

Who benefits from GM crops? – the rise in pesticide use

After more than a decade of commercial cultivation, genetically modified (GM) crops are still failing to deliver the benefits the biotechnology industry claimed they would bring. Richard Hines and Clare Oxborrow of *Friends of the Earth International* summarise the findings of their new report.

More than a decade after their first commercial plantings the bulk of GM agriculture is still located in just a handful of countries, with only four crops, soya, maize, cotton and canola (oil seed rape), making up almost all of the biotech harvest. And the number of GM-traits is still largely limited to those developed in the mid to late 90's, herbicide tolerance (68%), insect-resistance (19%) or both (13%).

Increased pesticide use in US

One of the biotech industry's claims was that the introduction of GM crops would lead to a reduction in pesticide use. However, independent studies have shown that not only was this prediction wrong, but that GM crops have actually substantially increased pesticide use.

Glyphosate

Much of this is down to the rise in usage of glyphosate (Roundup) on Monsanto's glyphosate-tolerant (Roundup Ready) crops, which account for around 80% of GM crops grown worldwide.

In the US there was a 15-fold increase in glyphosate use on soya, maize and cotton between 1995 and 2005, coinciding with an increase in Roundup Ready crop acreage from 0 to 102 million acres. Initially this increase was more than offset by reductions in the use of other pesticides, but since 1999 increasing numbers of weeds resistant to normal doses of glyphosate have been recorded. Farmers have been forced to apply glyphosate at higher rates. In 2006 alone glyphosate use on soybeans jumped 28%, whilst soybean acreage increased by only 5%. United States Department of Agriculture (USDA) data shows that glyphosate use on maize rose only slightly from 1994 to 2002, yet during the period of rapid Roundup Ready maize adoption from 2002 to 2005, usage jumped 35% from 0.71 to 0.96 lbs/acre/year¹.

Weed resistance to chemical pesticides is not new to the US, but extensive resistance to glyphosate only developed some years after the introduction of Roundup Ready crops², with scientists placing the blame directly on the biotech industry's doorstep. For example,

scientists have attributed the evolution of glyphosate-resistant horseweed in Delaware to the continuous planting of Roundup Ready crops^{3,4}.

The growing levels of resistance pose a big problem to world agriculture, largely due to continuing dependence on the pesticide⁵. This led Agronomist Stephen Powles of the Western Australian Herbicide Resistance Initiative to state that 'Glyphosate is as important to world agriculture as penicillin is to human health'⁶.

Other pesticides

The biotech industry's claim that the use of other pesticides is reduced is also being undermined by recent trends. To deal with resistant weeds farmers are being forced to use other chemicals such as 2,4-D, a pesticide associated with a number of adverse health impacts. From 2002 to 2006 the amount of 2,4-D used on soya more than doubled, whilst glyphosate use rose 43%, so one is clearly not replacing the other. Similarly, the use of atrazine on maize has been increasing alongside glyphosate.



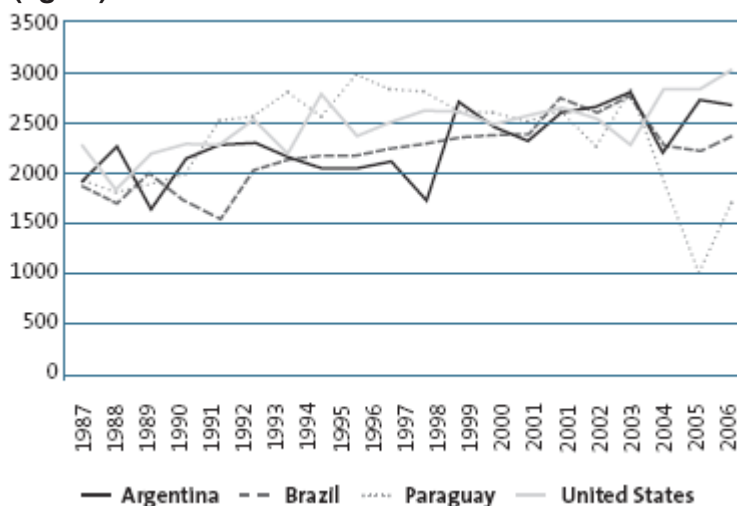
Photo: Jon Payment, <http://www.flickr.com/photos/chickenpeel/>

Same story the world over

The emergence of resistant weeds and associated increases in pesticide use are not confined to the US. Monsanto used to claim that it was *unlikely that resistant plants will appear over time in a weed population due to the mode of action unique to glyphosate*⁷. The growing number of glyphosate-resistant weeds throughout the GM growing nations tells a different story, with 58 cases of new glyphosate-resistant weeds identified in the last decade⁸.

One such weed is Johnsongrass (*Sorghum halepense*), considered to be one of the worst in the world. Problems controlling Johnsongrass with glyphosate were first reported by Argentine farmers in the late nineties⁹, and resistance was confirmed in 2003¹⁰. By October 2007, Argentine agricultural officials at the National Service of Agriculture, Food and Health and Quality (SENASA) estimated that 120,000 ha of land was infested with resistant Johnsongrass in the province of Salta, one of the areas where it first emerged. This represents a 10-fold increase from 2005 levels¹¹. The weed con-

Figure 1. Soybean yields in the top 4 soybean producers 1987-2006 (kg/ha)



Source: *Friends of the Earth International*, 2007. Based on data from FAOSTAT, *ProdStat, Crops*, Subject: Yield per hectare (kg/ha), Commodity: soybeans; Country: United States, Argentina, Brazil, Paraguay; Year 1987-2006, (last accessed 1 December 2007).

tinues to spread further afield, and SENSA has now reported the weed in five further provinces^{12,13}.

As in the US, the major recommendation to solve this is to use a cocktail of herbicides other than glyphosate, in an estimated quantity of 25 million litres a year¹⁴. Despite this the Argentine government approved a Roundup Ready maize variety in 2007¹⁵. This will further increase reliance on glyphosate and is likely to lead to accelerated expansion of glyphosate-resistant Johnsongrass. Elsewhere in South America the same problems are arising. In Brazil the use of glyphosate rose by nearly 80% from 2000 to 2005, much faster than the increase in area planted with Roundup Ready soya. Four glyphosate-resistant weeds have also evolved¹⁶.

What does the future hold?

Several factors make it virtually certain that the problems associated with herbicide-resistant weeds will become even worse in the future:

- The trend for developing herbicide-tolerant crops continues. Of the recent GM crops go gain approval in the US, half are herbicide tolerant, as are many of those awaiting approval.
- More weeds are developing resistance – 58 new cases of glyphosate-resistant weed have been identified worldwide in the last decade, covering an estimated 1 million hectares.
- Roundup Ready crops are increasingly being grown in rotation, vastly increasing selection pressure for glyphosate-resistant weeds. Nathalie Moll, executive director at EuropaBio, a European biotech industry association, has admitted that *farmers have rotated RR crops, usually soya and maize, to the point that the weeds themselves are now Roundup-resistant*.
- Herbicide-resistant weeds have prompted biotech firms to develop new GM crops that tolerate pesticide use in greater volumes, including crops that can tolerate more than one herbicide.

GM crops fail to deliver industry claims

One of the supposed benefits of GM was that yields would increase, thus benefitting farmers and the world's poor. However, no GM crop on the market has been designed to improve yields, and evidence suggests that GM actually produces lower yields in comparison to conventional varieties. In relation to soya there has been an estimated drop in yield of between 5-10% compared to otherwise identical varieties¹⁷. Instead, other factors are influencing crop yield, such as weather, irrigation and fertilisers, soil quality and farmers' management skills. Combined with the fact that the majority of GM crops are used in products like animal feed and biofuels for the benefit of rich countries, GM crops are failing to alleviate poverty, despite the biotech industry's claims. Figure 1 con-



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firms stagnating yield in countries that have heavily adopted Roundup Ready soya.

All these problems lead to the question of why GM crops are being grown on a large scale in some countries? Firstly, large-scale commercial farmers can benefit from adopting GM, due mainly to the reduction in farm labour required and increased flexibility in the timing of herbicide applications. GM soya is used in vast quantities to feed animals, without need for any labelling, even in Europe where consumers have shunned GM products. Finally, increasing control of seed supply by biotech firms means that farmers are finding it harder to find high-quality, non-GM alternatives.

It is now clearer than ever that Europe is right to take a precautionary approach to GM crops, where the only commercial GM crop (Monsanto's bt maize MON810) covers just 0.23% of Europe's agricultural land, and has been banned by five EU countries due to environmental concerns.

Increasing evidence shows that green farming methods, such as organic, can provide real solutions whilst boosting local economies and creating jobs.

For a full copy of the report visit http://www.foe.co.uk/resource/briefings/wh_o_benefits.pdf

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