

Genetically Modified Organisms

Planet Organic has a strict policy of no GMO's, and Planet Organic campaigned actively and successfully in the anti-GMO movement. This information sheet should give you some more information on the issues involved, tell you where we stand now and what the future might hold.

The Science

Genetic engineering involves the extraction of a particular gene from one species and its insertion into the DNA of any other. The theory is that in this way characteristics can be swapped between species. It is worth noting that this has nothing in common with traditional selective breeding which can only occur between closely related species and happens via the natural process of sexual reproduction. Genetic engineering can swap genes between literally any species and whole plants are then grown from the resulting cells.

Genetic engineering is sold as a precise science, but this is hardly the case. The extraction of the genetic material can be precise, but its subsequent insertion is entirely random. It cannot be predicted where in the host DNA it will end up. The science also assumes that there is a gene for this and a gene for that, so that inserting a particular gene will have a particular effect. This is simply not true. It is now known that genes work more in families or patterns, and that one gene may have a role in determining many different traits. Consequently, it is impossible to predict the full effects of random gene insertion. The implanted gene will also always cause some damage to the gene sequence at either end of its insertion, which can cause unpredicted results.

Broken Promises

The bio-tech companies promised that GMO crops would reduce herbicide and pesticide use, thus having environmental benefits. They were going to increase yields giving greater profit to farmers and feed developing countries by introducing drought resistant or infection resistant species. More recently, they were going to increase nutrient levels in crops, thus helping to end malnourishment.

None of these promises have been fulfilled. The cultivation of specific herbicide or pesticide resistant crops has rapidly led to the emergence of herbicide and pesticide resistant weeds or pests, necessitating the use of more and increasingly complex blends of sprays. According to all official figures, the use of pesticides and herbicides on GM crops has risen not fallen.

The yields for GM crops have been at best no better than non-GMO, with GM soya yields being consistently lower. This, combined with increased use of herbicides and the higher price of seeds, means farmers are so far not reaping the benefits.

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The argument that GM crops will end world hunger and feed developing nations is laughable given that the first GM crops were maize, soybean, rapeseed and cotton – the worlds most commercial crops, not food staples. They were also created to be resistant to commercial pesticides and herbicides, not natural diseases or drought. More recently there has been a \$6 million dollar project by Monsanto and the World Bank to develop a sweet potato resistant to a particular virus, but this has failed completely while a conventional breeding program in Uganda has produced a high yield variety more quickly and cheaply.

Over the last few years, there have been GM crops that promised to have dramatically increased nutritional value, such as cress species containing essential fatty acids usually found in fish oils, or tomatoes modified to have three times the usual levels of beta-carotene, which is converted in the body to vitamin A. These have often proved to have downsides. The tomato, for instance, while having more beta-carotene had the same levels of the caretonoids as a whole, meaning it had far less of other important nutrients such as lycopene. It was also found to have a lower than usual vitamin E content.

Environmental Damage

As well as increasing the need for chemical pesticides and herbicides, there are other feared environmental impacts of GM crops, involving reduced bio-diversity and long-term cross pollination. The UK trials of GM crops found that both GM oilseed and sugar beet were more potentially damaging than standard crops to the local environment. It is also known that GM crops can cross pollinate with each other as well as weed species at relatively large distances. The exact implications of this cannot be known.

One of the first countries to take on GM crops was Argentina, with GM soya now being grown on over half of the arable land. The countryside is as a result suffering from an environmental crisis, with herbicide resistant “superweeds” taking over. The level of herbicide use is killing the soil, and those living near GM fields are complaining of rashes and streaming eyes while their livestock die or have deformed young. Similar situations are also being seen in some areas of the US.

Health Impacts

One of the major issues driving the consumer backlash against GM crops is the potential health risks associated with eating GM products. At this stage, the long-term effects of this are unknown, as very little research has been done, but there are several specific areas for concern as well as a general feeling that many people have that “it can’t be right”.

Given that the effects an implanted gene will have can never fully be predicted, and that any insertion will cause some disruption of the original DNA, there is the risk that new toxins or allergens may result. For example, a strain of bacteria was genetically engineered to produce an amino acid called tryptophan, and also produced a toxin which caused a very unfamiliar disease called eosinophilia-myalgia syndrome (EOS). The

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number of cases of EOS connected to the GM tryptophan so far is up to 10,000, with 1500 permanent disabilities and 38 deaths. There was also a case where genes inserted from Brazil nuts into soya transferred the allergic potential that some people have for Brazil nuts. Fortunately this was discovered before the products hit the shelves.

A second potential source of serious health impacts is in the widespread use of antibiotic resistant genes in GM crops. These are added as a part of the manufacturing process, but will still be present in the adult plant. Given that we know that genes can be transferred from GM crops to bacteria, and that antibiotic resistant bacteria are already a significant problem, many people feel uneasy about this.

The most widespread concern, however, is that we simply do not know enough. While there have been feeding trials of GM in the US, these have just looked at whether cattle will get bigger if fed GM fodder, not at any disease risks. Even so, one of these studies reported damage to the gut lining in the “volunteer” cows. There have been very few trials or studies to investigate the safety of consuming GM foods in either animals or humans.

The Threat to Organic Farming

The organic movement has been very active in the battle against GMO's, and not purely from an ethical standpoint. There is a significant danger that organic crops can become contaminated with GMO's and thus lose their organic status. This can happen by accident during the transport or processing of seeds or crops owing to carelessness or neglect, but by far the more frightening possibility is cross pollination happening in the field. Pollen from crop species can travel up to 21 miles, so if there is an organic farm even at some distance from one growing GM crops, there is a risk that seed produced from the organic crop will have GM traces.

The Soil Association is currently suggesting that “risk products”, which are those that contain soya or maize, are randomly tested and any that contain GM traces (which are detectable at 0.1%) should lose their organic certificate. This could have major impact for organic growers, producers and the organic industry as a whole. However, recent EU legislation proposes a limit of 0.9% as being an acceptable level of GM in organic food, providing that GM has been introduced inadvertently – ie by contamination.

The Current Situation

There are worldwide only four major GM crops being grown – maize, soya, oilseed rape and cotton. Others that were introduced have been withdrawn owing to market rejection, including potatoes and tomatoes. Recently Monsanto also withdrew applications to grow GM wheat after opposition from farmers, who were concerned about losing their European and Japanese business.

Most GM crops are grown in only Argentina and the USA. There are currently no GM crops grown commercially in the UK, and at present there is only one field trial of GM

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peas in East Anglia. The biggest blockade to GM has been consumer pressure. Customers simply do not want it. Recently, the EU has changed its position over the labelling of foods, with any product containing more than 0.9% GM ingredients labelled as containing GMO's.

It may seem that the battle is being won, and indeed Europe and the UK have been very successful in limiting the spread of GM crops. However, there are developments within the biotech industry that we need to be aware of as the war is by no means over.

The Future

Given the opposition to GM in Europe and other countries, many of the biotech industry are seeing their biggest potential markets for current GM species as the developing world, particularly India. This is a worrying development for those concerned about fair trade and globalisation issues. It is difficult to see how it will benefit small farmers in these countries to become reliant upon imported seed for crops which do not in turn self-seed, which need higher amounts of pesticides and herbicides, and for which there is significant market opposition.

There are also in production a "second generation" of GM crops. These are not developed for pesticide resistance, but for higher nutritional value, and it is hoped by the industry that this will overcome public opposition. There are also in development food crops engineered to produce medical vaccines, so called biopharmaceuticals or "pharming", such as a potato which produces a vaccine for the human papilloma virus, one of the main causes of cervical cancer or another which produces a hepatitis B vaccine. These raise huge concerns over contamination of food supply.

Summary

- Genetic engineering is based upon an imprecise science, the effects of which cannot be predicted.
- The introduction of GM crops has resulted in increased pesticide and herbicide use, and causes more environmental damage than conventional crops.
- The yields of GM crops are lower than those of conventional crops.
- There are many concerns over the potential health risks of consuming GM food, and no studies which prove their safety.
- Contamination from GM crops is a significant threat to the organic food industry.