GM trials return to the UK

GM potatoes are being trialled at a site in Cambridgeshire, with more planned. Eva Novotny explains why we should be on our guard.

The Farm-Scale Evaluations of four GM crops concluded in 2002 with the only successful contender – GM maize – failing to make commercial reality, and the UK enjoyed a respite from the looming possibility of commercial GM crops.

But the GM industry has not gone away. The German company BASF, which has entered the field as BASF Plant Science GmbH, is planning trials of GM potatoes engineered to be resistant to late blight, a serious disease resulting in large losses when it strikes. Late blight is caused by the pathogenic fungus *Phytophthera infestans*[1]. The principal inserted gene, which produces the disease resistance, comes from a wild Mexican relative of the potato, *Solanum bulbocastanum*. The three varieties of potatoes in the trials give rise to potentially 334 potato lines; BASF expects to choose some 80 – 100 of these for trial and, over several years, to whittle them down to a few with desirable characteristics, for approval and ultimately for the table[2].

BASF is already trialling these and other potato varieties in Sweden, and possibly Germany. Attempts to run trials in The Netherlands and the Irish Republic failed to overcome various hurdles and so BASF decided to go elsewhere –"elsewhere" being England. BASF has received approval for trials on land at the National Institute of Agricultural Botany (NIAB) in Cambridge and at Hedon, near Hull in Yorkshire. Planting has already taken place on the Cambridge site, where the trials began in April this year and are due to run for five seasons to 2011.

Given that there are already 24 non-GM varieties of potato that are resistant to late blight, the need for GM alternatives is hard to justify. Not only that, the rapid evolution of the blight pathogens compared with the long development times for new GM varieties throws the marketable lifetime of the final product into question.

Hazards to the environment

There is concern, too, for the environment, not least amongst gardeners and bee-keepers in the neighbourhood of the trials. The Yorkshire trials mentioned above have been postponed until at least next year; the farmer who was to host them is doubtful because local bee-keepers accustomed to bringing their hives to the nearby borage farms are concerned that their honey might become contaminated with GM pollen.

When the GM potato plants on the NIAB land come into flower, the flower heads will not be removed. Although this would be easy to do, ACRE (the government's Advisory Committee on Releases to the Environment) has not advised NIAB to do so and no funds have been provided; therefore NIAB will not do it[3]. Neither, by a similar logic, will the flow of pollen from the GM plants be monitored. This throws into question NIAB's claims that it is gathering scientific information to help make evidence-based decisions about GM crops and that it is concerned for the environment.

One study has shown that 31% of potato plants growing more than a kilometre away from another variety had been cross-pollinated by the other variety[4]. Yet NIAB itself is conducting other potato trials only 500m away from the GM ones and there are allotments also within 500m[5]. While the edible tubers of this year's potato crops would not be affected by cross-pollination with the GM lines, their seeds would, and could produce a GM variety in the following season.

Spread of pollen is not the only problem. Tubers, rather than seeds, are the usual means of propagation. These could be carried from the site by animals and deposited elsewhere to grow into more GM potatoes. The metre-high electric fence surrounding the NIAB trials may deter activists but might fail to keep out foraging animals.

The trials also risk harming soil organisms and micro-organisms essential for breaking down organic matter into smaller products, which become available to plants as nutrients. If these organisms are transformed by GM genes leaking through the roots into the soil (as has been observed)[6], soil fertility could be degraded. This degradation could spread as the organisms carrying the GM genes multiply[7]. The trials, however, will ignore such a possibility; NIAB has not been instructed to monitor for soil changes although the need to do so is well recognised.

How safe is genetic engineering?

Genetic engineering is still in its infancy. It is based on the principle that one gene controls one trait; but in fact not only can one gene participate in controlling more than one attribute, several genes may be needed to determine a particular attribute. Moreover, the functioning of a gene depends on its position within the DNA, something the geneticists are altogether unable to control. Many further complications arise[8].

A geneticist has commented on these trials as follows[9]: *"The risk assessment has been granted using the assumption that these are normal potatoes with a few predictable genes added. A characteristic feature of transgenic crops is that they do not behave in such a predictable fashion. The reason BASF is testing so many transgenic lines is precisely because transgenics are not predictable ... the documents show an astonishing reliance on assumption-based reasoning."*

The effects on the humans for whose dinner tables these potatoes are ultimately intended are uncertain. Allergenicity and toxicity are potential problems with GM plants. BASF says that animal feeding trials would be held before their potatoes are marketed – but not before they are trialled. Such tests could prove harmful to the organs, immune systems and/or the progeny of the animals[10]. In that case, the years of trials will have been useless. A worrying aspect of corporate behaviour is that unfavourable outcomes are sometimes hidden away behind 'commercial confidentiality'. The temptation must be strong when so much money and time have been invested in a product.

Interestingly, according to many anecdotes, wild animals and farm animals are reluctant to eat GM crops[11]. Polls show that the majority of consumers in the UK and Europe are also inclined to reject GM foods. There is much local opposition to the trials in both Cambridge and Hedon. The British Potato Council is opposed to the trials. If consumers' common sense about this premature technology prevails, perhaps the GM technology wave, which the UK government is so keen for us to catch, will eventually reach shallow waters, break and be dissipated.

Dr Eva Novotny is a former SGR committee member and has authored numerous SGR outputs on GM issues.

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11. See note 8. Jeffrey Smith includes such anecdotes between the chapters of his book. See also Novotny, E (2002). A summary of Chardon LL Report I: Non-suitability of Genetically Engineered Feed for Animals. http://www.sgr.org.uk/GenEng/animalfeel_all.pdf

Patents and conflicts of interest: are scientists acting ethically?

Does the patent system encourage inappropriate commercial influence over biotechnology research? Helen Wallace argues that it does, and invites us to take part in an investigation to uncover and address the reality.

At its inception, the field of biotechnology proved a challenging development for the patent system. Patents allow applicants to claim a monopoly on inventions for 20 years or more. The idea is to reward the inventor – or whoever has invested financially in the research – by preventing competition, so that they can charge higher prices for the products of their research. In return, inventors must disclose information about their invention in the patent application.

But biotechnology exploits existing natural phenomena or entities, and discoveries about nature were not originally considered patentable. Patents were intended for novel inventions that had commercial uses. However, the strong commercial interest in biotechnology has since forced the scope of patentability to widen so that gene sequences, micro-organisms, cells, and plants and animals produced through genetic modification are now the routine subject matter of patent applications.

Such patents are controversial in principle because they allow discoveries about nature to be tied up in a restrictive commercial contract. They have also been criticised on the grounds that they may restrict access to useful products and research tools (harming both health and science) and, more broadly, because they reward only certain types of research and knowledge and encourage 'biopiracy' (the commercial appropriation of indigenous knowledge).

There is another issue – which is whether patents create conflicts of interest, for example by encouraging the scientists that claim them to hype the benefits of their research for greater reward. There is evidence to suggest that this may indeed occur.
GeneWatch UK's former director, Sue Mayer, conducted a survey of papers related to molecular biology and genetics that were published in the journal Nature over a six-month period between January and June 2005. Of the 79 papers considered, four had declared that certain authors had competing financial interests. Seven papers in which no financial interests were declared had authors whose names were also on patent applications that were based on the research in the paper or were closely related to it. Another paper had two authors with connections to biotechnology companies that were not disclosed. So, two-thirds of the papers in which the author might be considered to have competing financial interests did not disclose them[1].

Depending on the policy adopted by their institution, scientists who are named as inventors on patent applications may or may not benefit directly from any royalties. Either way, they may also benefit indirectly from being named on a patent application, for example through career advancement or further funding for research. Failure to disclose such interests may undermine the authority that science can claim for independence and impartiality.

In two of the cases in Sue Mayer's study, the published papers were accompanied by press releases claiming that the research would lead to new treatments and other applications.

Hype about biotechnology has been widely criticised for misleading the public and distorting research priorities. Although the media usually gets the blame for distorting science, a 2002 study of press releases from medical journals found that they did not routinely highlight the limitations of the studies publicised, nor the role of industry funding, and that data were often presented using formats that may exaggerate the perceived importance of findings[2].

It is time for scientists and journal publishers to take the issue of conflicts of interest more seriously. Self-policing is clearly not working; sanctions may be needed. One potentially effective sanction that the US Center for Science in the Public Interest has proposed is for journals to refuse publication for a certain period of the work of any authors failing to declare their interests in submitted papers[3].

In addition, we need a much broader debate about how science and research priorities are distorted by commercial interests including, but not limited to, patenting.

GeneWatch UK is currently conducting a major study on how corporations influence research priorities in the biosciences, in Britain and via the European Framework Programme. We are interested in how and why some research questions in health and agriculture are funded while others – often more important ones – are not.

Please contact me at <helen.wallace@genewatch.org> if you have useful examples or information about how the research funding system works. We hope to produce a report that helps SGR members and others to challenge and ultimately to change how research funding priorities are decided, and to encourage decision making that is more democratic and that acts in the interests of public health and sustainable agriculture.

Dr Helen Wallace is Director of GeneWatch UK.

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