*". The import of transgenic varieties is allowed only by a permit from the Ministry of Agro-Industrial Complex (AIC), issued on the basis of a positive decision from the Inter-Ministerial Biosafety Commission. The first step in applying for an import permit is a written request to the State Commission for Testing and Protection of Plant Varieties of the Ministry of AIC, enclosing information on the origin and characteristics of the plant variety. While the trials are being undertaken, samples are sent for sanitary and hygiene testing to the Food Institute of the Ministry of Health. Throughout these procedures, transgenic plants must be kept segregated during storage and both storage facilities and test sites should be labelled. Following the end of the test trials and a positive conclusion from the Ministry of Health, the transgenic plants are entered into the Ukrainian Register of Plant Varieties. Once registered, the Committee on Testing and Plant Varieties Protection and the Inter-Ministerial Council on Testing Regulation prepare proposals to the Ministry of AIC as to the possible uses for this variety and giving permits for the import of seeds for reproduction.

The Inter-Ministerial Council on the regulation of testing, registration and usage of transgenic plant varieties in Ukraine is attached to the State Commission of Ukraine for Testing and Protection of Plant Varieties. Most of the 15-member Council is composed of officials and scientists from the Ukrainian Academy of Agrarian Sciences, which represent agricultural interests. There are just three members representing other interests, namely the Institute of Occupational Medicine of the Academy of Medical Sciences, the Food Institute of the Ministry of Health and the Ministry of Environment. However, it is claimed that the representative from the department of Biosafety of the Environment Ministry, Olena Ligostayeva, was not consulted throughout the decision-making process on the *Bt* potatoes¹³.

Moreover, by the time membership of the Inter-Ministerial Council was approved and the Resolution outlining the provisional procedures was adopted in August 1998, two consignments of GE seed potatoes had already been imported and cultivated in the country.

2. *The Law on Ecological Expertise not Applied*

The Law on Ecological Expertise (Environmental Impact Assessment), adopted in February 1995, should have been applied. This law applies to both project proposals and activities already underway. Article 7 of this Law requires that "*legislation and regulations, project proposals, the introduction of new technologies, materials, substances and production, the realisation of which could violate the environmental law or create dangers*" should be subject to an environmental impact assessment. An annex to this law, adopted by the Cabinet of Ministers 27 July 1995, specifies that "*biochemical, biotechnological and pharmaceutical production*" must be subjected to an environmental impact assessment.

This law was not applied because the Ministry of Environment was not informed about the import and cultivation of the GE potatoes. According to a former employee of the Ministry of Environment, who worked on the preparation of a biosafety law, he only found out about the import and trials of the transgenic potatoes in Ukraine in late 1997 - months after the first shipments of potatoes arrived in Ukraine. This was at Monsanto's workshop for officials from various ministries and scientists from the Academy of Science.

It was during this workshop that the first official information was issued about the trials. The Ministry of Environment requested Monsanto to provide them with the documentation on risk assessments from Canada, results of Canadian field trials and health impact studies, but this information was never received by the Environment Ministry¹⁴.

¹³ Telephone interview with official from the Ministry of Environment, who wishes to remain anonymous, 10 August 1999

¹⁴ Interview with Sergey Gubar, 6 August 1999, now working for Institute of Environmental Research and Resources. Until October 1998, Gubar worked in the Ministry of Environment, Department of International Relations.

A recent court ruling in Brazil, in August 1999, upheld a complaint against Monsanto's application to launch sales of GE soybean in Brazil because of the company's failure to conduct an environmental impact assessment¹⁵.

3. *Who issued an Import Permit to Monsanto?*

When Monsanto came to Ukraine with its transgenic potato, it was to be the first genetically engineered product introduced to the country. The Ministry of Agro-Industrial Complex wanted to see the results of field trials before granting approval for registering the GE potato as an approved variety. The Biosafety Committee examined the results of US and Canadian trials to assess biological and environmental safety. On the basis of this evidence, the Committee concluded that they were not against limited exposure from the GMOs, but only for trials.

This position was forwarded by the Biosafety Committee to the State Committee for Testing and Protection of Plant Varieties, under the Ministry of Agro-Industrial Complex. It was to this Committee that Monsanto applied for a permit to undertake the trials, since the trials are structured as for a new variety. This Committee can set conditions for the field trials¹⁶. Once the Committee for Testing and Protection of Plant Varieties approved the field trials, it informed the external Quarantine Service, which is responsible for biological quarantine.

It is understood that the Ministry of Agro-Industrial Complex issued a permit for the import of these transgenic potatoes, having been advised by the State Committee on Testing and Protection of Plant Varieties¹⁷. Clearly, the subsequent widespread dissemination of the *Bt* potato contravened the criteria set by the Biosafety Committee for only limited exposure to GM potatoes.

2.1 Releases into the Environment

The first field trials of *Bt* seed potatoes started in 1997 for breeding and research, with the import of 37,8 tons of GE seed potatoes from Prince Edward Island. Three varieties of genetically engineered potatoes were tested: Superior, Russet Burbank and Atlantic.

There is some confusion as to where the *Bt* seed potatoes, imported in 1997 were grown. Monsanto's own records which were prepared in October 1998 to collect all the harvested seed potatoes for storage (until the *Bt* potato was registered for commercial use) at Shevchenko farm suggest that the seed potatoes imported in 1997 were grown at three locations: Borodyanka Breeding Station, 40-richya "Zovnia" Collective Farm and Shevchenko Collective in Cherkasy Oblast¹⁸. But, according to the farm workers and the farm manager at Shevchenko, the collective grew the *Bt* potatoes for just one season, in 1998. Some of the seeds came directly from Canada, the rest from Borodyanka Breeding Station¹⁹.

¹⁵ "Brazil Court rejects Monsanto Appeal on Genetically Modified Soybeans", by Phil Stewart in Sao Paulo, reported by Reuters, 16 August 1999; The Federal Judge, Antonio Souza Prudente ruled that Monsanto must perform a one year environmental impact study, stating: "Whenever there is a potential threat to the environment, an environmental impact study is required. That is in the Constitution and Monsanto is not exempt". Decision of the 6th Federal Court in Brasilia (process number 1998.34.00.027681-8), by Mr Prudente, Titular Judge of 6^a Federal Jurisdiction, Brasilia (DF) 18 June 1999. This decision was reconfirmed by the court on 12 August 1999.

¹⁶ Interview with Prof. Yaroslav Blume, Head of Biosafety Committee 6 August 1999

¹⁷ Interview with Prof. Yaroslav Blume, Head of Biosafety Committee 6 August 1999

¹⁸ See Annex 2: Appendix to Storage Contract of 29.10.98

¹⁹ Conversations with Shevchenko Collective Farm Manager, Pyotr Lila and the Chemist at Shevchenko

However, according to newspaper reports, the trials took place at the Potato Institute of the Ukrainian Agrarian Academy of Science²⁰. According to Prof. Blume, field trials took place at six Variety Testing Stations and one collective farm²¹.

The following year, in 1998 another 367,1 tons of seed potatoes were imported from Canada and grown at a total of nine locations: three state institutions and six collective farms. They are: the Borodyanka Breeding Station, the Potato Institute of the Ukrainian Agrarian Academy of Science and the Lubishyvka Breeding Station in Volyn Oblast. The Collective Farms where the GE potatoes were grown include: 40-richya "Zovnia", Shevchenko in Cherkasy Oblast, Baglie, Svitanok in Rovno Oblast, and "Rosiya" and Kievka, both in Kiev Oblast²².

The fields at the Shevchenko Collective where the largest acreage of potatoes were grown were not fenced, nor were there any barriers. The only locations where any buffer zones may have been present is at the three breeding stations. The field trials were carried out under the supervision of the Committee for Testing and Protection of Plant Varieties.

Unexceptional Harvest

In 1998, Shevchenko farm in the village of Moskalenok, Cherkasy Oblast, sowed some 200 tons of seed potatoes on 40 hectares of field. The harvest was 17 tons per hectare - a yield similar to the best quality local varieties. The fungal disease, *Phytophthora* proved not be such a problem, because the potatoes were regularly sprayed with fungicides, paid for by Monsanto.

According to the farm manager, the Shevchenko collective only grew the GE potatoes for one season, in 1998. The potatoes were planted in late June 1998 and were harvested by late August. Within 62 days of sowing the seed potatoes, 80% of the crop was harvested. When asked about the need for buffers, the farm manager agreed that there are some distances between the fields, but this was to prevent the spread of *phytophthora*²³.

After the second *Bt* potato harvest in 1998, and with no approval of the Health Ministry that the potatoes are safe for human consumption, the potatoes from the nine field trials were brought for storage to the Shevchenko Collective. This collective has refrigerated warehouses and the 1300 tons potatoes collected from the nine sites were stored there pending a decision from the Ministry of Health²⁴, and registration of the transgenic potato.

2.2 After the Field Trials - What next?

After 2 years of field trials, Monsanto wanted to register the potato as a new variety, with the State Committee for Testing and Protection of Plant Varieties. Registration is the first step to commercialisation and the *Bt* potato would have been the first GE plant registered in Ukraine²⁵.

²⁰ "Taming of the Garden Genie", by Galina Kvitka, Voice of Ukraine, 5 March 1999

²¹ Interview with Prof. Yaroslav Blume, Head of Biosafety Committee 6 August 1999

²² See Annex 2: Appendix to Storage Contract - Seeds of NewLeaf potatoes supplied to Shevchenko Collective for Storage

²³ Interview with farm manager of Shevchenko Collective, Pyotr Lila, 10 August 1999

²⁴ See Annex 2

²⁵ Interview with Yuri Kundiev, Director of the Institute of Occupational Health, Head of BioEthics Committee and member of the Academy of Medical Science, 7 August 1999

However, when the State Committee for Testing and Protection of Plant Varieties met in December 1998 to consider Monsanto's application to register the potatoes: "All of the sudden, the meeting broke up without a decision. The Committee just postponed the registration and this happened several times"²⁶.

In early 1999, the State Chemical Commission registered the foreign *Bt* protein, introduced into the potato, as a natural insecticide that is safe for humans²⁷. At the same time, on the recommendations of the Institute of Occupational Health, the Medical University and Institute of Toxicology, the Ministry of Health issued a statement announcing that the *Bt* potato is safe for human consumption²⁸.

At the end of January 1999, Monsanto and Solanum PEI held a press conference at the Canadian Embassy to announce their intention to establish seed production of the *Bt* potato in Ukraine. The press conference coincided with the visit to Ukraine of the Canadian prime minister, Jean Chrétien, with a large delegation of Canadian businessmen. Present at the press conference were Francis Royri, the deputy minister of the Ministry of Agriculture, Fisheries and Forestry of Prince Edward Island (PEI) and John MacQuarrie, Director of the Planning and Development Division of the same Ministry²⁹. The purpose of meeting with Ukrainian journalists was to convince them of the necessity of registering the transgenic potatoes by the State Committee for Testing and Protection of Plant Varieties. According to Francis Royri, the first phase of the project, which entailed the import and field trials of the *Bt* potato had already cost US\$ 1 million and now the only obstacle to producing a powerful potato-producing industry in Ukraine was the need for registration³⁰.

Despite the pressure on the Ukrainian government to register the potatoes, they were never registered.

Opposition to GE potatoes grows

"We can say that this is generally a new plant, which only looks like a potato"

-- Viktor Muravyov, Institute of Vegetables and Horticulture, Ukrainian Academy of Agrarian Science³¹

By early 1999, the Ukrainian media was writing more and more about the transgenic potatoes. Much of the information was provided to journalists by the TACIS Environmental Awareness Raising Programme (TEAP), working with the BBC Marshall Plan of the Mind and the NGO Green Dossier, who publish a weekly digest called "EcoWeek". This weekly journal publishes translated excerpts of articles as they appear in the foreign press, particularly in the UK media. In this way, information

²⁶ Dr. Vladimir Petruniek, Head of the State Chemical Commission quoted in article: "The NewLeaf Potato - unafraid of the Colorado Beetle - is hampered in its efforts to reach Ukrainian Fields: Those behind this story hide in the shadows" by Yigory Osipchiuk, in newspaper 'Fakty', 17 February 1999

²⁷ "The NewLeaf Potato - unafraid of the Colorado Beetle - is hampered in its efforts to reach Ukrainian Fields: Those behind this story hide in the shadows" by Yigory Osipchiuk, in newspaper 'Fakty', 17 February 1999

²⁸ Interview with Yuri Kundiev, Director of the Institute of Occupational Health, Head of BioEthics Committee and member of the Academy of Medical Science, 7 August 1999

²⁹ "Stumbling Block", an article by Yuri Krasnikow, in the newspaper 'Fakty', 28 January 1999

³⁰ "Antoshka, Antoshka", article featured in magazine "Business" No. 8 (319), in section Companies and Markets, 22 February 1999

³¹ Quoted in article: "Antoshka, Antoshka", in magazine "Business" No. 8 (319), in section Companies and Markets, 22 February 1999

about the results of Arpad Pusztai's experiments on GE potatoes and his controversial dismissal from the Rowett Institute in Scotland, reached the Ukrainian media³².

This media interest stimulated a public debate on the issue of GE potatoes. Both journalists and the public started asking questions like: How long will it take for the Colorado beetle to adapt to the GE potatoes? What plant will become its next food? If people experience health problems after eating these potatoes, who will be responsible?

Victor Myravyov, the Head of the Department of Scientific Research, at the Institute of Vegetables and Horticulture, under the Ukrainian Academy of Agrarian Science told the press that genetic changes will alter the biochemical composition of the potato, because it is not possible that only a single gene is responsible for a specific characteristic. One property is controlled by a group of genes and there are mutual influences of genes. In the GE NewLeaf potato, a new protein was synthesised which the Colorado beetle does not eat, and which does not exist in normal potatoes. This led Myravyov to claim: *"This plant is no longer a potato"*³³.

Victor Masalay, the Head of the State Inspectorate raises the concern that once surrounded by *Bt* potatoes, before the Colorado beetle dies of hunger it could move to tomatoes, aubergines and even sweet peppers - all of which are more valuable crops than potatoes³⁴.

Other arguments against GE potato cultivation in Ukraine put forward by the magazine "Business", concern economic control and loss of self-sufficiency. *"The second danger [uncontrolled dissemination of GE products] - taking into account the mentality of our peasants, could lead to a step-by-step monopolisation of the market by these new varieties. Textbook biology dictates that mutants and hybrids tend to degrade and lose their qualities. That is why hybrid seeds, such as sunflower, have to be bought every year. One possibility is that the NewLeaf will stop producing normal offspring and people will need to buy seeds urgently. But, there will be no local varieties left. At the same time, there will be no weapons left to fight against the Colorado beetle and that means that Ukraine will become dependent on geneticists in far-off foreign lands"*³⁵.

There are also the trade arguments. Dmitry Melnichuk, Rector of the National Agrarian University voices his concerns around trade implications: *"We aspire to participate in the European trading market. Suppose the GM plants have penetrated our fields. And tomorrow, Europe will say: 'For what do we need your agricultural products, polluted by genetically modified organisms?' In this way, we would block our way onto international markets"*³⁶.

³² Pusztai is a nutritionist, who worked at the Rowett Research Institute in Aberdeen, Scotland, undertaking experiments on rats, by feeding them GE potatoes with a foreign gene for making a snowdrop poison called lectin. After Pusztai spoke out about his findings in August 1998, which showed that rats fed these GE potatoes suffered damage to vital organs and a weakened immune, he was abruptly retired from the Rowett Institute.

³³ "Antoshka, Antoshka", article featured in magazine "Business" No. 8 (319), in section Companies and Markets, 22 February 1999

³⁴ "Antoshka, Antoshka", article featured in magazine "Business" No. 8 (319), in section Companies and Markets, 22 February 1999, and "The NewLeaf Potato - unafraid of the Colorado Beetle - is hampered in its efforts to reach Ukrainian Fields: Those behind this story hide in the shadows" by Yigory Osipchiuk, in newspaper 'Fakty', 17 February 1999

³⁵ "Antoshka, Antoshka", article featured in magazine "Business" No. 8 (319), in section Companies and Markets, 22 February 1999

³⁶ *ibid.*

There are also various explanations offered as to why Monsanto chose Ukraine for its genetic experiments. One paper suggests: *"Monsanto's generosity and strong desire to save the Ukrainian fields from the dreaded bug can be explained. Abroad, genetically modified plants are gradually losing favour. If there is a sudden breakthrough of the potato on our market and it happens smoothly, Monsanto can persuade the 'unreasonable' Europeans with extra arguments, saying that Ukrainians eat this type of potato - and nothing terrible happens"*³⁷.

Ministry of Health Creates Confusion

The Ministry of Health, whose task is to provide an independent assessment of the *Bt* potatoes for human consumption has changed its position, resulting in confusion.

In a letter to the Deputy Prime Minister of Ukraine, S. Tygipko, dated 27 January 1999, the Ministry of Health said *"... we believe that it is worth undertaking additional research into these varieties of potato, since the problem of using transgenic plants has to be solved on the basis of developing assessment methodologies and requires establishing relevant criteria for human safety. We think that it is also necessary that representatives from the Ministry of Health, Mr. I. R. Barplanko and O.P. Kravczuk should be included in the State Committee on Variety Testing and Protection. The Health Ministry will inform you about the final decision"*³⁸.

However, by February 1999, it seems that the Ministry of Health had reversed this position when on the recommendations of the Institute of Occupational Health, the Medical University and Institute of Toxicology, the Ministry issued a statement announcing that the *Bt* potato is safe for human consumption³⁹.

Further confusion was guaranteed, when the Minister of Health, Mr. Serdiuk, on his last day in office reversed the previous positive recommendation on the *Bt* potato's safety for human consumption. Initially, the Minister of Health was opposed only to the GE potato for human consumption, but during a press conference, he later claimed that he was concerned about all GE crops and micro-organisms.

Bt Potatoes miss the 1999 sowing season

Without the approval of the *Bt* potato for human consumption, the Committee for Testing and Protection of Plant Varieties was unable to register the *Bt* potato. By this time, it was already late spring 1999, and too late to start sowing potatoes.

So, the Ministry of Agro-Industrial Complex informed the Monsanto Representative Office in Kiev, in a letter dated 5 May 1999, that: *"Since the potato planting season is over, but the registration process for the transgenic potato varieties is incomplete, Minagroprom [Ministry of Agro-Industrial Complex] recommends that the 1998 potato harvest undergo industrial processing. This operation should be supervised by the Ukrainian State Seed Inspectorate.....Field trials of transgenic potato varieties can be resumed after the adoption by the Supreme Council of a law on the use of transgenic plant varieties in Ukraine"*⁴⁰.

³⁷ *"Taming of the Garden Genie"*, by Galina Kvitka, Voice of Ukraine, 5 March 1999

³⁸ Letter of Ministry of Health quoted verbatim in article *"Response to previous article - Transgenic Adventure: Clarifying Things"*, by Boris Poliszuk, in Silski Wisti (Village News), February (?) 1999

³⁹ Interview with Juri Kundiev, Director of the Institute of Occupational Health, Head of BioEthics Committee and member of the Academy of Medical Science

⁴⁰ The letter is signed by the Deputy Minister, S.M. Rizhook

Although the Ministry of AIC recommended processing the potatoes into industrial alcohol or starch, Monsanto decided instead to save money, by not having to transport the potatoes to a reprocessing facility⁴¹. The 1300 tons of GE potatoes which had been lying in refrigerated storage at the Shevchenko Collective since autumn 1988, waiting for a decision, were subsequently crushed and covered with compost at three sites on the collective in June 1999⁴². Monsanto paid for the burial of the potatoes.

However, burial or composting of these Monsanto transgenic potatoes was no solution. Monsanto's Bt potato also contains a Kanamycin antibiotic resistance gene as a marker. One study has shown that the soil bacteria, *Acinetobacter*, can not only take up and integrate DNA from the Kanamycin resistance gene (albeit, in transgenic sugar beet), but can restore the initially incomplete gene so it can function again⁴³. This means that through horizontal gene transfer, antibiotic resistance can be transferred to soil bacteria and potentially, on through the food chain. For more information, see Annex I: Potential Negative Impacts of Deliberate Releases of the Bt Potato in Ukraine.

2.3 Widespread Dissemination of the *Bt* potato in Ukraine

Despite the illusion that all the GE potatoes from the 1998 harvest were destroyed by crushing and burial, *Bt* potatoes are reported to be on the loose in Ukraine. According to several newspaper articles, Colorado-resistant potatoes are being grown on many small dacha plots and have already reached the local markets. *"...the transgenic potato has taken up residence in private market gardens, which border on the test sites....Individual farmers spread this potato around - this product which has not been investigated at all, is being offered by them as seeds for 1 grivna (\$0.25) per potato in the market places"*⁴⁴.

According to farm workers at the Shevchenko Collective, after the harvest it is customary for the workers and residents to clear the fields of any remaining crop. After the potato harvest, collective workers and residents took any remaining potatoes left in the field after harvesting. No special safeguards were taken to prevent farm workers from collecting any remaining GE potatoes from the fields after the harvest for use as food or as seeds for their private plots⁴⁵.

Alexander Sirenko, Head of the National Association of Nature Reserves, reports that before the potatoes were buried, many were stolen by farmers and are now sold in the markets of Kiev and Czerkavski⁴⁶.

Prof. Blume, Head of the Biosafety Committee confirms that he has heard rumours about *Bt* potatoes having been stolen from the field trials and sold in the markets. He does not discount them, because the fields were not guarded. Moreover, he claims that there are many types of *Bt* potato in Ukraine, because scientists have been bringing them from abroad. Given that in Ukraine, some 95%

⁴¹ Interview with Yuri Kundiev, Director of the Institute for Occupational Health, 7 August 1999

⁴² Interviews with farm workers at the Shevchenko Collective Farm

⁴³ Gebhard F. and Smalla K. (1998) Transformation of *Acinetobacter* sp. Strain BD413 by Transgenic Sugar Beet DNA, *Applied and Environmental Microbiology*, Vol 64 No. 4, p. 1550-1554

⁴⁴ *"Taming of the Garden Genie"* article by Galina Kvitka, in *Golos Ukrayiny* (The Voice of Ukraine), No. 41 (2043), 5 March 1999

⁴⁵ Interviews with farm workers at Shevchenko farm.

⁴⁶ Interview with Alexander Sirenko, 5 August 1999 in Kiev

of potatoes are grown on dacha plots, it is virtually impossible to enforce Ukraine's laws on patent protection and plant varieties⁴⁷.

Sirenko confirms stories of widespread dissemination of GE plants; not only potatoes, but also GE maize and soybean seeds can be found on the market, being sold by small dealers. However, the high price is slowing their dissemination. The GE seeds originate either from Ukrainian collectives undertaking field trials, or are smuggled from Romanian or Russian experiments⁴⁸.

2.4 What now for GMOs in Ukraine?

"Something which has not been studied sufficiently, cannot be used. We are not a testing ground for products, plants and substances which have not been researched. Chernobyl and the general pollution have been enough for us"

Ukrainian Deputy Minister of Environmental Protection and Nuclear Safety⁴⁹

In early March 1999, the Deputy Environment Minister, speaking at a press conference with a committee of biologists, and reported by the main news broadcast, called for the need to limit the use of GE seeds in the crops of 1999. He had been advised by biologists that it would take at least 10 years of research to assess the effects of this technology. Since Ukraine had not yet developed an adequate system of control to prevent the market penetration of unlicensed products, he warned people to be careful when buying agricultural products, such as potatoes, tomatoes and sugar beet⁵⁰.

At the time the Environment Ministry disseminated the following information: *"Today in Ukraine, under pressure from Western biotech companies and in violation of the current legislation, field trials of transgenic plants are taking place. According to unofficial data, in Ukraine today trials are taking place of the following: modified potatoes resistant to Colorado Beetle (Monsanto), maize resistant to insects (Novartis), sugar-beet tolerant resistant to glufosinate (AgrEvo), maize tolerant to Roundup (Monsanto and DeKalb) and maybe others"*^{51, 52}.

A month later, in April 1999, it was reported that the August 1998 Resolution *"On the approval of the Provisional Procedure of import, state testing, registration and usage of transgenic plant varieties in Ukraine"* had been suspended through the efforts of the Ministry of Environment. This was due to the fact that the Resolution was prepared without the participation of the Ministry of Environment and without the requirement to undertake environmental assessments of GMOs. Moreover, officials of the Environment Ministry informed that they want in-depth investigations to be undertaken on GMOs over a period of 5-10 years⁵³.

However, according to one official from the Ministry of Environment and Nuclear Safety, the Resolution has not been suspended, since only the Cabinet of Ministers, which issued the Resolution, can suspend it. Moreover, the official claims that the bodies involved to date, such as the Biosafety

⁴⁷ Interview with Yaroslav Blume, Head of Biosafety Committee 6 August 1999

⁴⁸ Interview with Alexander Sirenko, 5 August 1999 in Kiev

⁴⁹ A press conference of Ministry of Environment, shown on the main news broadcast of the official TV channel 'INTER', 9 March 1999, reported electronically by Mama 86, 13 March 1999

⁵⁰ ibid

⁵¹ Article in the daily 'Segodnia' (Today), 11 March 1999 and also in 'Eko-Week', 19 April 1999

⁵² Basta and Liberty are both tradenames for glufosinate herbicides produced by AgrEvo. Roundup is a glyphosate herbicide made by Monsanto.

⁵³ Reported in 'Eko-Week', Digest for Ukrainian media, 19 April 1999

Committee, the Committee on Testing and Protection of Plant Varieties and the State Chemical Committee are advisory bodies and cannot issue permits. The only body that can issue a permit is the Cabinet of Ministers, after inter-departmental consultation. However, the Environment Ministry was not consulted on the environmental impacts of the *Bt* potato or invited to comment, despite the fact that under Ukrainian law, the Environment Ministry is responsible for all environmental impacts⁵⁴.

2.5 The Situation Today

*"My Committee can elaborate the best regulations, complying with those of the EU, but our political system is unstable and GE seeds will arrive here, due to gaps"*⁵⁵

Yaroslav Blume, Head of the Biosafety Committee

Clearly, Ukrainian officials wary of public concerns and those of its own scientists are starting to be more cautious.

At present, Ukraine has a moratorium on the commercialisation of all GE plants and a moratorium on GE potato field trials. However, the trials of other GE plants are still permitted⁵⁶. Other GE plants waiting to be registered include: Roundup Ready Soya, the Novartis GE insect-resistant maize and AgrEvo's sugar beet tolerant to Liberty (Basta)⁵⁷. The latter, in particular, could have a negative impact on the wild variety of sugar beet found in the Crimea⁵⁸.

AgrEvo's Herbicide-tolerant Sugar Beet

In a press release, AgrEvo describes its "Ukrintersugar" project, a joint venture between Ukraine, Austria and Germany, that has been working in Ukraine since 1994 and which involves 234 farms, which produce sugar beet on an area of 35,000 hectares, using "Ukrintersugar" technology. AgrEvo plans to introduce the farms which are part of this project to its newest system of sugar beet growing based on biotechnology and known as LibertyLink® system⁵⁹.

However, in Greece AgrEvo's proposals for undertaking field trials of glufosinate-tolerant sugar beet (glufosinate is a herbicide sold under the trade name Liberty or Basta) was not allowed. A major concern is the high possibility for the GE sugar beet to cross-breed with the wild relatives of sugar beet, such as *Beta vulgaris Sicula* and *Beta maritima*. The possibility of creating super-weeds impossible to kill using conventional weed-killers is a major concern. Other concerns were the toxicity of glufosinate and the lack of benefit to both farmers and consumers. The Greek government has introduced a moratorium on field trials of all GE plants^{60, 61}.

⁵⁴ Telephone conversation with Environment Ministry official, who wishes to remain anonymous

⁵⁵ Interview with Yaroslav Blume, Head of Biosafety Committee 6 August 1999

⁵⁶ *ibid.*

⁵⁷ Quoted in 'Eko-Week', 19 April 1999 and confirmed by Juri Kundiev, Director of the Institute for Occupational Health during an interview, 7 August 1999

⁵⁸ Interview with Yaroslav Blume, Head of Biosafety Committee 6 August 1999

⁵⁹ AgrEvo press release issued by their Kiev office, undated, but distributed in February 1999

⁶⁰ The decision to introduce a moratorium on experimental field trials of GMOs was announced by the deputy minister for the environment Theodoros Koliopanos on 31 March 1999. Koliopanos also announced that all experimental plantings of GMOs presently pending in Greece have been rejected.

⁶¹ AgrEvo is also planning to introduce its GE herbicide-tolerant oilseed rape to Ukraine. In a press release, AgrEvo writes: "Owning the progressive technology of oil-seed rape production, AgrEvo has intensively started to implement its technology in Ukraine. Jointly with the association "Ukrripak", the company has developed a project on oil-seed rape growing under the AgrEvo technology (that includes the use of hybrid seeds and plant protection technology on the basis of biotechnology - LibertyLink® system) on an acreage of 0,5 million hectares during next 5 years."

Given the economic, social and political instability of the country and the fact that Ukraine has wild weedy relatives of some of the GE crops currently being tested, the onus needs to be on the governments exporting this technology to ensure that there are strong international laws to control all aspects of the movements and dissemination of GMOs into the environment.

Monsanto's Mistakes

"We are winding up some kinds of our business activity here"

Vladimir Vasiliev, Co-ordinator of Projects and Business Development, Monsanto Ukraine⁶²

Monsanto's adventure with GE potatoes in Ukraine did not end well for the company. Monsanto paid for the field trials, for refrigerated storage of the seed potatoes and finally for the destruction of 1300 tons of their product.

According to the Head of the Biosafety Commission, foreign companies are now reducing their activities and leaving, due to the instability in Ukraine⁶³. Monsanto Ukraine's Co-ordinator of Projects, Vladimir Vasiliev confirmed the company's frustration with Ukraine's slow reforms and debts by local consumers, and their intention to cut some of their business activities⁶⁴.

However, just 2 days later, the Acting Director of Monsanto Ukraine, Maria Osyka, was quoted saying: *"Ukraine is a strategic country for Monsanto and we will work here"*. Monsanto's main market in Ukraine is for herbicides, and the company sells variously 15-20⁶⁵ % and 25-30⁶⁶ % of the herbicides used in Ukraine. Despite the debts that Monsanto has incurred in Ukraine in its herbicide division, it seems that the company is not ready to quit Ukraine just yet. Osyka is reported as saying that Monsanto saw better opportunities to boost its presence on Ukraine's seeds market, after a recent acquisition of a seeds plants in the eastern Donetsk region, which annually produces 1000 tonnes of seeds of sunflower and other oil-bearing plants. *"We sold about 400 tonnes of high-quality sunflower seeds to Ukrainian farms this year and hope to sell more than 600 tonnes in 2000"*, says Osyka.

3 The Seed Potato Project

Monsanto's interest in coming to Ukraine is explained in an interview with Mykola⁶⁷ Boyko, Head of Registration of New Products at Monsanto Ukraine. He is quoted in February 1999 as saying : *"If the NewLeaf potato is registered in Ukraine, Monsanto together with the government of Prince Edward Island, will be able to restore seed potato production in Ukraine as soon as possible, which has in fact, been ruined. We also want to introduce Bt in the varieties of local potatoes, which will allow us to use the experience of local potato breeders. Then, the producers of agricultural products will save a lot of money by not having to buy agro-chemicals. Moreover, Ukraine will have the opportunity to become an exporter of transgenic seed potatoes to the Newly Independent States and Eastern European countries."*⁶⁸.

⁶² "U.S. Monsanto says cuts in Ukraine Business" by Pavel Polityuk, Chubynske, Ukraine, Reuters, 9 June 1999

⁶³ Interview with Yaroslav Blume, Head of Biosafety Committee 6 August 1999

⁶⁴ "U.S. Monsanto says cuts in Ukraine Business" by Pavel Polityuk, Chubynske, Ukraine, Reuters, 9 June 1999

⁶⁵ "U.S. Monsanto says cuts in Ukraine Business" by Pavel Polityuk, Reuters, 9 June 1999

⁶⁶ "U.S. firm Monsanto says it sees prospects in Ukraine" Kiev, Reuters, 11 June 1999

⁶⁷ Russian version of his name is Nikolai Boyko

⁶⁸ "The NewLeaf Potato - unafraid of the Colorado Beetle - is hampered in its efforts to reach Ukrainian Fields:

Monsanto is particularly interested in creating a seed bank of potatoes tailored to the region, and in particular to create a GE variety of the *Lugovskoy* potato which is naturally resistant to the fungal disease, phytophthora. Monsanto's *Bt* potatoes are susceptible to this fungal disease⁶⁹.

3.1 The Key Players

Those most closely involved in this project include: Monsanto Inc., Solanum Prince Edward Island, the Canadian government, the Ukrainian Ministry of Agro-Industrial Complex and its agencies. Another player was CNFA, "a non-profit, non-partisan, intermediary development organization which builds public-private partnerships to spur economic, social and democratic development in transitional economies"⁷⁰.

Monsanto, the US agro-chemical multinational, who developed and marketed its transgenic *Bt* potato

Monsanto provided the Committee on Biosafety with the results of the trials in the US and Canada to assess biological and environmental safety.

However, Monsanto did not undertake a country-specific assessment of the likely environmental impacts of the transgenic potato on the Ukrainian ecosystem and the Ukrainian authorities did not request such as assessment⁷¹. This is in spite of the fact that the 1995 Law on Ecological Expertise specifically requires an environmental impact assessment to be undertaken when introducing "new technologies, materials, substances, and production, whose realisation could violate the environmental law or create dangers"⁷².

According to the Official Website of the Government of Prince Edward Island, **Solanum-PEI** is "an arms-length company of the provincial government [which works] on developing export markets for genetically-improved seed potatoes and potato systems from Prince Edward Island"⁷³. It recently opened a World Potato Learning Centre in Romania to "assess and prepare potential seed producers and commercial growers for the ongoing work of introducing branded, high quality seed potatoes in a number of Eastern European countries...The course will concentrate on seed production systems, and will highlight seed production, business practices and biotechnology"⁷⁴. Monsanto has a contract with Prince Edward Island, a potato breeding region in Canada, which produces Monsanto's *Bt* seed potatoes, mainly for export.

Solanum-PEI and Monsanto have close ties with the Canadian government. For example, in spring and autumn 1998, Monsanto hosted two presentations for Ukrainian officials, academics and

Those behind this story hide in the shadows" by Yigory Osipchiuk, in newspaper 'Fakty', 17 February 1999

⁶⁹ Interview with Manager of Shevchenko Collective, Pyotr Lila, Farm Chemist and farm workers at Shevchenko, 10 August 1999

⁷⁰ website of CNFA: www.cnfa.com

⁷¹ The Ukrainian Biosafety Committee is still elaborating consensus documents on the biology of certain varieties of GE plants and is waiting for the new law on genetic engineering to be approved. Only then, will the Biosafety Committee prepare national criteria for biological and environmental risk assessments to improve the basis of decision-making for Ukrainian authorities.

⁷² Interview with Svitlana Kravchenko, Ecopravo-Lviv, in Kiev, 9 August 1999

⁷³ Website of Government of Prince Edward Island: www.gov.pe.ca/af/cornerpost/apr98

⁷⁴ Website of Government of Prince Edward Island: www.gov.pe.ca/af/cornerpost/link2.asp

parliamentarians, both of which took place in the Canadian Embassy in Kiev. The presentation in spring 1998 included representatives from North American regulatory authorities and government officials from Prince Edward Island. The presentation in autumn 1998 included representatives from the regulatory authorities from the US, EU, Canada and Ukraine who presented their respective registration procedures. This presentation also featured a video showing the labelling of GE NewLeaf potatoes in North America⁷⁵.

The Canadian government provided some technical assistance to this project⁷⁶.

CNFA is an organisation which builds partnerships to *"leverage the capital and know-how of U.S. agribusiness with limited government resources to revitalize agricultural and foods systems in the former Soviet Union"*. CNFA's Corporate Sponsor Program expands opportunities for U.S. food and agribusiness companies.

In Ukraine, CNFA's *The Citizens Network Agribusiness Alliance* (CNAA) has been very active in the potato project. CNAA is an alliance of over 250 U.S. organisations, agribusinesses, farm groups, banks, universities. Members of CNAA include Monsanto, as well as other biotech companies, such as Novartis, Pioneer Hi-Bred and Dekalb, and organisations, such as Ukraine-US Business Council and Ukrainian Agricultural Development Company⁷⁷. CNAA's mandate is to harness *"the creativity and technical know-how its members to redesign food and agriculture systems and build markets in developing and emerging economies"*⁷⁸.

CNAA's environmental officer, Wayne Williams, an environmental lawyer, worked with the Ukrainian Ministry of Environment in 1998 to prepare legislation on GMOs and to define the responsibilities of the different ministries⁷⁹. Williams was also present at Shevchenko Collective in June 1999, when 1300 tons of Monsanto's GE potato harvest was buried⁸⁰. Many consider that he represents Monsanto and Pioneer in Ukraine⁸¹. In June 1998, CNFA, the Environment Ministry and the Agro-Biotech Centre organised a workshop in Kiev to elaborate Ukrainian legislation on regulating (the production, trials, use, export, import and commercialisation) of biotechnological products^{82, 83}.

⁷⁵ Interview with Sergey Gubar, Institute of Environmental Research and Resources; formerly employee of the Ukrainian Ministry of Environment and Nuclear Safety, Department of International Relations.

⁷⁶ *"Taming of the Garden Genie"*, article by Galina Kvitka in *Golos Ukrayiny* (The Voice of Ukraine), No. 41 (2043), 5 March 1999

⁷⁷ CNFA website: www.cnfa.com/alist.htm

⁷⁸ CNFA website: www.cnfa.com/over.htm

⁷⁹ Interview with Sergey Gubar, Institute of Environmental Research and Resources; formerly employee of the Ukrainian Ministry of Environment and Nuclear Safety, Department of International Relations.

⁸⁰ Interview with Alexander Sirenko, Head of National Association of Nature Reserves, 5 August 1999

⁸¹ *ibid*

⁸² Information received electronically from Mama 86. Workshop held 24-25 June 1998.

⁸³ At CNAA's Sixth Annual Meeting in November 1998, in Prague, there was a lively discussion on biotechnology when the country manager for Pioneer Hi-Bred, Brian Foster, said that biotech crops alone were not the answer to the farm problem. *"It may help, but it requires a high level of management which is not available in Ukraine."* The fact that a legal and regulatory framework has not yet been fully developed in Ukraine was considered by most speakers to be a major barrier to getting GMOs in place. At this meeting, Wayne Williams said that consumers must be educated that biotechnology is not *"Armageddon."* *"A lot of criticism against Bt is not valid. One opportunity is to promote interaction with scientists and legislators who don't know what Bt is"*, Williams suggested.

Source: CNFA website: www.cnfa.com/septoct.htm

Agencies of the Ukrainian Ministry of Agro-Industrial Complex: State Committee for Testing and Protection of Plant Varieties

The Committee on Biosafety is the first stop for importers of GMOs. They assess the biological risks and the impacts on biodiversity based on the information supplied. In the case of the *Bt* potatoes, they approved limited exposure, but only for trials. The Biosafety Committee then decides which government body should be responsible for controlling the GMO. In the case of the *Bt* potatoes, they forwarded their decision to the State Committee for Testing and Protection of Varieties. This Committee, under the Ministry of Agro-Industrial Complex (AIC), establishes the conditions for the field trials, supervises the trials and grants permits for field trials. It has a network of breeding stations for testing new varieties which contain fields with buffer zones and refuge areas, to enable some control of cross-pollination or to mitigate negative effects on fauna. Monsanto applied to the Committee for Testing and Protection of Plant Varieties for a permit to conduct trials and paid them to supervise the trials. The Ministry of AIC had earlier issued an import permit for the *Bt* potatoes⁸⁴.

4 Key Biosafety Problems Relevant to the Case

No information from exporting country or exporter on potential adverse impacts of transgenic *Bt* crop to importing country. Neither the Canadian government, Solanum PEI or Monsanto considered it necessary to inform the Ukrainian government of the potential adverse impacts of transgenic *Bt* crops, such as Monsanto's potato. For example, there was no information to warn that the use of these transgenic *Bt* potatoes would sooner or later result in the development of *Bt*-resistant beetles. This is particularly shocking since clear instructions were given to US farmers planting the same *Bt* potato seeds setting out measures that needed to be taken so as to delay the development of insect resistance to the *Bt* toxin. It would also appear that the Ukrainian Ministry of Agriculture did not request any information from Monsanto about possible risks from their product.

No environmental impact assessment on Ukrainian ecosystem. Neither Canadian officials, Monsanto nor the Ukrainian Ministry of Agriculture carried out an assessment of the effects and interactions of the *Bt* potato on the Ukrainian ecosystem. There do not appear to be any official Government records of the results and impacts of the deliberate releases of Monsanto's transgenic potatoes.

It is useful to note that in both Canada and the U.S., companies applying for releases of genetically modified organisms are obliged to provide data from risk assessments to the relevant authorities before the releases are authorised. In this case, however, neither Monsanto nor the US authorities provided such data. The Ukrainian government did not ask for it either. Given the political instability of a newly independent state, there is a strong case for all parties to take responsibility to ensure that a comprehensive environmental assessment is carried out before releases can be authorised.

⁸⁴ Interview with Prof. Yaroslav Blume, Head of Biosafety Committee 6 August 1999

No agronomic or indirect biodiversity-related impact assessment in Ukraine. GE crops are designed for growing on industrial-scale monocultures. For example, herbicide-tolerant crops will entrench a dependence on toxic, energy-intensive methods, dependent on agro-chemicals. These strategies do not address the underlying causes of weed proliferation - monoculture (the practice of growing a single crop over the same, large area year after year) allows weeds to become established. Instead, weeds resistant to herbicide may evolve or the GE plants may transfer their 'foreign' herbicide-tolerant genes to other plants, requiring new generations of herbicides.

No Assessment of Socio-Economic Impacts

No assessment was carried out on the impacts of releasing GE potatoes on the farming practices and livelihoods of Ukrainian farmers. As a Party to the Convention on Biological Diversity⁸⁵, Ukraine should be encouraging its farmers to achieve conservation and sustainable use of biodiversity. Whole agricultural production chains may find themselves under monopolistic control - from delivery of agricultural inputs (seeds, agro-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..

No segregation of Bt potatoes from normal potatoes. The collecting of the remaining potatoes after the harvests would have resulted in farmers and dacha plot owners mixing the *Bt* potatoes with conventional varieties. This has led to the situation where it is very difficult and almost not possible to track the dissemination of the transgenic potatoes nor to provide warnings or information to other farmers and consumers in the region.

Unclear liability and compensation. There are likely to be ecological and health impacts in Ukraine from the releases of GE crops. However no rules exist, either at the national or international levels to identify who should be responsible for environmental, health or commercial damage arising from activities involving GMOs and how compensation should be allocated.

No clear national biosafety rules to regulate imports of genetically modified seeds and crops. The lack of clear rules in Ukraine specifically dealing with GMOs and the type of issues mentioned above no doubt contributed to the uncontrolled, widespread dissemination of Monsanto's *Bt* potatoes. A Working Group has now been convened, under the supervision of the Committee on Science and Intellectual Property, to improve the draft law regulating GE activities. It is hoped that these officials will address the above issues, as well as others raised under the Biosafety Protocol negotiations, including the need for criminal sanctions for illegal imports.

⁸⁵ Ukraine ratified the Convention on Biological Diversity on 7th February 1995

Import of GE Contaminated Maize to Switzerland

Greenpeace's demand that Monsanto and Solanum PEI be forced to recall the transgenic potatoes in Ukraine is not without precedent.

In April 1999, the Swiss Federal Department of Agriculture was notified of GE contaminated maize seed found in Germany⁸⁶. The seed was produced in the U.S. and imported to Europe. It was found that two conventional maize seed varieties, Benicia and Ulla, owned by the U.S. company Pioneer, are contaminated with GE maize - either Monsanto's (Mon810) *Bt* maize or Novartis' (Bt11) *Bt* maize. GE maize is banned for growing in Switzerland.

The seed was imported to Switzerland by Eric Schweizer Samen AG and distributed to some 33 regional seed suppliers. Some 200 hectares were sown with these two varieties in Switzerland.

After analysing samples of the seeds in Switzerland, on 6 May 1999 the Federal Department of Agriculture found trace contamination of GE. A day later, the same Department banned the trade and planting of the Ulla and Benicia maize varieties. On 14 May, the Department of Agriculture ordered that Benicia and Ulla maize crops already planted be destroyed⁸⁷. On May 19, 40 hectares of this maize was destroyed in Ticino.

In June, the seed importer agreed to compensate the farmer immediately for the cost of destroying the field and replanting⁸⁸.

5 Conclusions

The case of the imports of Monsanto's *Bt* potato in Ukraine and their failure to gain registration is a manifestation of opposition to this technology by the public, and the more independent scientists and officials.

The alleged destruction of the *Bt* potato, by composting, may instead result in the proliferation of genetic pollution. This and the collecting and dissemination of the post-harvest remaining GE potatoes could still present threats to the country's biological diversity. More beneficial impacts on Ukraine's biodiversity and agricultural prosperity could have occurred if investment had been made to encourage local seed-producing laboratories to create different potato varieties, which would have been well adapted to local conditions and furthered Ukraine's self-sufficiency in seed production.

Legal and financial responsibility needs to be taken for the environmental harm which has resulted from these imports. Greenpeace would expect the Ukrainian and Canadian governments to require Monsanto and Solanum to:

- immediately take all measures needed to find and recall the transgenic potatoes circulating in Ukraine

⁸⁶ Report of Untersuchung von Saatmais, Verdacht von gentechnischer veraendertem Saatmais; Ihr Schreiben vom 12.04.99; Ergebnismitteilung vom 16.04.1999; hier: Spezifizierung der gentechnisch veraenderten Maissorten, Chemische Landesuntersuchungsanstalt Freiburg, Deutschland, 22.04.1999.

⁸⁷ Neue Zuercher Zeitung (NZZ), 28 Mai 1999 'Zankapfel Gentechnik, Bauernfront im Streit um Gentech-Mais , Keine Einigung in der Auseinandersetzung um Schadenersatz'; Schweizer Bauernverband (Swiss farmers organisation) 26 Mai 1999 'Maisproduzenten drohen zwischen Stuehle und Baenke zu fallen'

⁸⁸ Neue Zuercher Zeitung 9 Juni 1999 'Genmais - Bauern erhalten Schadenersatz'; Schweizer bauer, 2 Juni 1999 'Eric Schweizer stellt sich der Verantwortung'

- immediately provide comprehensive information to all farmers affected in Ukraine, on the risks this transgenic potato poses to the environment, and environmentally sustainable agricultural practices
- create a compensation fund to enable the Ukrainian Environment Ministry to restore any potential damage to the environment.

Until the time that legislation is in place to regulate GE activities, the Ukrainian government should:

- revoke all import permits for GE seeds and permits for field trials of GE plants
- Extend the moratorium on field trials of *Bt* potatoes to all GE crops

The case does however, point to the need for clear, legally binding international rules to control all aspects of the movements and dissemination of genetically modified organisms into the environment. Governments from around the world are in the process of negotiating an international Biosafety Protocol to the Convention on Biological Diversity. Greenpeace believes that the type of problems raised in the Ukrainian *Bt* potato case need to be addressed by all governments through rules which protect biodiversity and human health from the risks of releasing genetically engineered organisms into the environment.

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Annex I: Potential Negative Impacts of Deliberate Releases of the Bt Potato in Ukraine

a) Environmental threats from Bt crops

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 an 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 Monsanto's potatoes, 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.

Studies have shown that the *Bt* toxin can bind with soil particles and clay particles in particular (Tapp & Stotzky, 1995 a, Crecchio & Stotzky, 1998), persist in soils for between 5-20 days (Palm et al, 1994) and retain toxicity to the larvae of species such as the tobacco hornworm (*Maduca sexta*) and the Colorado potato beetle (*Lepinotarsa decemlineata*) (Tapp & Stotzky 1995 b). At times insecticidal activity of *Bt* was increased by adsorption and binding to clays and the potential for accumulation in soils exists (Tapp & Stotzky 1995 b). It is known that Novartis transgenic *Bt* maize is harmful to Collembola. Collembola (springtail) is a flightless insect, which feeds on fungi and debris in soil, and which is generally considered as a beneficial insect (EPA MRID NO 434635).

A recently published study (Hilbeck et al., 1998) shows that transgenic *Bt* maize may poison beneficial predatory species reared on transgenic maize-fed herbivores such as the European corn borer and a bollworm. With both herbivores - even the bollworm larvae which did not die from the transgenic *Bt* maize - there was an increased mortality of the predatory larvae from the green lacewing. During their entire immature development, 62 percent of the lacewing larvae died when raised on transgenic *Bt* maize-fed prey, whereas only 37 percent of the lacewing larvae died that were fed with *Bt*-free prey.

This also raises major concerns about the impacts of transgenic *Bt* crops on non-target species. One major concern of the negative effects of *Bt* toxin on non-target species is the potential for species further up the food chain, such as birds, to have 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 together with the lady bird are the most important beneficial predatory species to control pest insects.

b) Insect resistance to Bt threatens organic farming

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 (see Whalon and Ferro, 1998).

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 (Cannon, 1996, p564). 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.

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.

In a 1992 lab study, eight species were analysed for resistance to *Bt* toxins. At least one of the tested species, the diamondback moth (*Plutella xylostella*), developed a high level of resistance in the field as a result of *Bt* use (McGaughey and Whalon, 1992).

A laboratory study showed that *Bt*-resistant European corn borers (ECBs) can be easily found, and that the resistance in a population of ECB increases rapidly with exposure to *Bt* - up to 35-fold increases in only 3 generations (Huang et al., 1997).

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 (Whalon et al. 1993). This selected CPB strain could survive for two generations on the transgenic *Bt* plants (see Whalon and Ferro, 1998).

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 (McGaughey and Whalon, 1992). There is also a high risk that the Colorado potato beetle would develop cross-resistance against other *Bt* toxins (Whalon and Norris, 1997).

c) build up of antibiotic resistance poses threats to human and animal health

Several GE crops such as Monsanto's GE *Bt* potato or cotton contain antibiotic resistance genes. Monsanto's GE *Bt* potato contains a marker gene which will confer resistance to the antibiotic Kanamycin. The concern is that antibiotic resistance genes may be transferred to disease-causing germs which would lead to resistance to life-saving antibiotics, and harmful disease-causing germs could no longer be controlled through the use of common antibiotics.

Clinical antibiotic therapy has become increasingly difficult because of a surge in the number of pathogens now carrying resistance genes. Such resistance includes resistance to kanamycin (Weltman et al. 1994, Gomez et al. 1991, Haglund et al. 1991, Dabernat 1987). Public health is approaching a major crisis in both developed and developing countries with the appearance of at least 30 new infectious diseases, together with the re-emergence of diseases already considered eradicated in the past 25 years (WHO 1996). Any activities which may encourage the increase in the spread of resistance to antibiotics must clearly be halted. The British Medical Association (BMA) believes that the use of antibiotic resistant marker genes in GE foodstuffs is a completely unacceptable risk, however slight, to human health ⁸⁹.

There is evidence that DNA can survive in animal guts and can even be traced in somatic cells (Schubbert et al., 1997, Schubbert et al., 1994). Scientific findings by Hoffman et al. (1994) show that the fungus *Aspergillus niger* incorporated the antibiotic resistance gene in all co-culture experiments with transgenic plants carrying an antibiotic resistance gene. Recent scientific assessments highlight the major risk of the

⁸⁹BRITISH MEDICAL ASSOCIATION, Board of Science and Education, The Impact of Genetic Modification on Agriculture, Food and Health, An Interim Statement, May 1999

transfer of antibiotic resistance gene from transgenic plants to potentially harmful soil bacteria or bacteria in the digestive tract (Courvalin, 1998). The transfer of DNA to soil bacteria through the decomposition of the plant is facilitated by the stability of DNA in soil, and the ability of some bacteria to spontaneously and efficiently incorporate DNA. These micro-organisms, Acinetobacter, are among those that are responsible for infections in immuno - compromised people whose numbers are increasing. In practical terms, this affects people with AIDS, leukaemia, elderly people, people who have had transplants, and those who have been treated with chemotherapy for cancer (Courvalin, 1998).

Kanamycin is a member of the aminoglycoside antibiotics family. These include Neomycin, Streptomycin, Gentamycin, Tobramycin and Amikacin. Kanamycin can be used for the treatment of infections in various parts of the body when penicillin or other less toxic drugs cannot be used because of resistant infectious agents. For example, bone, respiratory tract, skin, soft-tissue and abdominal infections and urinary tract infections can be treated with Kanamycin (Lokhvitskii et al. 1992, Aleksandrova et al. 1991, Pfau 1991, Tsukamura et al. 1988, Edson et al. 1987, Yelon et al. 1996, Hernandez et al. 1996, Kutushev et al. 1995, Tsubokawa et al. 1994, Riley 1997). It is also used to sterilise or destroy the bacteria in the bowel before intestinal surgery.

In addition, there is the risk of developing cross resistance (Onaolapo 1994). Only one mutation in the resistance gene may cause resistance to some or all members of the antibiotics family, making them useless for therapy. For instance it was found that *B. subtilis*, marked by a Kanamycin resistance gene, showed cross resistance to the aminoglycoside antibiotics Amikacin and Tobramycin, which belong to the new generation of aminoglycoside antibiotics (Smirnov et al. 1994).

Switzerland Rejects Release of GE Potato with Kanamycin Resistance Genes

In April 1999, the Swiss Agency for Environment, Forests and Landscape rejected an application for an experimental field trial to be conducted in Switzerland with a GE potato (not Monsanto's), which contained the kanamycin antibiotic resistance gene. The reason for the decision to reject the application was the presence of the kanamycin resistance gene because the Agency believes that the scientific and technical standard for using antibiotic resistance marker genes is no longer valid. The main concern in rejecting a permit for a field trial of the GE fungus-resistant potato was the risk of the potential spread of the antibiotic resistance gene⁹⁰.

The Dangers of Composting GE plants with Kanamycin resistance gene markers

A paper published in 1998 reveals the possibilities of horizontal gene transfer between transgenic sugar beet, containing the Kanamycin resistance gene and the soil bacteria, Acinetobacter.

The laboratory experiment showed that the soil bacteria Acinetobacter has the "natural" ability to take up and integrate transgenic DNA from plant based on (the so called) homologous recombination. The Acinetobacter bacteria used in the experiment was sensitive to the antibiotic Kanamycin, as the bacteria contained an incomplete (only part of the) Kanamycin resistance gene (nptII gene). The entire kanamycin resistance gene was present on the linear DNA and in the transgenic sugar beet.

The bacteria was able to take up and integrate isolated "linear" DNA, as well DNA from a leaf "homogenates" of transgenic sugar beet. The initially incomplete kanamycin resistance gene in the bacteria was restored, which means that the entire and functional kanamycin resistance gene was present in the bacteria after the integration of the foreign DNA (Gebhard & Smalla, 1998).

⁹⁰ Office fédéral de l'environnement, des forêts et du paysage, N° de référence B98002, Décision du 16 avril 1999 concernant la demande de la Station fédérale de recherches en production végétale de Changins (RAC), 1260 Nyon, du 9 décembre 1998, visant à obtenir l'autorisation d'effectuer une dissémination expérimentale de pommes de terre génétiquement modifiées à Duillier/VD et Bullet/VD

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Annex II: Appendix to Storage Contract of 29.10.98

Seeds of NewLeaf potatoes supplied to Shevchenko Collective farm for Storage, 1998 (Property of Monsanto Ukraine)

Variety Origin	Superior in kilograms	Atlantic in kilograms	Russet Burbank in kilograms	Non-standard in kilograms	Total in kg
1. Baglie Collective Farm Seed imported in 1998	24810	26980	30890	920	83600
2. Borodyanka Breeding Station Seed imported in 1997	32900	13970	31630	1320	79820
Seed imported in 1998	27090	16450	8500		52040
3. Potato Institute of the Ukrainian Agrarian Academy Seed imported in 1998	1200	1150	1400		3750
4. Svitanok Collective Farm, Rovno Oblast Seed imported in 1998	45450	33700	67450		146600
5. "Rosiya" Collective Farm, Kiev Oblast Seed imported in 1998	49070	75690	103320		228080
6. Lubishyvska Breeding Station, Volyn Oblast Seed imported in 1998	12300	9100	10500		31900
7. Kievska farm, Kiev Oblast Seed imported in 1998	4080	4150	4750		12980
8. 40-richya "Zovnia" Collective Farm Seed imported in 1997	8000		34000		
Seed imported in 1998	6600	4300	9800		62700
9. Shevchenko Collective Farm, Cherkasy Oblast Seed imported in 1997	84500	108300	107600	8448	
Seed imported in 1998	112120	141170		36500	598638
Total seed potatoes stored at Shevchenko Collective					1300108

The total amount of seed potatoes stored 1300108 kgs

Signed

For Monsanto Ukraine

For Shevchenko Collective Farm