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Briefing Note

Gene flow

Friends of the Earth

In nature, genes are constantly on the move. Pollen and seeds can be carried long distances by insects or the wind, and genes can be transferred non-sexually by bacteria. It is possible for GM crops to transfer their modified genes to plants of the same or closely related species. Once released they cannot be contained or recalled. Recent research has revealed that the GM crops closest to commercialisation in the UK pose a particularly high risk of contaminating other crops. This raises concerns about how GM and non-GM crops can grow and co-exist in the future.

Cross-pollination

Friends of the Earth has consistently raised concerns about the dangers of cross-pollination of GM crops with other crops and wild relatives. Pollen from GM crops carried by the wind or insects can pollinate non-GM crops and wild relatives. Pollen has been found to travel long distances, up to 3 kilometres[1]. GM herbicide tolerant oilseed rape and beet both have wild relatives in the UK and cross-pollinate easily with them, and GM maize and oilseed rape can both cross pollinate with non-GM crops. The five wild relatives of oilseed rape with a high risk of hybridisation are widely distributed across the UK, and in many places all five species are found[2]. A recent study estimated that hybridisation between oilseed rape and wild turnip would produce 32,000 hybrids every year along rivers, and 17,000 in arable areas.[3].

A recent report from the European Environment Agency acknowledged the extent to which this will become a problem if the crops are commercially grown in Europe[4]. The research concluded that under current farming practice, contamination between GM oilseed rape and beet and non-GM crops and their wild relatives is inevitable. In the case of herbicide tolerant GM crops, it predicts that "*plants carrying multiple resistances will become common*" and "*volunteers may become more difficult to control with herbicide treatments*".

A recent study in the US discovered that wild sunflowers, considered weeds by farmers, became hardier and produced 50 per cent more seeds when crossed with a GM sunflower[5]. This confirms the potential for weeds to become stronger and fitter when they gain novel genes. This echoes earlier research carried out by English Nature, the Government's nature advisors[6]. A study of weedy oilseed rape plants in Canada found plants that had acquired resistance to three different herbicides. This is leading farmers to use more environmentally damaging chemicals to control the weeds.

Honeybees and gene flow

Bees are extremely important pollinators of crops in the UK. Oilseed rape is a particularly attractive and important crop for bees and they will fly up to 5km to forage from it[7]. However, bees and their

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movements cannot be controlled, and nor can they distinguish between GM and non-GM oilseed rape. The potential for the movement of GM pollen and cross-pollination by bees is enormous. In order to avoid this, beekeepers are going to great lengths and costs to ensure that their hives are kept at least 6km away from GM crops.

Horizontal Gene Transfer

Genes can also move around by what is known as 'horizontal gene transfer'. This is the movement of genes between organisms by means other than sexual reproduction. Unlike cross-pollination, it can occur across species boundaries. It is most likely to occur between bacteria, some of which can 'pick up' genes from plant material. One of the biggest concerns is if antibiotic resistance genes, present in some GM crops, crossed over to bacteria. This would result in rendering vital antibiotics useless for treating major illnesses. In the only field study carried out so far, GM material was found to persist in the soil two years after the GM crop had been harvested[8]. In recent Government research, it was shown that genes from GM soya could be picked up by bacteria in the human intestine[9]. The significance of horizontal gene transfer and its implications are still not well understood and more research needs to be carried out in this area.

Co-existence of GM and non-GM crops

The question is whether it is possible for GM and non-GM crops to co-exist side by side in the UK and across Europe. It is now recognised that if GM crops are to be grown commercially on a large scale, it will be necessary for safeguards to be in place to minimise genetic pollution[10]. This will be essential in order to maintain consumer and farmer choice to eat and grow GM-free and organic food.

Measures such as increased separation distances, isolation zones, barrier crops or further genetic modification to interfere with plant fertility would need to be adopted. Consideration might also have to be given to limiting GM production to particular regions or zones. Many of these measures are impractical and will be costly to non-GM and organic farmers.

Recent research has suggested that if GM crops are grown at the same levels as in the US, organic and non-GM farmers would find it very difficult to avoid contamination, and could face increased costs of up to 40 per cent[11].

Friends of the Earth questions whether it will be practical, cost effective or even possible to grow GM and non-GM crops together in the UK. The logistical, bureaucratic and legal situation is far from clear and needs resolving before widespread growing of GM crops is permitted.

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