

Wildlife and Countryside Link response to the Science and Technology inquiry on GM foods and application of the precautionary principle in Europe

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1. Introduction

1.1 Wildlife and Countryside Link brings together 43 voluntary organisations concerned with the conservation and protection of wildlife, countryside and the marine environment. Our members practise and advocate environmentally sensitive land management, and encourage respect for and enjoyment of natural landscapes and features, the historic and marine environment and biodiversity. Taken together our members have the support of over eight million people in the UK and manage over 750,000 hectares of land.

1.2 This position is supported by the following Link members:

- Buglife – The Invertebrate Conservation Trust
- Friends of the Earth England
- Royal Society for the Protection of Birds
- RSPCA
- The Wildlife Trusts

2. Link position on GMOs and the Precautionary Principle

2.1 Wildlife and Countryside (Link) believes that there are still many important and unanswered questions with regard to the effects of Genetically Modified Organisms (GMOs) on the environment, biodiversity, animal welfare and consumer choice. Although it is theoretically possible that certain GMOs could have no environmental impact at all, or even produce environmental, biodiversity and consumer benefits, (such as less intensive farming and forestry practices), we have yet to see any evidence of these benefits.

2.2 We believe that the weight of current evidence is such that GMOs should not be approved for commercial release in England and that further scientific investigation is needed before GMOs are introduced commercially. Link therefore urges the Government to act in accordance with the precautionary principle and refuse commercial approval of GMOs until regulations can be improved, and GMOs can be shown, through rigorous scientific testing on a case-by-case basis, not to have negative environmental, animal welfare or wildlife impacts before they are approved for release.

3. Background

3.1 GMOs are the result of gene modification, a process which involves the artificial transfer of individual genes from one organism into another, which may include genes between non-related species. The aim is to produce a change in a plant or animal's biological characteristics and to confer a particular desired trait into the recipient organism. Organisms that contain an artificially inserted gene are known as 'transgenic'.

- 3.2 Genetic modification of commercial crops presently focuses on two main traits; herbicide tolerance and pest resistance. Herbicide Tolerant (GMHT) crops have genes inserted that make the plant resistant to herbicides. Genetically modified crops that are currently grown commercially have two main traits; herbicide tolerance and pest resistance. Herbicide Tolerant (GMHT) crops have genes inserted that make the plant resistant to herbicides. Pest resistant GM crops are genetically manipulated to produce insecticides.
- 3.3 Cloning is a laboratory technique to reproduce identical animals. Unlike Genetic Modification, it does not involve altering the DNA of an individual. Cloning involves growing an embryo from a single donor cell, producing an animal that is genetically identical to the donor individual. Commercial cloning of farm animals is not permitted in Europe but is practiced in some other parts of the world.

4. Wildlife and environmental impacts

- 4.1 Wildlife on UK farmland has undergone severe declines over the last 50 years as a result of changes to farming¹. The State of Nature report produced by UK wildlife organisations in 2013 found that 60% of the farmland species studied had decreased over the last 50 years². Wildlife is also under increasingly severe pressure from additional threats including climate change.
- 4.2 Link is concerned that the introduction of GM technology could exacerbate these stresses on the natural world, resulting in further declines in farmland wildlife. This is because the use of GM crops is associated with changes in agricultural practice that may lead to damaging impacts. For example, Genetically Modified Herbicide Tolerant (GMHT) crops allow farmers to apply a broad spectrum herbicide to their fields, creating a monoculture devoid of the arable weeds which form an important food supply for many birds and invertebrates. Evidence from Defra's Farm Scale Evaluations indicated GMHT spring oilseed rape and GMHT beet were worse for wildlife than their conventional counterparts³. Furthermore, the planting of GMHT crops may lead to increased chemical applications in the long term if weeds become resistant to the main herbicide used. This appears to be happening on a large scale in the US.⁴.
- 4.3 Insect-resistant crops also have potential effects on non-target species. Just as with insecticides that are applied externally, insecticides produced within the tissues of GM plants can affect pest and non-pest species, potentially reducing biodiversity, impacting on ecosystem services such as pollination⁵, or threatening rare or endangered species. Such crops may also disrupt food

¹ Robinson, RA et al (2002) Post-war changes in arable farming and biodiversity in Great Britain. *Journal of Applied Ecology* 39: 157-176

² Burns F, Eaton MA, Gregory RD, et al. (2013) State of Nature report. The State of Nature partnership. http://www.rspb.org.uk/Images/stateofnature_tcm9-345839.pdf

³ See <http://archive.defra.gov.uk/environment/quality/gm/crops/fse.htm>

⁴ Benbrook, C.M. (2012) Impacts of genetically engineered crops on pesticide use in the U.S. -- the first sixteen years. *Environmental Sciences Europe* 2012, 24:24.

⁵ Malone, L.A., Pham-Delegue, M (2001) Effects of transgene products on honey bees (*Apis mellifera*) and bumblebees (*Bombus* sp.) *Apidologie* 32: 1-18

chains. For example, work carried out in Scotland showed that individuals of 2-spot ladybird (*Adalia bipunctata*) were harmed when they ate peach-potato aphids that had been fed on potatoes genetically modified to produce the pesticide snowdrop lectin. Female ladybird life spans were halved and their reproduction reduced⁶. Link believes that further research is needed on the effects of insect-resistant crops on non-target organisms before any commercial release.

- 4.4 Continual expression of insecticidal proteins by GM plants may lead to pest species developing resistance to the toxin. Such resistance will either eliminate the commercial benefits of the GM crop or lead to increased pesticide application and the use of harsher, more toxic chemicals.
- 4.5 Crops are also being developed and trialled to produce chemicals that repel herbivores and attract predators, called 'herbivore-induced volatiles'. For example a variety of wheat is currently being trialled that produces aphid alarm pheromone, and it also attracts the natural predators of aphids for example ladybirds. However these chemicals could also result in the attraction of predators away from wildlife habitats and into crops, reducing the abundance of these herbivore controlling insects in natural systems such as hedgerows, grasslands and nature reserves. Such a shift in trophic structure in natural and semi-natural ecosystems is likely to be profound, significantly altering the balance and population dynamics that shape the niches. To date there has been no experimental examination or modelling of the effects of attracting predators and repelling herbivores on either the broad scale of agricultural ecosystems or on the resultant impacts on wildlife. Such experimental and modelling work would need to be undertaken and published prior to the approval for release of any GM crop using these ecosystem manipulation techniques.
- 4.6 Although nearly all GM crops currently on the market are herbicide tolerant or insect resistant, it is possible that a wider range of traits will be developed for future GM crops – for example tolerance to salinity or drought enabling crops to be grown on previously unsuitable land. It is difficult to predict how these new crops might affect our landscapes and wildlife. Link believes that risk assessments of new crops must take into account the broader environmental consequences and not just direct impacts of new crops. Link also believes the first priority must be refining and rolling out existing, sustainable solutions to agricultural problems, for example Integrated Pest Management, water efficiency measures etc. Investment in uncertain future benefits from GM technology must not be at the expense of tried-and-tested non-GM approaches.
- 4.7 GM tree technology is also developing around the world: for example the US government is currently considering an application for commercial planting of a GM frost-tolerant eucalyptus. The UK Forestry Standard does not currently allow GM trees to be used for commercial forestry in the UK, but with increasing

⁶ Birch, A.N.E., Geoghegan, I.E., Majerus, M.E.N., McNicol, J.W., Gatehouse, A.M.R. & Gatehouse, J.A. (1999). Tri-trophic interactions involving pest aphids, predatory 2-spot ladybirds and transgenic potatoes expressing snowdrop lectin for aphid resistance. *Molecular Breeding* 5: 75-83.

threats from tree diseases and interest in carbon sequestration potential, this position may come under pressure in the future.

- 4.8 As with agricultural crops, some tree pollen is highly mobile, with pine pollen for example drifting up to 600km. 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. The UN has recognised the development of GM tree technology, urging a precautionary approach towards the technology and noting the “potential impacts of genetically modified trees on forest biological diversity”⁷.

5. Genetic pollution

- 5.1 Link is concerned about the transfer of genes from GM crops into non-GM crops, and from GM crops into related wild plants. Unlike chemical pollution, genetic pollution cannot be recalled, cleaned up or constrained and is, in fact, self-perpetuating. A molecule of DDT released into the environment remains a single molecule or degrades over time, but a single GM allele can multiply itself repeatedly through reproduction.
- 5.2 GM transgenes have never been, and in many cases could never naturally be, part of the recipient species’ gene pool. If transgenes find themselves in wild relatives of GMOs through hybridisation they may be subject to gene regulation different to that for which they were designed, with unpredictable results. For example, if a wild plant gains a competitive advantage through hybridisation with a GM crop it may become invasive (a “superweed”), displacing natural populations and reducing biodiversity.
- 5.3 Link believes that the transfer of genes from GM to non-GM crops would create problems within the food chain; producers will not be able to guarantee their produce as GM free, impeding their access to important markets as well as reducing the ability of the consumer to exercise their right to choose, unless adequate coexistence measures are implemented and enforced.

6. Animal welfare issues

- 6.1 Significant investment has been made by biotechnology companies in research into genetic modification of animals. Growth hormones produced by GM microbes have been used to increase milk yields of cows, and transgenic cows, goats and sheep have been produced that express pharmaceutical proteins in their milk. This has significant implications for animal welfare. For example, the use of recombinant bovine somatotropin to increase milk yields of cows has been shown to cause stress on the immune system and an increased number of infections such as mastitis. The most extreme reported problem to date has been that of the “Beltsville pigs”, in which the introduction of a gene for human

⁷ Draft Decisions for the Eighth Meeting of the Conference of the Parties to the Convention on Biological Diversity. UNEP/CBD/COP/8/1/Add.21 March 2006, Curitiba, Brazil, 20-31 March 2006

growth hormone caused the pigs to develop severe arthritis, spinal deformities, and become blind or cross eyed and impotent. The suffering caused by such experiments does not appear to be justified, especially given that in many cases it is possible to produce the same proteins using modified micro-organisms.

- 6.2 Cloning also brings animal welfare issues. Link is opposed to cloning on ethical, animal welfare and health grounds, due to the many animals that die in the process and the suffering it causes during pregnancy and birth. Scientists agree that the health and welfare of a significant proportion of cloned animals is seriously affected and mortality is considerably higher than with sexually reproduced animals. Cloned animals die younger and suffer more defects than normal animals. Many clones suffer from defects such as contracted tendons, respiratory failure, limb and head deformities, heart disease and kidney problems.
- 6.3 Following the inability to agree new rules on cloning in 2011, the European Commission adopted in December 2013 two proposals. These cover the cloning of animals kept and reproduced for farming purposes and proposals on the placing on the market of food from animal clones. The proposal which calls for a ban on cloning is welcome. However the proposals have a number of loopholes which could result in cloning still occurring. The proposals only introduce a provisional ban on cloning, the emphasis being placed on Member states to introduce legislation that prohibits cloning and the placing on the market of animal clones or embryo clones. They do not ensure a ban on the cloning of animals for food production, or on the import and sale of animal clones. Link believes that any proposals must include a prohibition on the sale and import of food from cloned animals and their offspring.

7. Food security

- 7.1 GM is frequently presented as a critical tool for ensuring food security in the future. Link believes that, although in the future GM crops may play a role in helping meet the challenge of global food security, they are not a silver bullet and there are existing alternatives (such as changes to farming practices and socio-economic considerations) which help to address food security challenges whilst also providing multiple benefits at lower costs and with fewer risks. See Link's position statement on food security for further information⁸.

⁸ http://www.wcl.org.uk/docs/Sustainable_and_Secure_May13.pdf