

## **GM FARM SCALE TRIALS**

**October 2003**

In spring 1999, following widespread calls for a halt to the development of genetically modified (GM) crops in the UK, the Government launched a four-year programme of farm scale trials. The trials were designed primarily to answer criticisms from English Nature and others concerned about the environmental impact of GM crops, particularly the secondary effects on biodiversity. According to the Government, the farm scale trials are "designed to examine whether there are any differences in the diversity and abundance of farmland wildlife associated with the farmers' management of GM herbicide tolerant crops as compared with equivalent non-GM crops."<sup>1</sup> The Government believes that GM crops "do not themselves present any direct threat to the environment"<sup>2</sup> and so the GM farm scale trials were not designed to consider the direct impact of GM crops on the environment, such as the movement of genes. They were designed only to compare the impact of two different herbicide regimes, one used in the management of GM crops and the other in the management of conventional crops, on farmland wildlife.

### **What crops were tested?**

Farm scale trials were conducted with five GM crops, all of which have been modified to be tolerant to broad-spectrum herbicides. The technology allows the application of broad-spectrum herbicide that destroys all plants except the GM crop designed to resist it. Therefore farmers are able to spray GM crops with the relevant herbicide to remove weeds, but leaving the GM crop unharmed. Those tested were:

- Spring oilseed rape tolerant to the herbicide glufosinate ammonium (known commercially as Liberty) – developed by Bayer.
- Winter oilseed rape tolerant to glufosinate ammonium – developed by Bayer.
- Fodder maize tolerant to glufosinate ammonium – developed by Bayer.
- Sugar beet resistant to glyphosate (known commercially as Roundup) - developed by Monsanto.
- Fodder beet resistant to glyphosate – developed by Monsanto.

### **How were the trials organised?**

The trials were a joint project between the Government and the GM industry body SCIMAC (Supply Chain Initiative on Modified Agricultural Crops) which is comprised of biotech and seed companies. The trials ran for four years from 1999-2003 and cost the taxpayer over £5.5m.

The research contract to monitor the trials was awarded to a consortium led by the Institute of Terrestrial Ecology. A Scientific Steering Committee was appointed by the Government to oversee the research.

### **Where and when did the GM farm scale trials take place?**

Farm trials took place at locations throughout England, Scotland and Wales between 1999 and 2003 (though trials in Wales were stopped in May 2001). In 1999 only 3 farm scale trials were planted with winter sown oilseed rape. In 2000 the Government intended to run up to 80 spring sown trials for oilseed rape, maize and sugar beet, but despite financial incentives only 49 trials were actually planted, of which one failed to grow and 10 were significantly damaged by activists. Later that year 27 winter sown oilseed rape trials were planted. In 2001 31 spring sown oilseed rape, 25 maize and 26 sugar beet trials were planted, followed by a further 30 of winter sown oilseed rape. 2002 saw the last round of trial plantings: spring sown GM crops were grown at 74 locations - 25 oilseed rape, 33 maize and 16 sugar beet. Following this, winter sown oilseed rape was planted at a further 18 sites.

In all there have been 283 separate GM plantings during the farm scale trial programme - 3 in 1999, 76 in 2000, 112 in 2001 and 92 in 2002. Of these 72 were for spring sown oilseed rape, 70 for maize, 66 for sugar beet and 57 for winter sown oilseed rape.<sup>3</sup>

### **What were the trials meant to discover?**

The farm scale trials were intended to address concerns about the potential impact of growing herbicide resistant crops on the agricultural environment and on wildlife. The use of herbicides has already been associated with the decline of farmland bird species and there are concerns, for example from the RSPB, that GM crops may increase dependency on chemicals in agriculture and thereby reduce available food sources for wildlife.

The purpose of the GM farm scale trials was to compare the effects of two different herbicide regimes on farmland wildlife and biodiversity. Researchers took samples of insects, weeds and seeds in the soil and made comparisons between the GM crop and an adjacent non-GM crop. This data was then extrapolated to determine whether any wider effects on birds and other farmland wildlife are likely to occur.

### **What did the trials miss?**

The Government claimed the trials would answer concerns about the safety of GM crops. However there are many areas that the research did not address:

- *Unpredictable nature of GM technology* - the trials only looked at one GM trait (herbicide tolerance). GM crops engineered for different purposes, for example changed nutritional content, were not studied.
- *Whether GM crops are safe for humans and farm animals to eat.*
- *Impacts of GM crops on soil ecology* - according to soil scientists, GM crops could have "long term adverse and unexpected effects on soil micro-organisms or their functioning and could prove to be the greatest major hazard for the environment".<sup>4</sup> This impact could either be from herbicide usage or from the genetic material itself.
- *Contamination of neighbouring crops* - though research from the EU has suggested it will be impossible to grow GM without contaminating neighbouring crops, this problem was not considered in the farm scale trials despite high-profile examples of seed contamination in the UK.
- *Possible negative impacts of GM crops on bees* - no studies on this have been carried out during the trials, yet bees are extremely important to the pollination of commercial crops in the UK.
- *Comparison of GM crops with organic farming systems* - the environmental impact of GM crops in comparison with sustainable farming systems such as organic or low impact systems was not studied. The GM crop was only compared with a conventional chemical intensive farming system.
- *Incremental effects of growing GM crops over time* - the GM trial crops were only grown on each field for one year. In commercial use GM crops are likely to be grown in rotation, the same crop returning every three to four years to a particular field, or in the case of maize, it may be grown in the same field year after year.

- *Effects of widespread growing of GM crops* - impacts on biodiversity that might manifest themselves only when GM crops are used widely in the UK were not studied.
- *Trials "not sufficient" evidence for deciding on GM commercialisation* - one of the Government's GM advisory bodies, the AEBC, clearly stated in their Crops on Trial report that the FSTs "are not a sufficient condition"<sup>5</sup> for deciding on GM commercialisation. The Government subsequently agreed that the results of the trials "are only one part of the decision-making framework."<sup>6</sup>

In fact the farm scale trials cannot answer a whole range of uncertainties concerning the growing of GM crops and food. The Government GM Science Review gave its first report over the summer and pointed to areas of considerable uncertainty, especially in relation to food allergies, the impact on soil and soil ecology, possible genetic changes that would make a plant invasive, and a generally poor predictive understanding of ecology.

### **What do we know about the results?**

Earlier this month The Guardian newspaper claimed to have seen leaked results from the trials. The newspaper reported that two of the three GM crops grown experimentally - oilseed rape and sugar beet - appear more harmful to the environment than conventional crops and should not be grown in the UK.

The Guardian claimed that the third crop, GM maize, might be recommended for approval, though some scientists still have reservations.

According to The Guardian, the trials show that in GM sugar beet and oilseed rape the weeds and insects were significantly less numerous. Spraying with the Monsanto herbicide glyphosate had taken a heavy toll in the beet fields and the Bayer product glufosinate ammonium had wiped out many species in the rape fields.

The results will be formally announced on October 16th.

### **Why shouldn't maize growing proceed?**

The Guardian claims that the trials demonstrate GM maize encourages biodiversity. Non-GM maize fields are normally sprayed with the herbicide atrazine, which kills weeds as they

germinate. The trial GM crops were not sprayed with atrazine - the assumption was that atrazine would not be used on GM maize because glufosinate would do the job. But evidence from the US shows huge quantities of atrazine being used on GM crops. Farmers in America found glufosinate was not enough to kill competitive weeds so used atrazine as well.<sup>7</sup>

There is nothing to indicate the same would not happen here in the UK – that atrazine would be used on GM maize if it were commercialised. Atrazine has been banned for many uses in the UK because of its toxicity, but is still permitted for maize. Thus, even if The Guardian is correct and there was one aspect of the trials that found benefits from GM, the results are flawed because the process did not test what would **really** happen if commercial growing of GM maize proceeds.

### **The Greenpeace position**

Greenpeace is opposed to GM on the grounds that something could go catastrophically wrong. These tests did not begin to address those concerns and there remain huge uncertainties around GM.

1 Why do we need Farm Scale Evaluations? DEFRA, 2003

<http://www.defra.gov.uk/environment/gm/background/faq.htm>

2 Farm Scale Evaluations of GM crops. Michael Meacher letter to all English MPs. 17th March 2000

<http://www.gene.ch/info4action/2000/Mar/msg00025.html>

3 The locations of all the trials can be found at

<http://www.defra.gov.uk/environment/gm/fse/location/index.htm>

4 GM on trial. Greenpeace, 2000

<http://www.greenpeace.org.uk/MultimediaFiles/Live/FullReport/5757.pdf>

5 Crops on Trial - A report by the AEBC. September 2001

<http://www.aebc.gov.uk/aebc/pdf/crops.pdf>

6 Government response to Crops on Trial. January 2002

<http://www.defra.gov.uk/environment/gm/fse/croptrial/index.htm>

7 Weeds fight back. BBC Newsnight, 26th June 2002

<http://news.bbc.co.uk/1/hi/programmes/newsnight/archive/2067669.stm>