



## GM Herbicide Tolerant Crops – Less Equals More

*Herbicides needed to support glyphosate and combat resistant weeds: 2,4-D, dicamba and glufosinate ammonium*

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When genetically modified herbicide tolerant (GMHT) crops were launched in the US and South American markets in the late 1990s one of their main selling points was that they would simplify weed control, reduce costs for farmers, involve fewer passes with spray equipment and allow the use of safer chemicals.

Monsanto's Roundup Ready (RR) crops, tolerant to the weedkiller glyphosate, now dominate the GMHT market. Independent research shows that glyphosate is far from safe – indeed it has been linked to health effects including birth defects, damage to amphibians, as well as harm to soil microbe communities.<sup>i</sup>

In the early years the promises of GMHT crops about lower costs and simplified weed control proved true, and farmers were quick to take up RR crops. However the overreliance on glyphosate (to the exclusion of nearly all other means of weed control) inevitably meant that by the early 2000s<sup>ii</sup> the first weeds with resistance to the herbicide appeared in RR soya, maize and cotton crops in the US.<sup>iii</sup> Resistance in RR soya crops in Argentina and Brazil was not far behind.<sup>iv</sup>

The agri-biotech industry knew full well that reliance on one chemical, and its overuse, was likely to lead to resistance in the target pests or weeds. An international database of weeds resistant to all herbicides<sup>v</sup> monitors and documents the relentless increase in the numbers of species and weed biotypes with resistance to one or more herbicides. Yet there was a widespread belief that resistance to glyphosate could not happen because of its unique mode of action,<sup>vi</sup> which involves the inhibition of a vital enzyme in the formation of proteins and shortage of carbon for other biochemical process in plants.

Glyphosate resistance did happen, and farmers throughout the Americas are now faced with complex weed control strategies to combat the growing number of glyphosate resistant weeds. In some GM cotton crops farmers have to resort to hand weeding the most troublesome weeds as other methods no longer work. Not surprisingly the solution proposed by Monsanto and other agri-biotech companies is to use more herbicides. GM Freeze has reported the latest developments in weed resistance and how mixtures of different herbicides will be employed on RR crops in the future.<sup>vii</sup>

This series of briefings looks at the toxicology and impacts of three of the herbicides that will be used to shore up Monsanto's RR crops by trying to combat the increasing weed resistance debacle. These herbicides are:

- 2,4-D
- Dicamba
- Glufosinate ammonium

Three other herbicides of concern are Flumioxazin, Sulfentrizone and Acetochlor.

The use of all these chemical weedkillers is likely to increase as farmers implement new strategies to deal with glyphosate resistance in weeds in RR crops. This should put the final nail in the coffin of Monsanto's claim that RR crops would lead to cheaper, easier and safer weed control and demonstrate that on the contrary RR crops are now another proven staging post in the pesticides

“arms race” that began in the 1940s.

Integrated weed management can greatly reduce dependency on chemical weed control without using GM crops and can provide an important transitional step to agroecological methods of weed management based on crop rotations, break crops, grazing, mechanical weed control and mulches. Such approaches provide safer alternatives and deal with all types of weed – herbicide resistant or not.

## Notes

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<sup>i</sup> GM Freeze and Greenpeace International, 30 June 2011. [Herbicide Tolerance and GM Crops - Why the world should be ready to round up glyphosate](#)

<sup>ii</sup> Riley P, 2010. “Resistant weeds cast a shadow over glyphosate-resistant crops”. *Pesticide News* 87: 3-5

<sup>iii</sup> Heap I, 2012. [The International Survey of Herbicide Resistant Weeds](#)

<sup>iv</sup> *Ibid*

<sup>v</sup> *Ibid*

<sup>vi</sup> Duke SO and Powles SB, 2008. “Glyphosate: a once-in-a-century herbicide”. *Pesticide Management Science* 64:319-325

<sup>vii</sup> GM Freeze, 19 October 2011. [Weed Resistance in RR Crops – An update](#)