Effects of Glyphosate-Resistant Crops on Water Quality

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Glyphosate (N-[phosphonomethyl] glycine) is a highly effective, non-selective herbicide. Herbicide-resistant crop (HRC) has been the most successful trait used in transgenic crops throughout the world. Transgenic glyphosate-resistant crops (GRCs) have been commercialized and grown extensively in the Western Hemisphere and, to a lesser extent, elsewhere. GRCs have generally become dominant in those countries where they have been approved for use, greatly increasing the utilization of glyphosate. Potential effects of glyphosate on ground and surface water are lower than the effects of the most herbicides that are replaced when GRCs are adopted. Perhaps the most positive indirect effect is that GRCs crops promote the adoption of reduced- or no-tillage agriculture, resulting in a significant reduction in soil erosion and water contamination. Glyphosate and its degradation product, aminomethylphosphonate (AMPA), residues are not usually detected in high levels in ground or surface water in areas where glyphosate is used extensively. There are some concerns about AMPA in water since it has higher mobility and persistence in the environment than glyphosate. However, neither glyphosate nor AMPA are considered to be significantly toxic. Of greater concern are the formulation ingredients, which can vary from country to country, from product to product, and even over time with the same product. There is some published evidence that formulation ingredients might adversely affect amphibians in some situations.