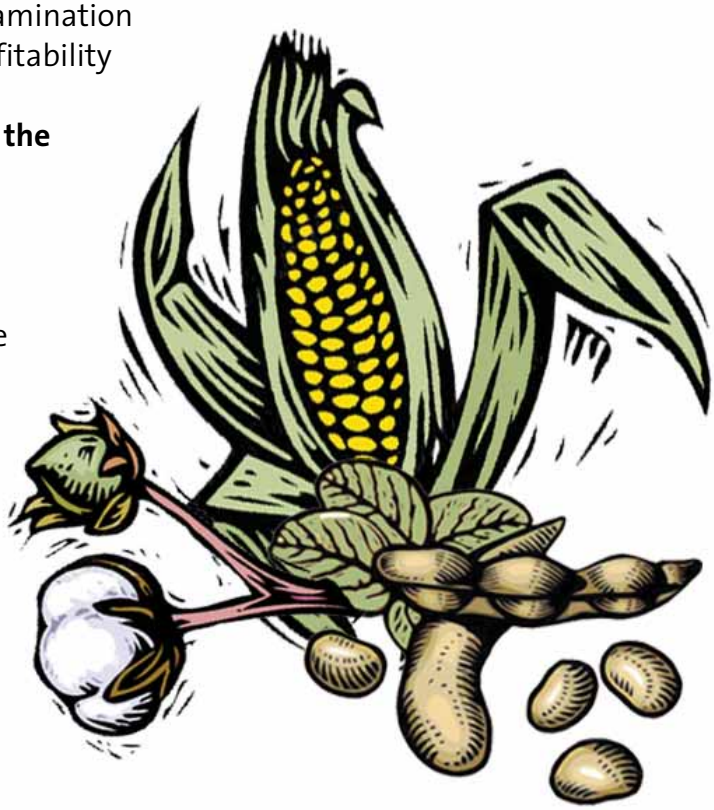
What you should know about GM crops

"Myths are based on false promises and deception, against actual reality and genuine concerns. "

The biotechnology industry has spread a lot of myths about what GMOs can do. These are not based on fact and have been shown to be false in reality. The myths we often hear are that:

- GMOs will solve the hunger crisis in the world and in Africa
- GM crops have massively increased yield potential
- GMOs decrease pesticide use
- GM foods are safe because it has been thoroughly tested
- GM foods are the same as those that are produced through conventional breeding
- GMOs are more nutritious, longer-lasting and better-tasting
- GM and non- GM crops can co-exist without contamination
- GM technology will boost farmer income and profitability

These statements are simply not true. Here are the facts about GMOs



What types of GMOs are on the market?

There are just three types of GMOs available on the market – pest resistant, herbicide tolerant and a mixture of the two, called 'stacked' varieties.

Pest resistant or "Bt"

Bt stands for "Bacillus thuringiensis ". This is a little bacterium that lives in the soil. It is poisonous to certain types of insects. The

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genes that create this poison have been engineered into various crops so that the crop also becomes poisonous to certain insects.

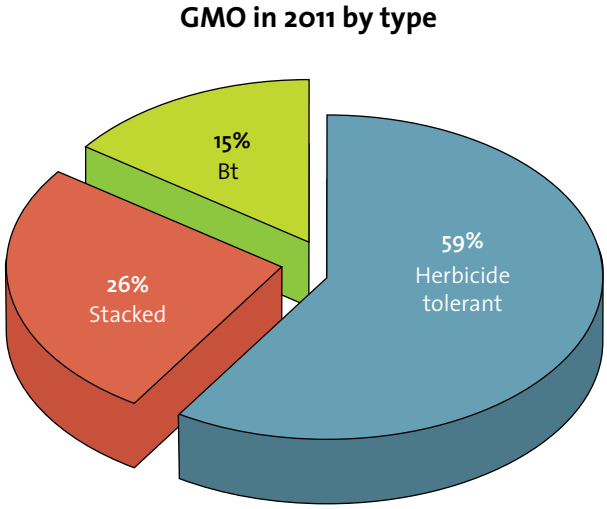
Herbicide Tolerant

GM herbicide tolerant crops are those that have been engineered to withstand massive doses of a particular herbicide without the GM crop dying. These crops are sprayed with herbicides to kill off surrounding weeds. The most common herbicide tolerant crops grown in the world are called Roundup Ready because they have been engineered to withstand Monsanto's glyphosate called Roundup.

Stacked

These crops contain a mixture of herbicide tolerant and pest resistant genes. Stacked GMOs can contain between 2 and 8 mixtures of genes.

Overview of the GM crops grown worldwide in 2011



Redrawn from statistics provided by James, C. (2011). Global Status of Commercialized Biotech/GM Crops: 2011

The other 1% of crops is made up of mainly Roundup Ready alfalfa (200,000 hectares) and sugarbeet (475,000 hectares) grown in the USA.

Which countries grow the most GMOs?

GM Crops are not the norm! Less than 3% of global agricultural land is planted to GM crops, with the majority being grown in the United States, Brazil and Argentina. Together, these three countries grew 77% of the 160 million hectares of GM crops grown in 2011. South Africa is the 8th largest producer of GMOs in the world, having grown about 2.1 million hectares in 2011.[1]

What are the health risks?

GMOs go through very little testing for health and safety. When a new drug comes onto the market it must go through the following experiments:
- three month tests on 3 mammal species,
- one year tests on one mammal species, and a further
- two years on another mammal.

This is the procedure to test for a drug that will only be given to sick people who can be monitored by a doctor. It is strange that the same is not done for new GMOs, which will be used as food for everyone, is often not labelled, and is not being monitored for health effects. It is quite normal for a GMO to be tested for just 90 days on rats. That's all. Even with this minimal testing, scientists are finding early warning signals that GMOs may not be safe in the long-term.

Animal tests have shown worrying health impacts including:

- Effects on gastro-intestinal tract: Inflammations, ulcerations and excessive growth of stomach and gut lining
- Disturbance of liver, pancreas and kidney function
- Disturbance of testes function (male function)
- Alterations in haematology (blood composition)
- Altered body weight
- Allergic reactions and immune responses.
- Impacts on second generation.

Nutritional changes:
- Altered level of existing, or presence of ***new toxins***
- Altered level of existing, or presence of ***new allergens***
- Altered level of existing, or presence of ***new antinutrients*** (these stop nutrients from being absorbed by the body)
- Altered level of existing ***nutrients*** (e.g. vitamins)[2]

What about the effect of the chemicals that are sprayed onto GM crops? Herbicide tolerant GMOs increase the amount of toxic chemicals that come into direct contact with the crop. This means that more chemicals are found on, and within the foods that we buy. New studies are coming out about one of the most common chemicals used in herbicides, called glyphosate.

What environmental risks have been identified?

GMOs can disrupt the entire food web, impact on aquatic systems as well as create new weeds, secondary pests and resistant pests. [3]

Disrupting the food web

GMOs can have a negative impact on pollinating insects, such as bees, when they feed on GM crops. There are also many insects that are 'farmer's friends', such as ladybirds and lacewings. These can be killed by pest resistant GMOs, which disturbs the balance of pests and predators in the field. Negative impacts have also been found on moths and butterflies.

It has also been found that Bt genes from GM crops disrupt the food web in the soil. Ecological health begins in the soil as it is the most vital source of nutrients for plants.

Insect resistance, secondary pests and superweeds

Farmers buy GM technology to make management of their crops easier. But this has turned into a nightmare for many farmers because in the long run, GM crops have created new problems on top of the old ones. In South Africa it has been found that insects are becoming resistant to the poison that GM Bt plants make. This is a problem for farmers because they do not get the crop protection that they paid for. These pests then become harder to to deal with and often, farmers have to resort to spraying pesticides.
In some cases the GM crop takes care of the pests that is being targeted, but farmers suddenly have to deal with pests that have not been a problem before. For example, in South Africa farmers found new pests in their GM cotton fields such as stinkbugs[4]. In Pakistan and India GM cotton farmers had to deal with the mealybug, which was not common before[5]. These 'secondary' pests become a problem because they no longer need to compete with the pests that the Bt toxin is killing.

One of the most expensive and serious problems created by GM technology is the appearance of weeds that develop a tolerance to the herbicides. In other words, they do not die when the GMOs are sprayed with the herbicide. This occurs because the same herbicide is used over and over, which encourages the weeds to develop a tolerance to the herbicides. The widespread use of Roundup Ready crops has led to farmers over-using herbicide made from glyphosate, resulting in a speedy increase in glyphosate resistant weeds where GM crops are grown. These weeds are choking farmer's fields and causing farmers to use more herbicides, older and stronger herbicides. This is also an environmental catastrophe because so much more poison must now be used on these crops.

It is a myth that GMOs reduce the need for agro-chemicals, in fact GMOs cause an increase in chemical use. In the USA, farmers used ten times more glyphosate on their crops in 2007 than they did in 1993.[6]

References and notes

1 James, C. (2011). **Global Status of Commercialized Biotech/GM Crops: 2011**. ISAAA Brief No. 43. ISAAA: Ithaca, NY.

2 There are many peer reviewed studies on health effects. Thank you to Dr. Ricarda Steinbrecher for compiling this list. For example see: Finamore, A et al. (2008) **Intestinal and Peripheral Immune Response to MON810 Maize Ingestion in Weaning and Old Mice**. *Journal of Agricultural and Food Chemistry*

- Cell structure and function: GM soya fed mice: Malatesta et al. (2002; 2003 and 2004)
- Changes in histomorphology: Ostaszewska et al. (2005)
- Protein profile: rainbow trout: Martin et al.(2003) in animal feeding trials
- Altered hepatic enzymes: gna rice: Poulsen et al. (2007) and in GM maize 1507: MacKenzie et al. (2007)
- Increase in triglycerides: Mon863 maize fed female rats: Seralini et al. (2007)
- Liver and kidney damage: Bt maize fed rats: Kilic and Akay (2008)
- Liver and pancreas of lambs of sheep fed Bt 176 maize: Trabalza-Marinuzzi et al. (2008)

3 There are many peer reviewed studies on environmental effects. Thank you to Dr. Ricarda Steinbrecher for compiling this list. For example see:

- Pollinators e.g. Bees in US: Kaatz (2007)
- Beneficial organisms, e.g. lady birds, lacewings: Hilbeck et al. (1998), (2012) vs. Romeis et al. (2006); Loevei & Arpaia (2005)
- Soil food web - plant interaction: Castaldini (2005)

4 Pschorn-Strauss, E. (2005). Bt cotton in South Africa.The case of the Makhathini Farmers. Seedling.April 2005. http://www.grain.org/article/entries/492-bt-cotton-in-south-africa-the-case-of-the-makhathini-farmers accessed 8 August 2012

5 Wan-Ho, M. 2010. Mealy bug Bt cotton disaster in Punjab. **http://www.i-sis.org.uk/mealybugPlaguesBtCotton.php accessed 8 August 2012**

6 US EPA. **Pesticide Sales and Usage: Market Information**. See reports for 1998/1999 and 2006/2007, Table 3.6 at www.epa.gov/oppoo001/pestsales/