



# GMO 2015 Inquiry

**Unanswered Questions from  
20 Years of GMOs in Canada**

An Introduction

## 20 years of GMOs

It's been 20 years since the Canadian government approved the first genetically modified (GM; also called genetically engineered or GE) crops and foods, but critical questions about their impacts on our health, our environment, and our economy remain unanswered.

It's time to investigate the real impacts of genetically modified organisms (GMOs). In 2015, the Canadian Biotechnology Action Network (CBAN) will dig into important questions about GMOs and find out what's really happening in Canada.

Follow CBAN through the year as we investigate:

- 1 Where in the world are GM crops and foods?
- 2 Are GM crops better for the environment?
- 3 Are GM foods better for consumers?
- 4 Are GM crops better for farmers?
- 5 Are GM crops and foods well regulated?
- 6 Do we need GM crops to feed the world?

**Help shape our inquiry by sending us your questions.** Tell us what you want to know about GM crops and foods.

Join us for the GMO Inquiry 2015 to get this new research, Inquiry updates and to get involved. [www.GMOinquiry.ca](http://www.GMOinquiry.ca)

Read on to find out more about CBAN's investigation, and why the questions are important.

## Why the GMO Inquiry now?

Twenty years ago, the Canadian government approved the first genetically modified crops. In 1995, federal regulators approved GM canola varieties as well as the first GM soy, GM tomatoes (withdrawn from the market by the companies) and GM potatoes (also withdrawn from the market by the company). With these decisions, the federal government introduced genetically modified crops into our environment and food system.

After 20 years, we still have some major unanswered questions and we hear conflicting messages about the impacts and risks of GM crops and foods. Even though we still have important unanswered questions, the Canadian government could soon approve new GM foods, including the first-ever GM apple (this would be the first GM fruit grown in Canada) and the first GM food animal in the world (a GM salmon).

**What are the real impacts of GMOs on our environment, on our food and farming systems, on our economy, and on our health? We want to know about the food we're growing, buying and eating. We want to know who really benefits, and who pays the costs.**

The Canadian government has not monitored or shared detailed information to answer our questions. It's time to bring together research in Canada and from around the world, as well as the experiences of farmers in Canada and other countries, to shed light on the impacts of GMOs over the past two decades. It's time to decide if we want GMOs in the future of our food and farms.

## What is genetic modification?

**G**enetic modification (GM) is the introduction of new traits to an organism by making changes directly to its genetic makeup, e.g. DNA, through intervention at the molecular level and without traditional breeding methods. It's also called genetic engineering or GE. With genetic engineering, scientists can change the traits of plants and animals by inserting DNA pieces, whole genes, or long stretches of DNA segments from many different organisms. These sequences can also be taken from the same species or be newly made up. Scientists can also delete or swap DNA sequences in organisms or introduce genetic material to silence genes.

Unlike conventional breeding and hybridization, genetic engineering is a laboratory technology that enables the direct transfer of genes between organisms in different species or kingdoms that would not breed in nature, and the introduction of new sequences that do not even exist in nature.

These GM technologies are not precise and their outcome is not predictable: they commonly result in off-target effects and unintended consequences.

## THE QUESTIONS

# 1 Where in the world are GM crops?

**W**e often hear that GM crops are being widely grown by farmers around the world and are therefore very successful. But is this really true? We know, for instance, that the large majority of GM crops are grown in just a handful of countries. Just three countries – US, Brazil and Argentina – account for over 77% of the world’s GM crop acres, and ten countries grow 98% of the total.<sup>1</sup> **What GM foods are really out there, and where in the world are they being grown?**

Media reports about new GM research also often give the impression that there are many different types of GM foods in our grocery stores. We know, however, that just four crops – soy, corn, canola and cotton – account for almost 100% of all GM crops grown in the world. We also know that after twenty years, almost all the GM crops on the market are engineered with one or both of just two traits: herbicide

tolerance and insect resistance. In 2013, 57% of the world’s GM crops were engineered to be tolerant to a few herbicides, 16% were engineered to be toxic to pests, and 27% were “stacked” with both.

**In Canada, we grow GM corn, canola and soy, as well as some GM white sugar beet, but how much of each crop? Our government does not track this information.** We know from industry that over 97% of all canola in Canada is GM.<sup>2</sup> What about the other GM crops? How much of Canada’s fields are GM, and how much of the food in Canadian grocery stores is GM?

Statistics about GM crop acreage and adoption also leave a number of other important questions unanswered. For instance, how much access do farmers have to non-GM seed? How widely have GM crops been adopted around the world, and what does this tell us about the successes, and failures, of this technology? What do the numbers tell us, and what do they hide? **Once we know more about the real status of GM crops, we can investigate their impacts.**

## GM CROPS GROWN IN CANADA

CROP	TRAIT	WHERE ON THE SHELVES
1. Corn	Insect resistant, herbicide tolerant	Corn flakes • Corn chips • Cornstarch • Corn syrup • Corn oil and other corn ingredients in processed foods • Sweeteners like glucose and fructose • Eggs, milk and meat • Some sweet corn
2. Canola	Herbicide tolerant	Canola oil • Eggs, milk and meat
3. Soy	Herbicide tolerant	Soy oil • Soy protein • Soy lecithin • Tofu • Soy beverages • Soy puddings • Eggs, milk and meat
4. Sugar beet	Herbicide tolerant	Sugar

## GM CROPS IMPORTED TO CANADA

FOOD	GROWN	WHERE ON THE SHELVES
5. Cottonseed oil	U.S.	Cottonseed oil • Vegetable oil in processed foods such as potato chips
6. Papaya	U.S. (Hawaii)	Papaya in fruit juices and other processed foods
7. Squash	U.S.	Some zucchini • Yellow crookneck and straightneck squash
8. Milk products (Bovine Growth Hormone)	U.S.	Milk solids and powder • Frozen desserts with dairy • Imported mixed drinks with milk ingredients

## 2 Are GM crops better for the environment?

The biotechnology industry says that genetically modified crops are better for the environment. In particular, the industry tells us that GM crops reduce the use of chemical pesticides (the term refers to both herbicides and insecticides). Is this true?

We know that overall pesticide use has increased in the US<sup>3</sup> and has been steadily climbing in a number of countries since GM crops have been grown. **Are we using more herbicides in Canada because of GM crops?** Almost all of the GM crops currently grown are genetically modified to withstand certain herbicides, such as Monsanto's glyphosate herbicide called Roundup. Glyphosate-resistant weeds are now becoming a problem in some parts of Canada because weeds have been constantly exposed to the chemical herbicide. Will more chemicals be used to control these weeds?

Canada was the first country in the world to approve GM 2,4-D- and dicamba-tolerant crops to deal with glyphosate-resistant weeds. Unlike the US government, it appears that Canada did not estimate how these GM crops would increase the use of the chemicals they are twinned with.<sup>4</sup> What will the environmental impacts of this new decision be?

Insect-resistant Bt crops are genetically modified to be toxic to certain insects. They have reduced the use of chemical insecticides in the US.<sup>5</sup> Has this been the same in other countries? Are GM insect-resistant crops an environmental success story? What happens when insects become resistant to the Bt toxin? Is the Bt toxin harming organisms in the soil or pollinators and birds?

Even without GM, the large-scale production of corn, canola, and soy has a big environmental footprint. Monarch butterfly numbers in North America have declined by 90% percent over the past 20 years because of habitat destruction due to increased corn and soy production. Are GM crops part of this problem? **What do we know about the effects of GM crops on species like the monarch butterfly and on biodiversity in general?**

Also, contamination from GM plants is a direct threat to the future of organic farming, which, among other practices, prohibits GM seeds and GM animal feed. GM contamination can also have negative impacts on other farmers. **Do GM crops put our future options for ecological farming at risk? Is it true that new GM crops could help farmers make agriculture more sustainable?**



### 3 Are GM foods better for consumers?

**T**he Canadian government does not consult Canadians before introducing new GM foods. For example, the government may soon approve a “non-browning” GM apple. The company that owns the apple says it will benefit consumers because it has “more eye appeal: no yucky browning” but 69% of Canadians do not even want it approved.<sup>6</sup> Why don’t Canadians have a say?

Successive Canadian governments have refused to establish mandatory labelling of GM foods despite 20 years of polling that consistently shows over 80% of Canadians want GM foods labelled. This means that consumers in Canada can only make educated guesses as to where GM foods are on grocery store shelves. Why is the government so resistant to labelling GM foods? Is this lack of labelling justifiable?

The biggest question for most consumers is: Are GM foods safe to eat? Health Canada says: *“Given that the use of genetic modification does not introduce unique risks, the potential for long term effects of GM foods is no different from conventional foods with a long history of use in Canada.”* Is this true?

**We don’t know what, if any, negative health impacts there could be from eating GM foods, but there are many unanswered questions.** There is no scientific consensus on the safety of GM foods and crops<sup>7</sup> and there are some new long-term tests that raise serious concerns, requiring more investigation.<sup>8</sup> What are the potential health risks of GM foods, and what further testing is needed?

### 4 Are GM crops better for farmers?

**F**armers in Canada are growing GM corn, canola, soy and white sugar beet. How do these GM crops benefit farmers, and what risks do they pose? **A handful of corporations are profiting from GM crops, but are farmers also benefiting?** If GM crops are useful for farmers, are all farmers sharing the benefits?

The biotechnology industry says that farmers are the prime beneficiaries of GM technology. The benefits we hear about most are that GM crops increase yields, are convenient for farmers, and increase farmers’ incomes. But is this the reality for Canadian farmers? For instance, we know that while crop yields did initially increase when GM crops were first grown in some countries, these increases have not been consistent over the years, or across different environmental and agricultural conditions. A study in the US found that yields from GM herbicide-tolerant corn and soy did not increase at all.<sup>9</sup>

**Are yields in Canada going up because of GM crops? Are net farm incomes increasing because of GM crops?**

Statistics about yields do not tell the whole story of productivity or farm income. Farmers have to pay more for patented GM seed and the pesticides that go with them. In addition, GM crops are creating problems such as herbicide-resistant weeds, Bt-resistant insects, and contamination that can be costly for farmers. For example, in 2009, Canadian flax shipments to Europe were found to be contaminated with GM flax (which was approved in Canada and the US but never marketed) and farmers lost important export markets.<sup>10</sup>

Many farmers in Canada are concerned about the possible introduction of GM alfalfa because, among other impacts, GM contamination would threaten organic certification and conventional export markets.<sup>11</sup> **Is every GM crop the same or are some GM crops more risky for farmers than others?**

The Canadian government does not evaluate or monitor the agronomic and economic costs of GM crops. **Should the government consult farmers when making decisions about GM crops?**

## 5 Are GM foods and crops well regulated?

**T**he Canadian government tells us that “Health Canada conducts a rigorous and thorough science-based assessment of all GM food products.” Is this true?

Health Canada has already approved 12 different GM crops for human consumption (only 7 of which are currently on the market)<sup>12</sup> and is set to approve more, including the first-ever GM food animal (a GM salmon). Can we have confidence in our government’s regulation? Is Health Canada taking care of our safety when it approves new GM foods? Is the Canadian Food Inspection Agency taking care of our environment when it approves new GM crops? For instance, Canada was the first country in the world to approve GM 2,4-D-tolerant and dicamba-tolerant crops. Did regulators look at how these crops could increase herbicide use, and the health risks associated with more of these herbicides in our environment and food system?

Canada calls its regulation of GMOs “science-based.” However, Health Canada does not conduct its own safety testing. Instead it relies on safety data submitted by the company or institution that wants to sell the GMO, and this data is kept secret. Is this secrecy justifiable? Is it acceptable and responsible that Health Canada approves GMOs based on industry-generated data that is not peer-reviewed?

Canada’s regulation for health and environmental safety is focused on a narrow set of questions and does not even consider the potential economic risks or the wishes of Canadians. There are no public consultations with farmers or consumers. Is there a way to regulate GMOs for the public good?

Twenty years ago companies reassured Canadians about the safety of GM foods by stressing that they were well regulated by our government. Today, the biotech industry is complaining that regulations are too time-consuming and expensive.<sup>13</sup> **After 20 years, industry is pushing for even less regulation of GMOs. Is this responsible? Who decides?**

## 6 Do we need GM crops to feed the world?

**S**upporters of genetically modified crops claim that we need this technology to feed a growing global population. But are people really hungry because there is not enough food being grown in the world? **What are the real causes of hunger, and what are the solutions?** Are GM crops going to help us address malnutrition?

CBAN carefully examined these questions in 2014 with our report “Will GM Crops Feed the World?” and found that we already produce enough food to feed the world, and that GM crops do not help solve the real causes of hunger.<sup>14</sup> This question brings attention to a number of different issues raised by GMOs – including many that we will investigate earlier in the GMO Inquiry – and gives us the opportunity to look at the bigger picture.

To stop hunger, we need to address its root causes. Control over our farming and

food systems needs to be in the hands of farmers and communities, instead of private corporations. Farmers and other experts around the world are calling for diverse, sustainable and community-based agricultural development. Such models include agro-ecological food systems, which have enormous potential to produce enough high-quality food for all of us, while also supporting rural communities, building biodiversity and addressing climate change.

What does ecologically sustainable and socially just food and farming look like in Canada? We hope you will join us to envision solutions and discuss alternatives as we conclude the GMO Inquiry towards the end of 2015.

**It’s time to discuss the future of food and farming together.**

## notes

- 1 James, Clive. 2013. Global Status of Commercialized Biotech/GM Crops: 2013. ISAAA Brief No. 46. ISAAA: Ithaca, NY
- 2 International Service for the Acquisition of Agri-Biotech Applications (ISAAA). 2013. Biotech Crop Annual Updates 2013: Canola [www.isaaa.org/resources/publications/biotech\\_crop\\_annual\\_update/download/04%20Canola%202013.pdf](http://www.isaaa.org/resources/publications/biotech_crop_annual_update/download/04%20Canola%202013.pdf)
- 3 Benbrook, C., 2012. Impacts of genetically engineered crops on pesticide use in the U.S. – the first sixteen years. *Environmental Sciences Europe*, 24.
- 4 For background on GM 2,4-D tolerant crops see [www.cban.ca/content/view/full/1399](http://www.cban.ca/content/view/full/1399)
- 5 Benbrook, C., 2012. Impacts of genetically engineered crops on pesticide use in the U.S. – the first sixteen years. *Environmental Sciences Europe*, 24.
- 6 Leger Marketing, 2012. Canadian Public Opinion Poll: Arctic Apple Issue. Commissioned by the BC Fruit Growers Association and the Quebec Apple Producers Federation. July 3.
- 7 European Network of Scientists for Social and Environmental Responsibility. 2013. Statement: No scientific consensus on GMO safety. October 21. [www.ensser.org/increasing-public-information/no-scientific-consensus-on-gmo-safety/](http://www.ensser.org/increasing-public-information/no-scientific-consensus-on-gmo-safety/)
- 8 In particular: Carman, J et al. 2013. A long-term toxicology study on pigs fed a combined genetically modified (GM) soy and GM maize diet. *Journal of Organic Systems* 8(1): 38-54; and Séralini et al. 2014. Republished study: long-term toxicity of a Roundup herbicide and a Roundup-tolerant genetically modified maize, *Environmental Sciences Europe* 2014, 26:14 .
- 9 Gurian-Sherman, Doug. 2009. Failure to Yield: Evaluating the Performance of Genetically Engineered Crops. Union of Concerned Scientists. [http://www.ucsusa.org/food\\_and\\_agriculture/our-failing-food-system/genetic-engineering/failure-to-yield.html](http://www.ucsusa.org/food_and_agriculture/our-failing-food-system/genetic-engineering/failure-to-yield.html).
- 10 For more information see [www.cban.ca/flax](http://www.cban.ca/flax)
- 11 For more information see [www.cban.ca/alfalfa](http://www.cban.ca/alfalfa).
- 12 The 7 GM foods on the market are canola, corn, cotton, papaya, squash, soybeans, and sugar beet. Four of these are grown in Canada, the others are imported from the US. For details see [www.cban.ca/gmfoods](http://www.cban.ca/gmfoods).
- 13 For example: Pratt, S. 2014. GM crop regulations a food security hurdle, says executive. *The Western Producer*, October 23; and White, E. 2014. Irrational resistance to GM hurts ag sector: expert. *The Western Producer*, October 30.
- 14 For CBAN's report "Will GM Crops Feed the World?" see [www.cban.ca/feedingtheworld](http://www.cban.ca/feedingtheworld)

# Help us shape the Inquiry

» **visit [GMOinquiry.ca](http://GMOinquiry.ca)**

**TELL US** what questions you want answered about genetically modified crops and foods in Canada.

**JOIN** the GMO Inquiry 2015 for new research, Inquiry updates and ways to get involved this year.

## FIND OUT MORE

- Join the Inquiry at [www.GMOinquiry.ca](http://www.GMOinquiry.ca) to get new research, inquiry updates and ways to get involved.
- For information and updates on a range of GMO issues see [www.cban.ca/Resources](http://www.cban.ca/Resources)
- For detailed research see:  
Will GM Crops Feed the World? [www.cban.ca/feedingtheworld](http://www.cban.ca/feedingtheworld)  
Golden Rice – Vitamin A Rice [www.cban.ca/GoldenRiceFactsheet](http://www.cban.ca/GoldenRiceFactsheet)  
Genetically Modified Cotton [www.cban.ca/GMcottonFactsheet](http://www.cban.ca/GMcottonFactsheet)

**After 20 years of GM crops and foods, its time to get answers and find solutions. It's time to decide whether we want GMOs in our food and fields for another 20 years.**



The GMO Inquiry 2015 is a project of the Canadian Biotechnology Action Network (CBAN). CBAN is a campaign coalition of 17 organizations that researches, monitors and raises awareness about issues relating to genetic engineering in food and farming. CBAN members include farmer associations, environmental and social justice organizations, and regional coalitions of grassroots groups. CBAN is a project of Tides Canada Initiatives.

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