

REPORT FOR THE CHARDON LL HEARING

CONCLUDING COMMENTS

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1. Introduction

The preceding four reports have focused on various aspects of the undesirability of introducing Chardon LL (or any other genetically engineered crop) into commercial agriculture. In this concluding report, we present additional support for that position.

2. Dangers of the applied herbicide

The herbicide 'Liberty' required for Chardon LL is also manufactured by Aventis. It is a non-selective herbicide, designed to kill all plants. However, 'Recent reports have shown that it is not so effective as first thought, with serious weeds such as thistles and couch grass not being killed off. This has led to other herbicides being used. [1]' '[A] study in Canada showed that some disease-causing fungi are highly resistant to glufosinate, [2] whilst important fungi that protect plants from disease are highly susceptible to glufosinate. [3]' [4]

[1] Pesticide News, Sept. 1997, No 27, Gaps in Basta's effectiveness?.

[2] Ahmad, I., J. Bisset and D. Malloch, 1995, *Pest. Biochem. Physiol.*, vol. 53, pp. 49-59, Effect of phosphinothricin on nitrogen metabolism of *Trichoderma* species and its implications for their control of phytopathogenic fungi.

[3] Ahmad, I. and D. Malloch, 1995, *Agric. Ecosys. Environ.*, vol. 54, pp. 165-174, Interaction of soil microflora with the bioherbicide phosphinothricin.

[4] Friends of the Earth Briefing Sheet by Emily Diamand, Nov. 1997, Genetically Engineered Oilseed Rape.

Concerned at the prospect of this herbicide coming into widespread use on GM crops in Britain, Friends of the Earth sought the evidence for its safety from the Government. However, 'Biotech company Aventis has appeared at the High Court in London to stop the UK Government forcing it to disclose the risks of genetically modified crop trials. UK ministers want the company to reveal the health and environmental impacts of a chemical used in its experimental crop growing programme. However, the company is seeking a judicial review. ... on the grounds of commercial confidentiality.' (BBC News Online, 7 Sept. 2001) This response provokes the question: 'If the herbicide is indeed safe, why does its manufacturer take legal action against the government to prevent the public from seeing the proof of its safety?'

The answer may be found in the following extract from an article by Professor Joe Cummins. There is 'clear evidence that the herbicide caused birth defects in experimental animals. ... The chemical acts by causing premature cell death in the immature brain by a process called apoptosis. It also prevents development of glutamate channels in the brain, thus disrupting cellular communication. The birth defects observed in animals included brain defects leading to behavioural changes. Cleft lip and skeletal defects or kidney and urethra injury were observed in treated new-born. The herbicide also caused miscarriage and reduced conception in treated mothers. ... The human birth defects cannot be studied using the science epidemiology because the crops are not labelled and the relationship between eating the crops and birth defects cannot be established. ... The government agencies

regulating genetic engineering appear to be collaborating with the chemical companies to protect them from the liability flowing from the injury caused by their products.’ [1] Other reports show that ‘glufosinate has toxic effects on humans and animals,[2] particularly affecting the nervous system. The US Environmental Protection Agency also states that it is toxic at very low concentrations to many aquatic and estuarine invertebrates. [3]’ [4]

- [1] Prof Joe Cummins of the University of Western Ontario, in an article sent in April 2000 to the Institute of Science in Society (ISIS), citing the following references: Fujii, T and T. Ohata, 1994, *J. Toxicol Sci.*, 19, 328; EPA/OTS : DOC #88-920003678; Watanabe, T. and T. Iwase, 1996, *Terat. Carcinog. Mutagen.*, 287, 1996; Watanabe, T., 1997, *Neurosci. Lett.*, 222, 17; Watanabe, T., 1995, *Teratology*, 4, 25B.
- [2] Cox, C. 1996, *J. of Pesticide Reform*, vol.16 (4), pp.15-19, Herbicide Factsheet: Glufosinate.
- [3] U.S. EPA (Environmental Protection Agency), 1990, HOE 039866 Technical. Data Evaluation Record, cited in Cox, 1996, *op cit.*, Estuarine invertebrate toxicity test; U.S. EPA, 1986, Data Evaluation Record, cited in Cox, 1996, *op. cit.*, Aquatic invertebrate acute toxicity. Soluble concentrate 200g/l.
- [4] Friends of the Earth Briefing Sheet by Emily Diamand, Genetically Engineered Oilseed Rape, Nov. 1997.

3. Design of farm-scale trials

The crop trials were not designed to investigate the effects on the environment of the engineered genes themselves, or even directly to discover the effects of the chemical regimes required to grow GM crops. The trials were designed only to compare the effects, on a limited number of species of wildlife (not even including mammals), of the chemical system used on the GM plants with that used on the conventional crop. [1] Farm-scale evaluations do not even require that the GM plant should be compared with its parent non-GM variety; they require only that ‘equivalent’ varieties be planted. [2] Any differences between the varieties introduce extra and unnecessary variables into the experiment. These are only some of the design flaws of the trials. The Co-operative Wholesale Society, Britain’s largest farming organisation, pulled out of the trials in 1999 on the grounds that they were flawed [3].

- [1] Department of the Environment, Food and Rural Affairs (DEFRA), www.defra.gov.uk/environment/fse/background/science/index.htm, on Farm-Scale Evaluations.
- [2] *ibid.*
- [3] *GM-Free*, 1999, vol. 1, no. 3, p. 18.

I have myself seen the trial of oilseed rape at Munloch, Scotland, in February 2002. The accompanying photographs were taken at this site. They are relevant to Chardon LL because all trials are designed according to the same principles. In the Munloch trial, different varieties of oilseed rape were indeed used. (Julian Little of Aventis Cropscience, week ending 31 Dec. 2001, *Northern Farmer*)



a. Large-scale view showing the GM crop at left, non-GM crop at right (photographed by Nigel Mullen)



Small-scale views of (top) non-GM crop and (bottom) GM crop; both were photographed from the same distance to camera (photographed by Eva Novotny in February 2002)



Close-up views of (top) non-GM crop and (bottom) GM crop; both were photographed from the same distance to the camera (photographed by Eva Novotny in February 2002)



Small-scale view of the dividing path between the crops, with the GM crop at left and the non-GM crop at right (photographed by Eva Novotny in February 2002)

In the trial displayed here, there are clear differences between the two sides of the plot. Possibly the two crops would look similar if both were receiving the same chemical regime, in which case the use of the required herbicide (Liberty) on the GM crop has caused significant stunting of the plants; but the effect of genetic modification on the plants themselves is not a feature officially being observed in these trials. The sizes and colours of the GM and non-GM plants are not the same, and the ground cover is not the same. Also, the textures of the leaves are different, as is apparent when the leaves are rubbed with the fingers. Different weeds are growing in the two areas, although this may be due to the difference in herbicides used in the two regimes. To an insect, earthworm or other creature, any or all of these differences may be significant. It is difficult to understand how it might be possible to discover the effects on wildlife that are due solely to the difference in the management regime, when the crops themselves are so unlike.

4. Testing of the safety of GM crops

The only feeding tests made in support of Aventis's application have been made on rats and chickens, both of which have digestive systems very different from that of cattle; and the experiments themselves were seriously flawed. Aventis is now conducting a feeding test on cattle, at the instigation of the reports heard at this Hearing that animals are averse to eating GM crops. Careful note should be taken of the warning that 'Research in animal feeding trials has indicated that health effects

often only reveal themselves over long time spans, sometimes even over successive generations.’ (Soil Association, *Organic farming, food quality and human health*, 2001, p. 3, col. 2a) A short-term cattle-feeding study, even if no adverse effects are found, would be inadequate to rule out the possibility of complications appearing in future generations of Chardon-fed cattle.

Only two animal-feeding tests were offered by Aventis, both of which are irrelevant for the intended consumers. The tests were both poorly designed and poorly analysed. Yet Aventis has presumably put into its application for acceptance of Chardon LL by the EU the best possible data to prove the safety of its crop. This very low standard of testing is typical of regulatory standards in the UK, the EU and the US. We must hope that the current tests on cattle, which have been forced upon Aventis by the disclosures in this Hearing, are being conducted according to recognised scientific standards.

5. Poor control of genetic insertion

Genetic engineering is still so poorly understood by its practitioners that they are unaware of what is actually being inserted in the process. Roundup Ready soya beans were amongst the first crops to be grown commercially; but it is only in the last few years, when independent scientists have examined the inserted components, that this ignorance has been exposed:

‘New doubt is cast today on Monsanto’s Genetically Modified soya, as research is for the first time published in a peer-reviewed science journal, showing further unknown ‘gene fragments’ in the soya

‘This is a second embarrassing discovery of inaccuracy in Monsanto’s original application for EU approval of the soya. Last year, the same group of scientists found that Monsanto’s genetic mapping of the soya was wrong, when they discovered repeated fragments of the inserted genes. The findings of today’s research paper are more significant, since ... this time there is an extra unidentifiable genetic sequence, which could be expressed in a new protein or exert other functions, leading to unknown and unpredictable effects.’ (Greenpeace press release, 15 August 2001, based on a paper by P. Windels, I. Taverniers, A. Depicker, E. Van Bockstaele and M. De Loose, 2001, *European Food Research and Technology*, vol. 213, issue 2, pp.107-112, ‘Characterisation of the Roundup Ready soybean insert’)

6. Lack of published evidence of safety

‘The biotech industry claims that genetically engineered foods are among the most tested foods ever. ... Monsanto says “ ... Our food safety team conducts exhaustive safety studies, which are published in peer-reviewed, scientific journals.”

However, Greenpeace’s search of the scientific literature found ‘just three health studies in peer-reviewed journals. None of these met scientists’ recommendations that novel crop plants in the diet be tested for 90 days nor did they meet the FDA’s [US Food and Drug Administration’s] own testing requirements for food additives

that would require, in some cases, up to 2 years multiple feeding studies. ... Regulations still do not require tests for toxicity to the immune system, developmental toxicity, or effects on the nervous system despite the advice of scientists.’ (Greenpeace, Background Information 01/01, at <http://www.greenpeaceusa.org>)

‘The media has been saturated with statements from scientific bodies to assure us that GM foods have been “rigourously tested” and are “totally safe”.’ ...

‘I e-mailed all the experts – the biotech companies, government regulatory bodies in the UK and USA and the leading academics promoting the genetic engineering of food and crops – all of whom would have the facts at their fingertips and be keen to share them.’ ...

‘Despite receiving many ... responses, the ... data never did appear – and respondents defensively explained that such research would be “unnecessary”, “excessive” or “impossible” and, indeed, that requests for such research were “hysterical”.’ (Robert Vint, ‘The Mystery of the Missing Research on GM Foods’, Genetic Food Alert at www.geneticfoodalert.org.uk, 27 July 2000))

7. Fraud in testing and inadequate regulation

The forage maize Chardon LL is intended by the Government to be the first GM crop to be included on the National Seed List, even though field trials have not yet been completed. Moreover, some data from the 1999 trials were found to have been deliberately falsified: a crucial parameter, the amount of dry matter, had been reported higher than the data merited in order to meet the protocol. The Cabinet Office merely discounted the data and said it had ‘no bearing on the proposed list[ing] of Chardon LL’. (Andrew Barnett, *The Observer*, 16 April 2000, from internal minutes of the Ministry of Agriculture) Thus the Government threw away the reported measurements that indicated the maize lacked Value for Use.

Fears that this incident may not be an isolated case of fraud are raised by the following extracts:

‘One in three UK scientists working in government or recently privatized laboratories has been asked to alter research findings, according to a survey by a trade union that represents government-employed researchers.

‘Thirty per cent of respondents had been asked to modify their conclusions or advice. Reasons given were: to suit the customer’s preferred outcome (17 per cent); to obtain further contracts (10 per cent); and to prevent publication (3 per cent).

‘The Institute of Professionals, Managers and Specialists (IPMS), which represents scientists in government departments, research councils and private companies, surveyed over 500 respondents from a range of employers.’ (*Nature*, vol. 403. p. 689, 17 Feb. 2000)

‘All policy makers must be vigilant to the possibility of research data being manipulated by corporate bodies and of scientific colleagues being seduced by the material charms of industry. Trust is no defence against an aggressively deceptive corporate sector.’ (*The Lancet*, April 2000)

Apart from the issue of possible fraud, the regulation of genetically engineered crops is extremely lax. It is noteworthy that one official scientific body has at last recognised the inadequacy of present regulations. 'The US National Academy of Sciences (NAS) released a report at the end of February criticizing the US Department of Agriculture (USDA) for inadequately protecting the environment from the risks of GM plants. Specifically, USDA review processes lack scientific justification and are not applied uniformly. The NAS found that assessment of environmental risks, particularly from plants genetically engineered to be insect resistant, was "generally superficial", and the process "hampers external review and transparency" by keeping environmental assessments confidential in the name of trade secrets. The report calls on the USDA to make its review process "significantly more transparent and rigorous", to seek evaluation of its findings from outside scientific experts and to solicit greater input from the public.'

The British public could heartily echo every word. (Quotation from *Greenpeace Business*, issue 66, April/May 2002)

8. Wider consequences of growing GM crops

8.1 Biodiversity

Wildlife recognises the superiority of organic farms over farms that rely on chemicals. These benefits to the countryside are now of much concern to the government. A summary of 23 research projects shows conclusively that organic farming supports much greater biodiversity than does conventional farming. Because GM crops are also dependent on chemicals or on transgenes that cause toxicity, similar findings as for conventionally grown crops can be expected in a comparison of organic and GM crops. Evidence collected over the past 13 years and compiled by the Soil Association concludes that organic farms have 5 times more wild plants, including rare species not found on conventional farms; and they have nearly twice as many birds in-field as conventional farms, including 36 more species of birds. They also have up to 5 times as many spiders and 3 times as many non-pest butterflies; and 1.6 times more insects and invertebrates, which feed birds. There is, however, one species that is more abundant on conventional farms: that species is aphids. When conventional farms convert to organic methods, the wildlife gradually returns. (Report by the Soil Association, *The Biodiversity Benefits of Organic Farming*, May 2000)

8.2 Greenhouse gases and soil

The consequences of interfering with the natural cycle of soil functions extend well beyond agriculture. 'Organisms present in the soil provide two increasingly important environmental protection roles. Firstly, they have a critically important function in decomposing pollutants of water prior to entry into watercourses. In this capacity they are also important in removing any plant toxic compounds that may come into contact with the soil prior to having a detrimental effect on plant growth. Secondly, they serve to lock up carbon in the bank of humus within the soil (and the reserves in the soil organisms). This process known as carbon sequestration is important in preventing the escape of the greenhouse gas carbon dioxide into the atmosphere.'

Thus, if the possible detrimental alteration of soil organisms by transfer to them of genetically engineered genes actually occurs, water purity and plant growth may be compromised and global warming may be accelerated.

9. Who benefits from GM crops?

If GM crops are allowed to be grown in this country, some of the negative consequences may be:

- likely increase in the use of chemicals, as demonstrated by experience on farms in the United States;
- likelihood of lower yields and occasional disastrous harvests of some crops, as is occurring in many places around the world;
- ever more farmers brought to ruin by liability clauses in their contracts with GM seed manufacturers, as is already happening in the United States and Canada;
- continuing need for use of chemicals and drugs to keep animals in moderate health;
- continuing moderate standard of human health, with need for high expenditure on the National Health Service;
- continuing decline in soil fertility, already in progress on conventional farms, whether or not the warnings about destruction or harmful alteration of native soil organisms prove to be justified;
- increasing loss of choice to farmers and consumers between organic and genetically engineered varieties (which is already occurring, as some farmers have found they cannot find conventional seeds) and between different varieties of a given type of crop.

Only the manufacturers of GM seeds and of their accompanying chemicals will benefit, enjoying huge profits during the time that GM crops continue to be grown. During that time, the manufacturers will have also have engineered a stranglehold upon the food chain; this, indeed, is their overtly stated aim: 'In 1996, Robert Fraley, then the President of Monsanto's Ceregen Division, explained the company's strategy of taking over scores of plant-breeding institutes and smaller biotechnology firms to the American magazine *Farm Journal*. 'What you are seeing', he boasted, 'is not just a consolidation of seed companies, it's really a consolidation of the entire food chain.' (George Monbiot, 2000, *Captive State: the Corporate Takeover of Britain*, Macmillan, London, p. 253, quoting from *Farm Journal*, cited by the Rural Advancement Fund International, September 1996: *The Life Industry*, <http://rafi.org/web/>)

Accompanying the increase in the wealth of corporations will be an increase in their power and influence over Government policy, which is already excessive.

10. General summary

GM crops in the United States and around the world have had many failures, even disasters. The chemicals and monocultural farming for which they are intended

produce results that are in many cases inferior to those produced by ecological agriculture. The chemicals are harmful to soil ecology and to animals and human beings. The superiority of health in plants, animals and human beings resulting from organic farming has been proved. If for no other reason than to decrease dramatically the funds needed by the National Health Service, the Government would be well justified in converting UK agriculture to organic methods. GM crops will, by the Government's own admission, gradually pollinate and pollute conventionally grown and organically grown varieties, leaving British consumers without the choice the Government has promised. With their unreliable performance and the risks they pose for the environment and for health, there is little justification for allowing such crops to be grown in this country.