



Genetically Modified Crops and Herbicides

The federal government does not monitor pesticide use, and it does not track which GM crops are commercialized, how much or where GM crops are grown, or how they impact pesticide use. (The term “pesticide” includes herbicides, insecticides and fungicides.)

The use of genetically modified (GM or genetically engineered) crops has been tied to the use of pesticides for over twenty years.

With widespread adoption of GM crops, herbicide use has increased dramatically.

100% of the GM crops grown in Canada are genetically modified to be herbicide-tolerant.

Five GM crops are grown in Canada: corn, canola, soy, white sugar beet, and a small amount of GM alfalfa. All have GM herbicide-tolerant traits meaning that they are genetically engineered to withstand being sprayed by certain herbicides. Some have additional GM traits (insect resistance or low lignin).

88% of the world's GM crops are herbicide-tolerant. Most, but not all, herbicide-tolerant crops are genetically engineered to withstand applications of glyphosate-based herbicides. By 2012, about 56% of the global use of glyphosate-based herbicides was on GM crops.

Glyphosate is the most widely used herbicide in Canada.

While glyphosate-tolerant crops dominate the GM seed market, how much area is planted in Canada is unknown. Many GM corn varieties, and roughly half of all canola varieties, are tolerant to the herbicide glufosinate. **Many or most genetically modified crops are now stacked with multiple GM traits, to tolerate more than one herbicide.**

INCREASED USE OF HERBICIDES

Herbicide-tolerant crops were introduced in Canada in 1995 with the promise of creating a more efficient system for herbicide application, reducing total herbicide use. This

was true for many farmers in the first few years of growing GM crops, but this trend quickly reversed and we now see a steady increase in herbicide use.

Sales of agricultural herbicides in Canada increased by 234% between 1994 and 2020, from 21.91 million kilograms to 73.07 million kilograms.

While total herbicide sales increased in Canada, there was also a shift towards glyphosate and away from some other herbicides used in corn, canola, and soy.

Glyphosate is the top herbicide ingredient sold in Canada.

It is also the top agricultural herbicide ingredient, followed by glufosinate ammonium and 2,4-D. Glyphosate use tripled in Canada between 2005 and 2011.

SPREAD OF HERBICIDE-RESISTANT WEEDS

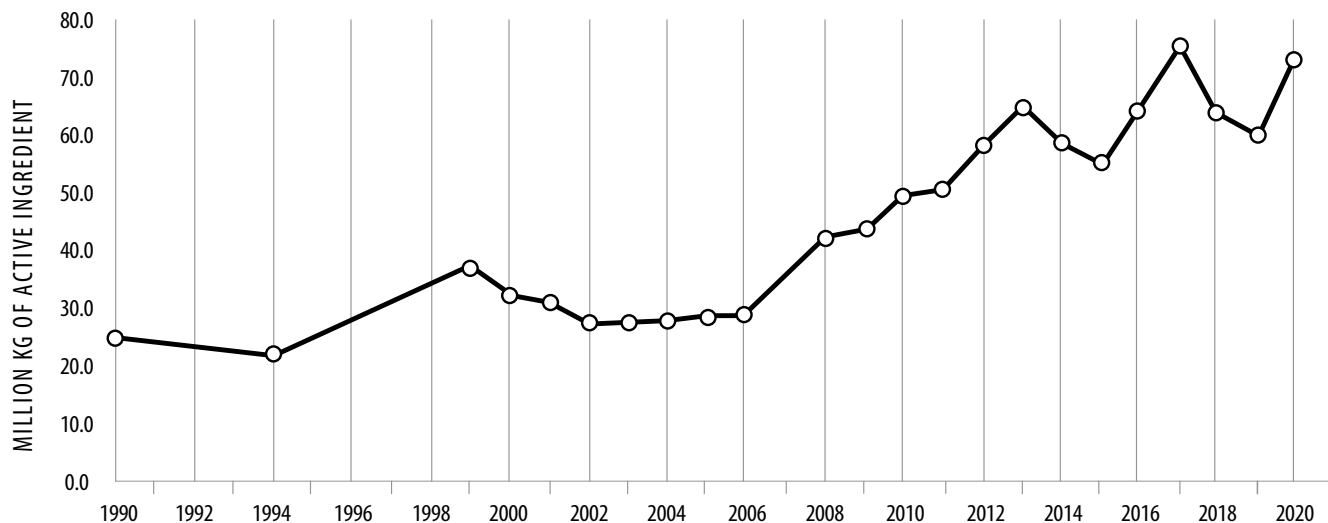
As a result of evolutionary pressure from widespread and frequent use of certain herbicides, some weeds have developed herbicide resistance. Higher doses and additional kinds of herbicides are being used to control the spread of these herbicide-resistant weeds.

57 weed species across the world have developed resistance to glyphosate (all since 1996): 17 of them are found in the US, and eight in Canada. Glyphosate-resistant weeds are now found in five Canadian provinces. Five are in Ontario (Common ragweed, Common waterhemp, Giant ragweed, Horseweed and Italian rye grass); glyphosate-resistant kochia is spreading across Manitoba, Saskatchewan and Alberta; the first glyphosate-resistant weed (Birdsrape mustard) was found in Quebec in 2017; and glyphosate-resistant Downy brome was found in Alberta in 2021.

In 2010, Monsanto began offering rebates to farmers when its herbicide product failed to kill all their weeds. DowDupont (now Corteva) also warned that weeds with resistance to multiple herbicides may prevent some farmers from growing certain crops altogether.

The emergence of herbicide-resistant weeds displays the failure of the herbicide-tolerant cropping system introduced twenty years ago by Monsanto, Bayer and other companies.

Herbicide Sales in Canada 1990-2020



Data for 1990-2006 is from the UN Food and Agriculture Organization and data from 2008-2020 is from Health Canada.

DICAMBA- AND 2,4-D-TOLERANT CROPS

There are no new herbicide products (with different modes of action) coming to market to help control glyphosate-resistant weeds, so companies have genetically modified crops to tolerate the older herbicides 2,4-D and dicamba.

- Monsanto launched (2017) a GM soy that is tolerant to **dicamba and glyphosate** (Roundup Ready™ Xtend™).
- DowDupont (Corteva) is selling GM corn (2017) and soy (2018) tolerant to **2,4-D and glyphosate** (Enlist™).
- In 2020, Canada approved Monsanto's corn that is tolerant to four herbicides including both **2,4-D and dicamba**.

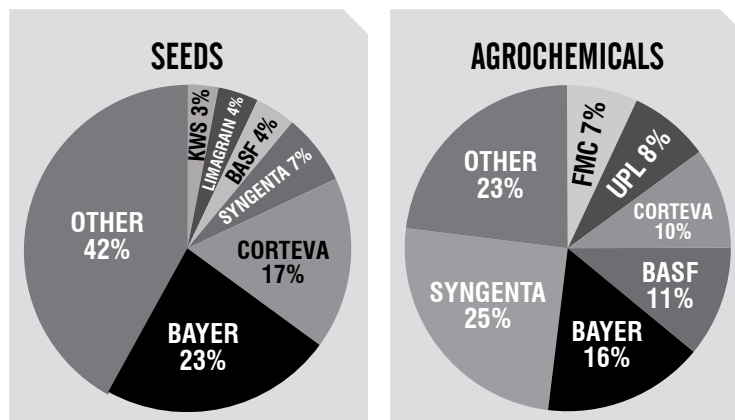
The introduction of these new GM herbicide-tolerant crops will repeat and deepen the cycle of rising herbicide use and the evolution of resistant weeds in a "pesticide treadmill."

CORPORATE CONTROL

Until 2016, the global market for GM crops was dominated by six companies - Monsanto, Dupont, Syngenta, Dow, Bayer and BASF. After a wave of mergers, these markets

are now controlled by just four companies: **Bayer** bought Monsanto, Dow and Dupont merged and rebranded as **Corteva**, ChemChina bought **Syngenta**, and some of Bayer's and Monsanto's business was sold to **BASF**. Sales of pesticides and GM seeds are closely tied together for these companies. **Six companies now control 58% of the global seed market and 78% of the global pesticide market.**

Corporate control in global seeds and agrochemicals post-mergers



For further background see CBAN's report "Are GM Crops Better for the Environment?" (2015) www.gmo inquiry.ca/environment