



## *Position statement: Genetically modified organisms*

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### Background

This statement concentrates on the issues of the potential impact of genetically modified organisms (GMOs) on the environment, the countryside and landscapes particularly in relation to woodland.

GMOs are the result of gene manipulation. This involves artificially inserting a gene from one organism into another producing a change in a plant or animal's biological characteristics, through means other than conventional breeding programmes or natural selection. Organisms that contain an artificially inserted gene are known as 'transgenic'. Genetic modification of commercial crops presently focuses on two main traits; herbicide tolerance and pest resistance. Herbicide tolerant crops have genes inserted that make the plant resistant to herbicides. This means that broad-spectrum herbicides can be used across the entire field killing all plants other than the GM crop. Pest resistant GM crops are genetically manipulated to produce natural insecticides.

GM crops are not new, either in the UK (where they have been planted in field tests since 1987) or internationally (where in 2000 they were being grown commercially on over 44 million hectares in 14 countries<sup>1</sup>). However Farm Scale Evaluations (FSEs) have led to wider scale growing of GM crops and the prospect of commercial release in the UK for the first time. These evaluations, established in 2000 as a result of concerns expressed by government agencies and NGOs, are three-year trials of GM herbicide tolerant crops that will report in 2004. During this period the biotechnology industry has agreed to refrain from commercial growing in the UK. The FSEs have sparked wide scale criticism both from environmental organisations as well as the general public. Even the Agriculture and Environment Biotechnology Commission (AEBC), the Government's own GM watchdog, stated that *"They (FSEs) cannot be, as widely interpreted, the final piece of the jigsaw before commercialisation can proceed. Additional information, and consideration of a wide range of viewpoints, must be factors in the eventual decision"*<sup>i</sup>

In July 2002 the Government announced a public debate on GM issues against a background of possible commercial release. This debate, which has yet to formally begin, has already run into problems. COI Communications, the Government's communications expert, has warned that current funding is inadequate, which means "widescale" public debate is virtually impossible.

In October 2002 the UK Government announced the coming into force of the English Genetically Modified Organisms (Deliberate Release) Regulations 2002, soon to be followed by the devolved administrations. The regulations are widely tipped as paving the way for commercial release of those crops currently grown in FSEs, which are herbicide-tolerant spring and winter oil seed rape, sugar beet and forage maize.

GM tree technology is also gathering pace with trials rapidly increasing around the world. Since 1988 there have been at least 116 GM tree trials involving 24 species in 17 countries. The late 1990s saw a huge increase in the number of trials and the number of species tested. Between 1995 and 1998 the number of tree trials doubled with 44 new trials in 1998 alone. GM tree technology is likely to make its commercial debut in Chile, China and Indonesia<sup>ii</sup>. In the UK there have been five trials so far. An obvious concern with transgenic trees is that they remain in the environment for several decades rather than one growing season, as with an agricultural crop, which further increases the possibility of both modified gene escape and gene behaviour being affected by environmental stresses. As with agricultural crops, some tree pollen is highly mobile, with pine pollen for example drifting up to 600km.

### Potential benefits

Genetically modified crops such as those developed to allow better targeting or lower usage and inputs of agrochemicals may have potential benefits for wildlife particularly if their use results in less intensive farming and forestry practices in general. In the same way that transgenic crops may be of benefit to agriculture, so GM trees could be of benefit to forestry. For example, research is underway on transgenic trees that develop lignin fibres of reduced strength, a characteristic that would reduce the amount of chemicals needed in the paper-making process. Furthermore GM technology could see the re-introduction of English Elm to our countryside. Transgenic Elm trees, resistant to Dutch Elm Disease fungus, have already been grown in Scotland<sup>iii</sup>.

### Risks

Broadly speaking two sets of risks to the environment have been identified:

#### ◆ ***Vigour and hybridisation***

The characteristics of GMOs are not yet fully understood and there is a risk that they will compete to displace native species. There is also a risk of GM species interbreeding with closely related wild or cultivated species. In the case of FSE crops in the UK, oilseed rape and sugar beet have wild relatives. A recent report from the European Environment Agency concluded that under current farming practice, contamination between the transgenic crop and the non-GM wild relative is inevitable<sup>iv</sup>. This could lead to vigorous hybrids developing and establishing across the countryside, displacing natural populations through competition and thus reducing biodiversity. The report also predicts, in the case of herbicide tolerant crops, that *"plants carrying multiple resistances will become common"* and *"weeds may become more difficult to control with herbicide treatments"*. The sometimes dramatic results of natural hybridisation are reasonably well documented and provide a warning about potential consequences. A report commissioned by DEFRA<sup>v</sup> published in January 2003 stated that *"In the period 1998 to 2000 gene flow was detected from GM trials into adjacent OSR (Oil Seed Rape) crops"*. The report concluded, *"if transgenic oilseed rape is grown on a large scale in the UK, then gene flow will occur between fields, farms and across landscapes"*. However the Government's advisors on GM releases, the Advisory Committee on Releases to the Environment (ACRE) reviewed the report and advised that *"ACRE's risk assessment of GM oil seed rape has always assumed some gene-flow will occur and that this does not itself constitute a risk to human health or the environment. It was concluded that the extent of gene flow was entirely within expectations"*<sup>vi</sup>

◆ ***Broader consequences of GMOs upon ecosystems, biodiversity and landscape character***

Disruptions to ecological food webs may also occur. For example, genetically modified pest-resistant crops contain naturally occurring insecticides that can impact on non-target species or potentially get into the food chain and continue to affect on predators. Indeed in laboratory tests in the US, monarch butterfly larvae showed higher mortality having consumed milkweed leaves dusted with transgenic, pest-resistant, maize pollen<sup>vii</sup>. GM crops may also lead to an overall increase in pesticide use rather than the reduction predicted by some. Recent studies have found that, in the US, farmers growing GM crops are using just as many toxic pesticides as conventional farmers and in some cases more<sup>viii</sup>.

Where GM crops have been modified to allow them to grow in a much wider range of environmental conditions, the transgenic crops themselves or their hybrids may invade semi-natural habitats. Increased applications of herbicide or other pesticides might also be required to bring them under control. If GM crops lead to lower farming production costs and have characteristics that enable them to be cultivated on marginal land, the face of the farming landscape could change fundamentally and threaten semi-natural habitats particularly in the uplands.

### **Potential impacts on woodland**

If GMOs lead to reduced inputs of agrochemicals into the environment they could ameliorate the negative effects of habitat fragmentation through reducing detrimental impacts from the external environment on woods and creating less hostile surroundings for species migration. However reports from the US are already indicating that in fact more herbicide is being used on GM crops as weeds develop resistance<sup>ix</sup>. Similar outcomes in the UK would further isolate semi-natural habitats from each other and amplify pesticide drift into woods. If the vigour of GMOs or their hybrids enables them to colonise woodland then they may threaten to displace ancient woodland species, many of which are immobile and poorly adapted to strong competition. Similarly insect resistant crops may impact on the woodland ecosystem if the natural insecticides they produce pass into the food chain.

### **GM trees**

The potential benefits arising from GM trees are similar to those from other GMOs. However, the risks may be even greater given the timescale of a GM tree in the environment and the isolated location of many commercial plantations, which would make monitoring and enforcement problematic. The Forest Biotech Conference in Oxford (July 1999) discussed the suppression of flowering to ensure sterility as a means of negating threats from interbreeding. Even if there could be the prospect of sterile trees, this cannot be 100% guaranteed<sup>ii</sup>. Whilst agricultural crops are harvested at or before the seed stage, trees are not, which means that the risk of regeneration of GM trees in the wider environment may be a significant factor. It is clear that GM trees have no role to play in any strategy to conserve ancient woodland and its associated biodiversity or in the expansion of new native woodland cover.

## The Woodland Trust's View

As a conservation body, our view of GMOs is primarily focussed upon their potential impact on the environment rather than on their public health implications, which others are better placed to comment upon. It has its origins in the Trust's conservation approach '*Seeing the Woods for the Trees*' whose principles state

- ◆ *conservation should maintain and enhance biodiversity by enabling the widest range of habitats and species to survive and evolve*
- ◆ *conservation should endeavour to ensure that the rate of environmental change allows species to adapt and evolve*

Based on our assessment of the information available, we support the precautionary principle that GMO's should not be released into the environment and we are therefore opposed to the ongoing FSEs and any future unenclosed GM tree trials. We are also completely opposed to any future commercial release unless and until there is clear evidence that

- ◆ GMOs will not hybridise with other species
- ◆ GMOs will not harm ecological food webs
- ◆ GMOs will not spread in an uncontrolled way across the countryside
- ◆ There are no delayed, direct or indirect, effects on the environment (a concept specifically mentioned in the recent Government consultation on *English Genetically Modified Organisms - Deliberate Release - Regulations 2002* and for which environmental risk assessments are proposed in the regulations).

In our view such evidence should be derived from controlled, enclosed experiments over timescales governed by scientific necessity, rather than politics or financial gain, and which do not allow the possibility of accidental cross-pollination and risks to the environment. If and when evidence supports these aspirations then we would argue for legislation and tight regulation of GMO crops and the farming systems under which they are grown to promote delivery of environmental benefits (i.e. genuine reductions in use of agrochemicals) and enable responsibility to be assigned and the situation to be rigorously controlled in the face of unforeseen circumstances and potential abuse of their characteristics (e.g. blanket herbicide application facilitated through the use of herbicide resistant crops).

In addition, until such research is complete, we will not permit any of our own woods or any farm tenancies in our control to be involved in trials.

It is our belief that the potential benefits of GMOs are either unlikely to be realised or could be delivered in more effective ways (organic farming for instance or improved recycling of chemicals for paper making) and that the environmental risks associated with GMOs outweigh any benefits.

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<sup>i</sup> Agriculture and Environment Biotechnology Commission (2001). *Crops on Trial*: a report by AEBC.

<sup>ii</sup> World Wildlife Fund 1999. *GM technology in the forest sector*. A scoping study for WWF.

<sup>iii</sup> Gartland K, et al (2001). *GM breakthrough could help Dutch Elm Disease fight*. The Biochemist. August 2001.

<sup>iv</sup> European Environment Agency (2002). *GMOs: the significance of gene flow through pollen transfer*.

<sup>v</sup> National Institute of Agricultural Botany (2003). *Monitoring large scale releases of Genetically Modified Crops (EPG1/5/84) incorporating report on project EPG 1/5/30: Monitoring releases of genetically modified crop plants*.

<sup>vi</sup> ACRE (2003). *Monitoring large scale releases of Genetically Modified Crops (EPG1/5/84) incorporating report on project EPG 1/5/30: Monitoring releases of genetically modified crop plants. Advice of the Advisory Committee on Releases to the Environment under Section 124 of the Environmental Protection Act 1990*.

<sup>vii</sup> Losey J.E., Rayer L.S., Carter M.E. (1999). *Transgenic pollen harms monarch larvae*. Nature 399, 214 (1999)

<sup>viii</sup> Organic Consumers Association (2002). *Hazards of Genetically Engineered Foods and Crops*.

<sup>ix</sup> Benbrook, C. (2001). *Do GM crops mean less pesticide use?* Pesticide Outlook Aug 2001.