



# Are GM crops better for the environment?

Over the past 20 years, some genetic material from GM crops has mixed with non-GM crops. In 2009, Canada's flax exports were found contaminated with GM flax, shutting down trade. Flax farmers had to test their farm-saved seed and purchase new seed if the GM trait was found, reducing genetic diversity in Canada's flax varieties. GM canola in Canada contaminated non-GM canola seed stocks and most certified organic grain farmers no longer grow canola.

Organic farmers do not use GM seeds or synthetic pesticides. GM contamination threatens organic certification and the future of organic food and farming.

Such GM contamination can be impossible to reverse, can have unpredictable environmental impacts, and threatens the future of organic and ecological farming.

## FUTURE GMOS, FUTURE RISKS

Future risks from GM crops, trees and animals may look very different from our current reality, as new organisms with new GM traits are introduced into our environment and food system.

Canada has just approved a GM "non-browning" apple, and GM herbicide-tolerant and low-lignin alfalfa could be put on the market soon in Canada. The Minister of the Environment has approved the production of a GM fast-growing salmon in Canada, though it is not yet approved for eating and is therefore not yet being grown. Canada also continues to allow field tests of GM poplar trees. These GM crops, trees and animals all pose new, unique risks that are hard to predict.

The only experiment that will reveal the full environmental impacts of GMOs is open-air release – but once released, it may not be possible to control or recall genetically modified organisms.

**Genetically modified (GM, also called genetically engineered) crops have been a 20-year open-air experiment in Canada.**

The term "pesticides" includes herbicides, insecticides and fungicides.

**M**ost of the GM crops grown in Canada are herbicide-tolerant, and the rest are insect-resistant (some are both). There is limited data in Canada to help us examine the relationship between GM crops and pesticide use but we can see that, in general, herbicide use has increased over the past 20 years.

## MORE HERBICIDES

The widespread cultivation of GM herbicide-tolerant crops has pushed up the use of herbicides in Canada, as well as in other countries. Glyphosate-tolerant crops, in particular, have driven up the use of glyphosate-based herbicides.

- Herbicide sales in Canada rose by 130% between 1994 and 2011, from 21.9 million kilograms to 50.3 million kilograms.
- Glyphosate is the top herbicide ingredient sold in Canada, followed by 2,4-D and glufosinate ammonium. Glyphosate use tripled between 2005 and 2011.

### GM Crops Currently Grown

Canada	Global
Corn	Cotton
Canola	Squash
Soy	Papaya
Sugar beet	Alfalfa

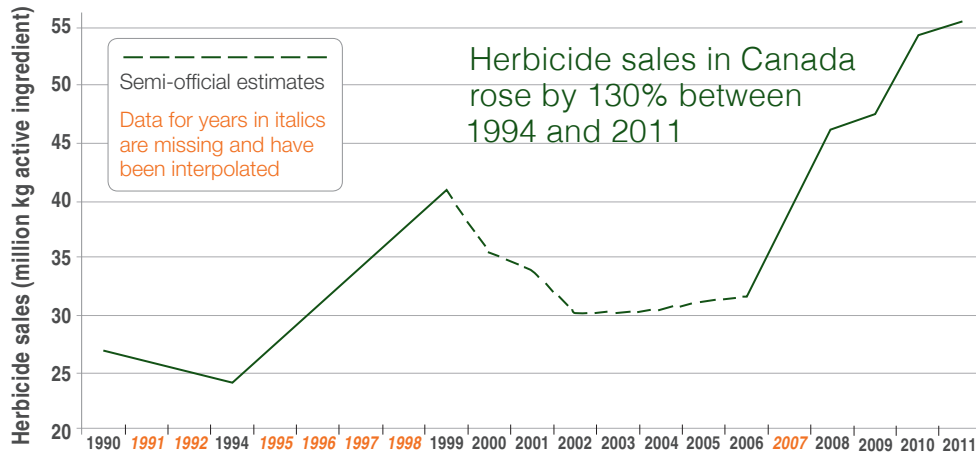


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The overall rise in pesticide sales in Canada is not due to expanding cropland, but is better explained by increasing “pesticide use intensity”, or the amount of pesticide applied per hectare.

## Herbicide Sales in Canada 1990-2011



Data for 1990-2006 is from the UN Food and Agriculture Organization and data for 2008-2011 from Health Canada

## Glyphosate

Glyphosate is the most widely used herbicide in the world. It is a “non-selective” herbicide which means that it kills all types of plants. It was developed by the chemical company Monsanto (now the largest seed company in the world) and commercialized in the formula called “Roundup” in 1974. **In March 2015, the World Health Organization’s International Agency for Research on Cancer determined that glyphosate is “probably carcinogenic to humans.”**

## HERBICIDE-RESISTANT WEEDS

The use of specific herbicides with GM herbicide-tolerant crops has caused herbicide-resistant weeds, or “superweeds”, to evolve and spread. These are weeds that can no longer be killed by certain herbicides.

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Worldwide, 32 weeds have developed resistance to glyphosate in the past 20 years. Most are found in just a few countries: 14 in the US, 10 in Australia, 7 in Argentina, 5 in Canada, and 6 in Brazil.

Canada now has five species of glyphosate-resistant weeds: giant ragweed, Canada fleabane, common ragweed, kochia, and tall waterhemp. These weeds are estimated to be on more than one million acres of Canadian farmland.

## 2,4-D- AND DICAMBA-TOLERANT CROPS

To deal with the problem of glyphosate-resistant weeds, companies have genetically modified crops to tolerate the older herbicides 2,4-D and dicamba. These GM crops will increase herbicide use even more, and lead to the spread of weeds resistant to 2,4-D and dicamba.

Canada was the first country in the world to approve 2,4-D-tolerant corn and soy (Dow AgroSciences) and dicamba-tolerant soy (Monsanto), in 2012.

## TOXIC GM PLANTS

Companies have also genetically modified crop plants to be toxic to certain pests. The industry said that the GM insect-resistant (Bt) crops would reduce the amount of chemical insecticides in the environment.

The Canadian government does not track the impact of Bt crops on insecticide use. In the US, Bt crops have reduced the use of insecticides, but some insects are now becoming resistant to the Bt toxin.

Bt plants themselves produce a toxin, which may have impacts on soil organisms and non-target insects.

## HARM TO BIODIVERSITY

Herbicide-tolerant crops have encouraged the use of herbicides that reduce plant and weed diversity on farms. This limits the habitat and food sources for a number of important species, including wild bees and other pollinators. In particular, monarch butterflies have declined by 90% because of glyphosate use on GM glyphosate-tolerant crops over the past 20 years in the US.

## GM CONTAMINATION

Gene flow from GM crops poses a threat to non-GM crops and to wild and weedy crop relatives, particularly in global centres of origin and diversity (areas where food crops originate or where their genetic diversity is greatest).

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