

Where in the world are GM crops and foods?

The reality of GM crops in the ground and on our plates

Report 1

Where in the world are GM crops and foods?

Published March 19, 2015

Updated March 30, 2015

For more details, please contact:

Canadian Biotechnology Action Network (CBAN)
Suite 206, 180 Metcalfe Street
Ottawa, Ontario, Canada, K2P 1P5

Phone: 613 241 2267 ext. 25 | Fax: 613 241 2506 | info@cban.ca | www.cban.ca



Collaborative Campaigning for Food Sovereignty and Environmental Justice

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.

Acknowledgements

CBAN would like to thank Thibault Rehn, Wesley Tourangeau, Ann Slater, Cathy Holtslander.

Graphic Design: jwalkerdesign.ca

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Summary

In this first report of GMO Inquiry 2015, we investigate what GM crops are grown in Canada and around the world, where they are being grown, how much of each one is being grown, and where they end up in our food system.

Industry promotional materials commonly depict genetically modified (GM) crops being grown widely around the world, but this is not entirely true. In reality, there are primarily four GM crops – corn, soy, cotton and canola – being grown anywhere in the world. Together, these four crops account for 99% of global GM acres.

Almost 100% of GM crops on the market are genetically engineered with either one or both of just two GM traits: herbicide tolerance, and insect resistance. These two traits account for almost all of the GM crops grown commercially over the past 20 years.

Just ten countries account for almost all – 98% of – the GM hectares around the world. The top three countries that cultivate GM crops – the US, Argentina and Brazil – account for over three quarters of global GM hectares. GM crops are grown on approximately 3.7% of the world’s total agricultural land, by less than one percent of the world’s farmers.

There are four GM crops grown in Canada: canola, corn, soy and sugar beet. Almost all of the canola (approx. 95%) and sugar beet (almost 100%), a large proportion of the grain corn (over 80%), and approximately two thirds (at least 60%) of the soybeans grown in Canada are GM. There is a very small, unknown quantity of GM sweet corn grown in Canada. GM foods are also imported from our major trading partners, notably the US.

The Canadian government does not monitor where all GM crops are grown in Canada, and has not established mandatory labelling of GM foods. The numbers in this report on GM crop cultivation in Canada are gathered from a number of sources, including commodity and industry groups, and international organizations.

The government regulates and lists approved GM foods within a wider category of “novel foods,” which includes GM and non-GM foods, and does not specify which are on the market. Without mandatory labelling, this often leads to confusion about which GM foods are in our grocery stores. For instance, GM tomatoes, GM rice and GM wheat are not on the market anywhere in the world.

This report outlines the current reality of GM crops in the ground, and GM foods on our plates. This information provides a foundation from which we can assess the economic reality of GMOs, examine the successes and failures of the technology after 20 years, and investigate their impacts and risks.

GMO INQUIRY 2015

Twenty years ago, in 1995, the Canadian government approved the first genetically modified (GM, also called genetically engineered or GE) canola varieties, as well as the first GM soy, GM tomatoes (not currently on the market) and GM potatoes (not currently on the market). With these decisions, the government introduced genetically modified crops into our environment and food system for the first time.

After 20 years, we still have major unanswered questions and hear conflicting messages about the impacts and risks of GM crops and foods. Even while our questions persist, the Canadian government has just approved the first-ever GM apple (this will be the first GM fruit grown in Canada) and could soon approve the first GM food animal (a GM salmon).

Canadian farmers and eaters want to know the impacts of GM crops – on our environment, our food and farming systems, our economy, and on our health. We want to know about the food we’re growing, eating and buying. And we want to know who truly

benefits from GM crops and foods, and who pays their costs and bears the burden of their risks.

The Canadian government has not monitored or shared detailed information to answer these questions. However, research in Canada and from around the world, as well as the experiences of farmers in Canada and other countries, helps shed light on the problems with GM over the past two decades. It’s time to bring our research together and assess the evidence, so that we can decide whether GM crops have a place in the future of our food system.

This is the first of a series of reports that are part of GMO Inquiry 2015.

Upcoming reports will answer the following questions:

- Are GM crops better for the environment?
- Are GM foods better for consumers?
- Are GM crops better for farmers?
- Are GM crops and foods well regulated?
- Do we need GM crops to feed the world?

As part of the first step in the GMO Inquiry 2015, we asked people to send us their questions about GMOs. CBAN is using these questions to guide the Inquiry. We need to know what Canadians wanted to know about GMOs, what information they were seeking, and what was important to them. The following is a sampling of questions that are answered in this report:

How common are GMOs in Canadian food products?

*How much corn in Canada is GM?
I can only find American statistics!*

What crops are GMO in Canada?

Can you tell me if there is any GMO wheat currently being grown?

Which GM crops stay in Canada, and which ones are exported?

Which of the foods that we regularly buy and consume contain GM products? I have a sense that anything containing corn probably has GM corn in it – is this true?

Where are GM crops grown in Canada: which provinces and regions?

Besides canola, corn, soy, and sugar, are there any other foods in the supermarket that could be GM? I’m specifically concerned with fresh fruits and veggies.

How many different GMO vegetables and fruits are grown in Canada?

Did the GM apple in the Okanagan get approval and is it in our supermarkets?

I am shocked that we have GMOs in Canada, I thought it was only the US. I would like to know what fruits and vegetables are GMOs, so I won’t buy them.

WHERE IN THE WORLD ARE GM CROPS AND FOODS?

There are a number of questions we need to answer to find out what 20 years of GM crops and foods have meant for farmers, eaters and the environment. To begin this investigation, we need to clearly understand what GM crops are grown in Canada and around the world, where they are being grown, how much of each one is being grown, and where they end up in our food system. We need to know the reality of how far GM crops proliferate in food and farming in Canada, in order to evaluate their successes and failures, assess their future potential, and investigate their real impacts and risks after 20 years.

This reality is not easy to uncover. **Canada does not track and report details on where all GM crops are in the fields or where GM foods are on the market.** In addition to limited data from Statistics Canada, the few estimates we have about GM crops in Canada come from Canadian commodity groups, the United States Department of Agriculture and the organization The International Service for the Acquisition of Agri-biotech Applications (ISAAA; see box on page 10). The sources of these estimates are not public.

In this report we dig through the available sources of information to draw a picture of the reality of GM crops and traits in the ground and on our plates, in Canada and around the world. We identify where our information about the status of GM crops comes from and what we still do not know, and point out what the statistics do not tell us.

GM CROPS IN THE GROUND AROUND THE WORLD

Industry promotional materials commonly depict genetically modified crops being grown widely around the world, but this is not entirely true.

In reality, there are primarily four GM crops being grown anywhere in the world, and almost all of them are genetically engineered with either one or both of two GM traits. Just ten countries account for a majority of GM hectares around the world.

What is Genetic Modification?

Genetic 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. 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.

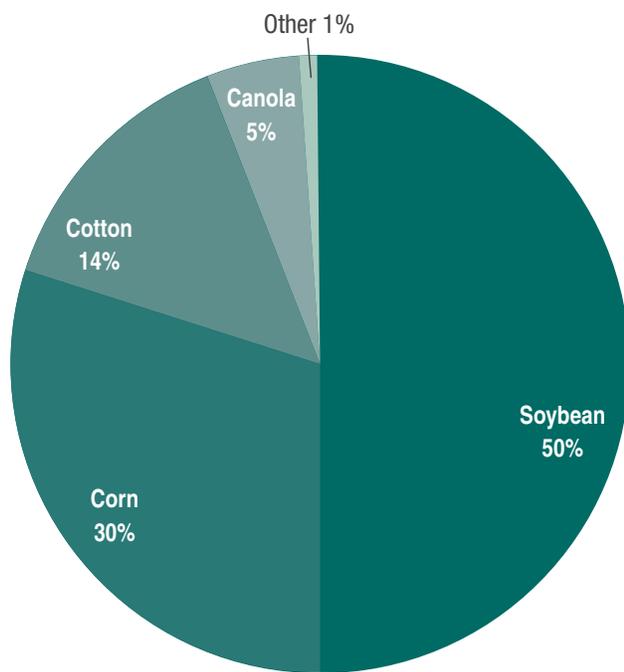
FOUR GM CROPS

Four GM crops account for 99% of worldwide GM crop hectareage. These are soy, corn, cotton and canola.¹

Half of all the GM hectares in the world are planted with GM soybeans.² GM corn accounts for 30% of the total global GM hectareage and GM cotton accounts for another 14%. GM canola accounts for 5% of the GM hectares in the world.³

Four GM crops account for 99% of worldwide GM crop hectareage. These are soy, corn, cotton and canola.

FIGURE 1: GM CROPS AS PERCENT OF TOTAL GM AREA



MAJOR GM CROPS

1. Soybean
2. Corn
3. Cotton
4. Canola

MINOR GM CROPS

5. Alfalfa
6. Sugar Beet
7. Papaya
8. Squash
9. Eggplant

These are the only GM crops that have been grown in any significant quantities, over the past 20 years.⁴

GM corn, soy and canola (and cottonseed oil) proliferate in our food system as ingredients in processed food and in animal feed, but there are very few GM crops – fruits and vegetables or GM grains – that are consumed as whole foods. The exceptions are some GM sweet corn grown in the US and Canada, some GM squash varieties grown in the US, and GM papaya grown in the US and China. There is also a very small amount of GM eggplant now grown in Bangladesh. However, all of these GM fruits and vegetables – along with some GM sugar beet (grown in Canada and the US) and GM alfalfa (grown in the US) – collectively account for only 1% of global GM crop hectares.⁵

It is a misperception that there is a wide array of GM foods on the market. 56 GM crops were field tested around the world between 1986 and 1995, the majority of which were on 8 crops.⁶ **Twenty years later, only 9 crops are grown commercially.** There are no commercialized GM varieties of a number of key global staple crops, including wheat, rice, barley, millet, sorghum, cassava, potato and yam.

TWO GM TRAITS

Almost 100% of GM crops grown in Canada and the world are engineered with one, or both, of just two traits. These are herbicide tolerance and insect resistance.

Herbicide-tolerant (Ht) crops are engineered to survive applications of particular herbicides, which would otherwise kill the crop plants. This means that the herbicide can be applied on an entire field, killing the weeds but leaving the GM crop standing. Monsanto’s GM “Roundup Ready” crops, which are genetically engineered to tolerate applications of the company’s glyphosate-based herbicide, “Roundup”, are the most common Ht crops today.

Insect-resistant crops are engineered with a gene from the bacteria *Bacillus thuringiensis* (Bt), which is toxic to some insects. GM Bt plants are engineered to synthesize Bt endotoxin in their cells, making the entire plant toxic to some above- and/or below-ground insects such as butterflies and beetles. For example, Bt corn varieties in Canada are engineered to variously target black cutworm, corn earworm, corn rootworm, European corn borer, fall armyworm or the western bean cutworm,⁷ and Bt cotton, in several countries, is engineered to target the cotton bollworm.

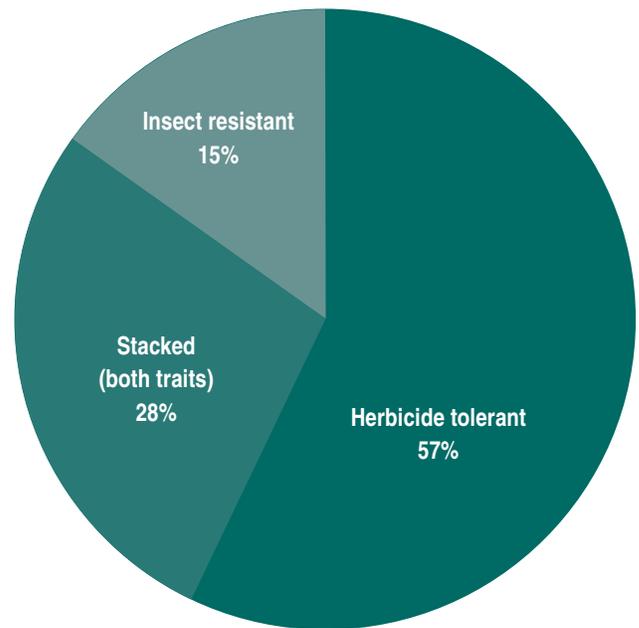
In 2014, 57% of the world’s GM crops were engineered to be herbicide-tolerant, 15% were engineered to be toxic to pests, and 28% were “stacked” with both herbicide tolerance and insect resistance.⁸ This means that, when we consider stacked and single trait crops together, **85% of all GM crops in the world are engineered to be tolerant to herbicides.**

These two traits account for almost all the GM crops grown commercially over the past 20 years. Other traits – virus resistance and drought tolerance – collectively account for less than 1% of global GM crop hectares.⁹ Even in 1997, for instance, herbicide-tolerant crops were 63% of all GM crops, and insect-resistant crops accounted for 36%.¹⁰

While the biotechnology industry is researching and developing GM crops with a wide variety of other traits, including for higher yields, tolerance to environmental conditions, and higher nutritional content, none of these crops – including the GM Vitamin-A-enhanced rice called “Golden Rice”¹¹ – are ready or currently commercialized anywhere in the world.

Two products with new GM traits were very recently approved in the US: a potato that is genetically engineered to resist bruising and to produce less acrylamide (a suspected carcinogen) in frying (November 2014), and a GM “non-browning” apple (February 2015). As of March 2015, neither is on the market.

FIGURE 2: GM TRAITS AS PERCENT OF TOTAL GM AREA



MAJOR GM TRAITS

- Herbicide tolerance
- Insect resistance

MINOR GM TRAITS

- Virus resistance
- Drought tolerance

TEN COUNTRIES

Twenty years after their introduction, a large majority of the area planted to GM crops still remains in just a few countries. The US was the first adopter of GM crops and is still the largest cultivator, accounting for 40.3% (73.1 million hectares) of the global area under GM crops in 2014.¹² Brazil grows 23.3% (42.2 million hectares), and Argentina 13.4%.¹³ Together, these top three countries grow over three quarters – 77% – of the world’s GM crops. India and Canada account for approximately 6% of the total global GM hectareage each. China and Paraguay account for 2% each, and South Africa, Pakistan and Uruguay account for less than 2% each.¹⁴ **Together, these top ten countries accounted for 98% of the total global GM hectareage in 2014.** (See *Table 1*).

In 2014, there were 28 countries that grew GM crops (one more than in 2013, and the same number as in 2012).¹⁵ However, 13 of these countries grew less than 0.1% each of global GM hectareage, and another 6 grew less than 1% (See *Table 1*). The list of countries that grew GM crops in 2014 includes Bangladesh, which grew as little as 12 hectares of GM crops in 2014, and Costa Rica, which grew 38 hectares.¹⁶ GM crops are only being grown on approximately 0.14% of arable land in Europe.¹⁷ Over 160 countries in the world do not grow any GM crops. (See *Figure 3*).

The industry-affiliated organization ISAAA (see page 10) calls countries that grow more than 50,000 hectares of GM crops “biotech mega-countries” and, in 2014, it put 19 countries in this category.¹⁸ However, this list included countries such as Mexico, which grew 170,000 hectares of GM crops; Australia, which grew 540,000 hectares; and Spain and Sudan, which grew approximately 100,000 hectares each. This represents a small proportion of the total arable land^a in these countries: For instance, Mexico’s total GM cultivation accounts for a mere 0.7% of its arable land area.¹⁹ Similarly, Sudan’s GM crops are only being grown on 0.4%, and Australia’s and Spain’s on 1% of their arable land. (See *Figure 3*).

In contrast, the US grows GM crops on 47% of its arable land. Brazil’s GM crops account for 58% of its arable land, and Argentina’s account for 61%. In India, for instance, where there is only one GM crop currently being grown, 7% of total arable land is under Bt cotton cultivation, while 4% of China’s arable land is devoted to growing GM crops. In Canada, GM crops are grown on 18% of agricultural land^b and 25% of arable land.

GM crops are grown on approximately 3.7% of the world’s total agricultural land and 13% of arable land.²⁰ This means that 87% of global arable land remains free of GM crops. ISAAA also reports that, in 2013, 18 million farmers grew GM crops around the world,²¹ **a number that represents less than one percent of the world’s farming population.**²²

Twenty years after their introduction, a large majority of the area planted to GM crops still remains in just a few countries.

a Arable land is defined by the United Nations Food and Agriculture Organization (FAO) as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow.

b Agricultural land is defined by the FAO as the share of land area that is arable, under permanent crops, and under permanent pastures.

Figure 3: GM crops around the world

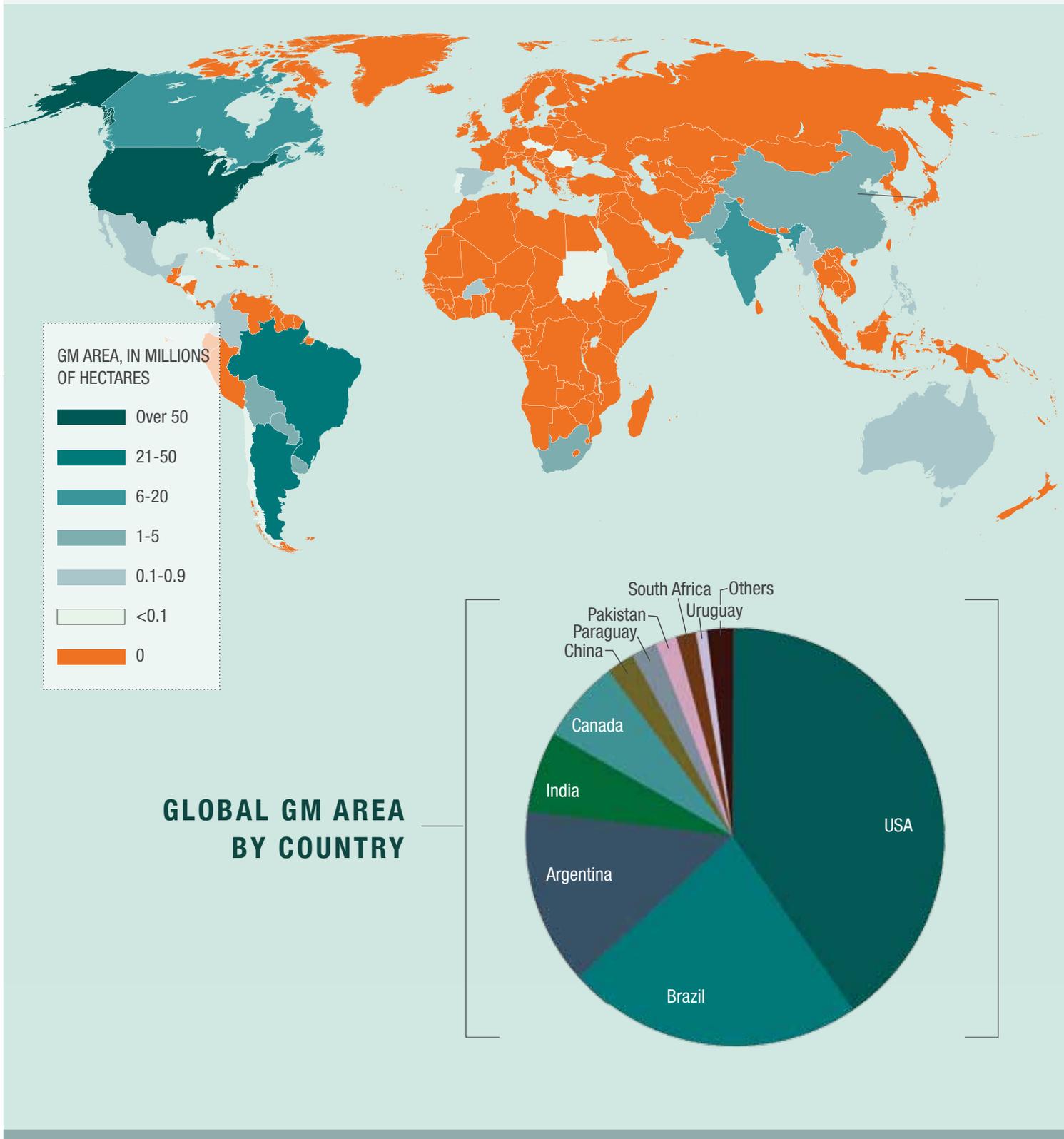
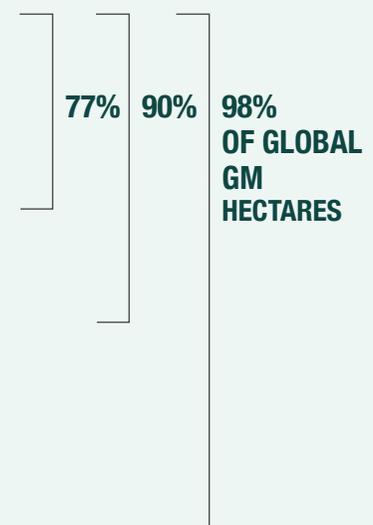


Table 1: Global GM area by country

	Country	Area (millions of hectares)	% of global GM hectares	Crops
1	USA	73.10	40.3%	Corn, soybean, cotton, canola, sugar beet, alfalfa, papaya, squash
2	Brazil	42.20	23.3%	Soybean, corn, cotton
3	Argentina	24.30	13.4%	Soybean, corn, cotton
4	India	11.60	6.4%	Cotton
5	Canada	11.60	6.4%	Canola, corn, soybean, sugarbeet
6	China	3.90	2.1%	Cotton, papaya
7	Paraguay	3.90	2.1%	Soybean, corn, cotton
8	South Africa	2.70	1.5%	Corn, soybean, cotton
9	Pakistan	2.85	1.6%	Cotton
10	Uruguay	1.64	0.9%	Soybean, corn
11	Bolivia	1.00	0.6%	Soybean
12	Philippines	0.83	0.5%	Corn
13	Australia	0.54	0.3%	Cotton, canola
14	Burkina Faso	0.45	0.3%	Cotton
15	Myanmar	0.32	0.2%	Cotton
16	Mexico	0.17	0.1%	Cotton, soybean
17	Spain	0.13	0.1%	Corn
18	Columbia	0.10	0.1%	Cotton, corn
19	Sudan	0.09	0.05%	Cotton
20	Honduras	0.03	0.02%	Corn, soybean, canola
21	Chile	0.01	0.01%	Corn
22	Portugal	0.009	0.005%	Corn
23	Cuba	0.003	0.002%	Corn
24	Czech Republic	0.002	0.001%	Corn
25	Romania	<0.001	<0.001%	Cotton, soybean
26	Slovakia	<0.001	<0.001%	Corn
27	Costa Rica	<0.001	<0.001%	Corn
28	Bangladesh	<0.001	<0.001%	Eggplant
	28 COUNTRIES	181.48m hectares	100%	9 crops



Data from James, 2015. ISAAA Brief Number 49.

Sources of Global GM Crop Numbers

Much of our information about the global status of GM crops comes from one organization. The International Service for the Acquisition of Agri-biotech Applications (ISAAA) defines itself as a “not-for-profit international organization that shares the benefits of crop biotechnology to various stakeholders, particularly resource-poor farmers in developing countries, through knowledge sharing initiatives and the transfer and delivery of proprietary biotechnology applications.”²³ ISAAA is funded by a number of large biotechnology corporations, including Monsanto (and its Indian subsidiary Mahyco) and Bayer CropScience, as well as industry lobby group CropLife and some national government agencies, including the US Department of Agriculture and the US Agency for International Development.²⁴

In the absence of consistent information from all national governments, including Canada, ISAAA’s annual reports are one of the only sources of information on the global status of GM crops. However, the reports do not clearly state where all their information comes from.²⁵ In its 2014 report, for instance, ISAAA includes statistics on Canada’s total GM hectareage and how much of each GM crop – corn, canola, soy and sugar beet – is grown in Canada. The report also outlines how much of the GM corn grown in Canada had stacked GM traits. There are no references for this information, with one exception: the report references the adoption rate of GM canola to a personal communication with the commodity group the Canola Council of Canada.

We can only assume that much of ISAAA’s data is based on seed sales figures provided by industry. Because of this, it is very difficult to analyse ISAAA’s data, and to assess its accuracy. While some figures may represent the reality of hectareage on the ground, others have been challenged in the past. For instance, ISAAA’s 2012 report stated that South Africa’s GM crop area had increased by 26% or 600,000 hectares over one year. However, this claim was refuted by the African Centre for Biosafety (ACB). ACB’s director Mariam Mayet said, “*The ISAAA in its desperate attempt to bolster the popularity of GM crops in the media, has overestimated the spread of GM crops in SA by a staggering 400%! According to the latest figures from the Department of Agriculture, Forestry and Fisheries (DAFF), the combined maize and soybean cultivation in South Africa increased by less than 150,000 ha over the stated period and the area planted with GM cotton has declined by 3,000 ha.*”²⁶

ISAAA has also been challenged on their statistics on GM corn planting in the EU in 2007 and in the Philippines in 2005,²⁷ for claiming that GM rice was being grown in Iran in 2006,²⁸ and by the International Federation for Organic Agriculture Movement (IFOAM).²⁹

THE REALITY OF GLOBAL GM CROP ADOPTION RATES

Monsanto and other proponents of GM crops commonly say that genetic engineering is “one of the fastest, most widely adopted agricultural innovations in history”³⁰ and that the spread of GM crops around the world is testament to its success, especially with farmers. In 2014, for example, ISAAA said, “*Hectarage of biotech crops increased every single year between 1996 and 2013, ... reflecting the confidence and trust of millions of risk-averse farmers around the world, in both developing and industrial countries.*”³¹ However, this claim misrepresents the reality and ignores a number of important political and economic factors that can drive GM crop adoption.

Firstly, global GM crop growth rates are largely a product of the fact that a few countries have rapidly adopted GM crops over the past 20 years.

Six years after GM crops were first introduced, in 2001, just four countries (US, Argentina, Canada, China) accounted for 99% of GM crops.³² By the 10th year, 21 countries were growing GM crops, but six of them still accounted for 96% of total GM hectares.³³ **The total number of countries growing GM crops has not increased since 2010.**³⁴

ISAAA calls GM crops the “fastest adopted crop technology in recent times”.³⁵ However, after the initial years of high growth rates, the global growth of GM crops is, in fact, slowing down, as the amount of land under GM crops in the few countries that are large-scale adopters has become saturated. In the past seven years, annual global growth rates were between 3 and 10%, with the global GM area in 2013 and 2014 approximately 3% higher than the years before.³⁶ **While a few countries rapidly adopted GM crops when they were first introduced, slowing growth rates show that most other countries are not following suit.**

ISAAA also highlights high growth rates in certain countries. In its 2013 report, for instance, ISAAA reported that Sudan increased its Bt cotton hectarage by 300% from the year before.³⁷ While this number sounds very impressive, this increase changed Sudan’s total GM hectarage from 20,000

While a few countries rapidly adopted GM crops when they were first introduced, slowing growth rates show that most other countries are not following suit.

hectares to 61,530 hectares, or 0.1% to 0.3% of its total arable land area.³⁸ Most recently, ISAAA’s 2014 report focused on Bangladesh growing its first GM crop – Bt eggplant. However, only 12 hectares of Bt eggplant were grown in Bangladesh, by 120 farmers.³⁹ Perhaps more importantly, while some countries may be beginning to adopt GM crops, these crops are not always introduced with farmer or consumer consultation, or within a democratic process. *Future GMO Inquiry 2015 reports will explore this issue further.*

Secondly, in some instances, **corporate concentration in the seed market can constrain farmers’ choices.** This is the case in India, for instance, where non-GM cotton seed is not easily available.⁴⁰ The fact that GM crops have been adopted and continue to be approved in some countries does not necessarily mean that they benefit farmers.

Thirdly, **these statistics leave some very important questions unanswered.** Are governments approving GM crops because farmers are asking for them? Do all farmers growing GM crops have access to non-GM seed? Are GM crops producing more food? Are farmers earning more money because of GM crops? *We must find answers to these questions as we form a real picture of GM crops around the world, and CBAN will explore many of these issues through GMO Inquiry 2015.*

WHERE IN CANADA ARE GM CROPS AND FOODS?

There are four genetically modified crops grown in Canada: GM corn, canola, soy and white sugar beet. But how much of each is grown? What GM foods are currently on the market and where are they in our grocery stores?

The Canadian government does not answer these basic questions. This is because the government does not gather statistics on all GM crops planted across Canada and has not established mandatory labelling of GM foods for consumers.

Table 2: GM Foods in Canada

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

CERTIFIED ORGANIC FARMERS DO NOT PLANT GM SEEDS OR FEED ANIMALS GM GRAINS

*GM grains are commonly fed to livestock and dairy cows.

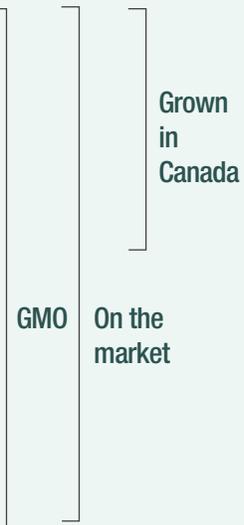
WHAT GM FOODS ARE WE EATING?

GM foods are commonly thought to be everywhere in our food system, but this is only the case for processed foods in North America, not for whole foods or fresh produce. For instance, it’s widely reported that 70% of the food we eat is GM,⁴¹ but this estimate reflects the dominance of GM corn, soy and canola in packaged foods. It is true that up to 70% of the *processed* foods in North American stores *could* contain GM ingredients.

Table 3: Approved “plants with novel traits” versus GM crops/foods on the market

This table consolidates the CFIA’s list of approved “Plants with Novel Traits” (PNTs), with additional information from Health Canada’s list of “Novel Foods”, to explain which of these PNTs are GMOs, and which are on the market.

	CROP	GMO	MARKET (COMMERCIAL) STATUS	GROWN IN CANADA	IMPORTED TO CANADA	GM TRAIT(S)
1	Canola	✓	Grown in Canada	✓	✓	Herbicide tolerant
2	Corn	✓	Grown in Canada	✓	✓	Insect resistant Herbicide tolerant
3	Soy	✓	Grown in Canada	✓	✓	Herbicide tolerant
4	Sugar Beet	✓	Grown in Canada	✓	✓	Herbicide tolerant
5	Papaya	✓	Grown in the US and China	✗	✓	Virus resistant
6	Squash	✓	Grown in the US	✗	✓	Virus resistant
7	Cotton	✓	Grown in the US, India, China, and others	✗	✓	Insect resistant
8	Alfalfa	✓	Grown in the US	✗	Imported as animal feed	Herbicide tolerant Low lignin
9	Apple	✓	Approved March 20, 2015	?	?	Non-browning
10	Potato	✓	Not grown anywhere in the world	✗	✗	Insect resistant
11	Rice	✓	Not grown anywhere in the world	✗	✗	Herbicide tolerant
12	Flax	✓	Deregistered in Canada. Not grown anywhere in the world	✗	✗	Herbicide tolerant
13	Tomato	✓	Not grown anywhere in the world	✗	✗	Delayed ripening Insect resistant
14	Lentils	✗*				Herbicide tolerant
15	Sunflower	✗**				Herbicide tolerant
16	Wheat	✗*				Herbicide tolerant



* Product of chemically induced seed mutagenesis
 ** Product of conventional plant breeding

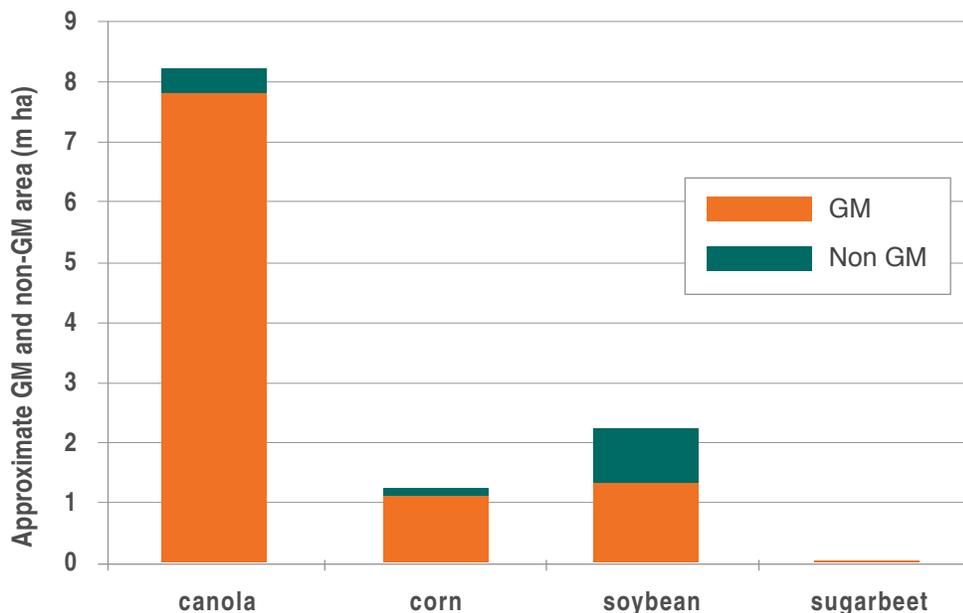
Frequent media reports about experimental GM research can also give the impression that there are many different GM foods on the market,⁴² and sometimes media incorrectly identify what GM foods reach our plates.⁴³ Information from Health Canada does not necessarily clarify this question for the public. Health Canada’s website summarizes that, “To date, over 81 genetically modified foods have been approved for sale in Canada,”⁴⁴ but this statement can lead to the misperception of a huge array of GM foods on the market. **In reality, these approved GM foods are varieties of just 13 different crops, and only 7 of them are currently on the market** (see *GM Food Chart*). For instance, the list includes 15 GM cotton events.^c

In addition, these GM foods are not listed separately by Health Canada but are part of a larger list of 184 approved “novel foods”.⁴⁵ **Government lists of approved products are not lists of genetically modified foods and crops.**⁴⁶ Health Canada and the Canadian Food Inspection Agency (CFIA) are responsible for assessing the safety of GM foods and crops, but Canada regulates GM products

under the broader categories of “Novel Foods” and “Plants with Novel Traits.” This means that the lists of approved products in these categories include foods and crops that are the product of other technologies, including conventional plant breeding and mutagenesis (exposing seeds to chemicals or radiation in order to generate mutants). For example, the list of “Plants with Novel Traits” includes varieties of wheat that are the product of mutagenesis, not genetic engineering. Furthermore, many of the GMOs on this list are not actually on the market in Canada. For example, the list includes GM potatoes and GM tomatoes, which were approved by the government, but neither of which is currently on the market anywhere in the world.^d (see *Table 2*). *GMO Inquiry 2015 will include a future report on the regulation of GMOs in Canada.*

Information from Health Canada and the CFIA does not provide a complete picture of what GM foods and crops are grown and eaten in Canada. Relying on the government’s lists of approved products commonly generates confusion.⁴⁷

Figure 4: GM crops grown in Canada



c A GM “event” is a specific genetic modification or transformation event. See <http://www.gmo-compass.org/eng/glossary/163.event.html>

d A new GM potato was approved in 2014 in the US but this is not yet approved in Canada and is not yet on the market in the US.

WHAT GM CROPS ARE BEING GROWN, AND HOW MUCH?

WHO HAS THE NUMBERS?

According to **Statistics Canada**, in 2014, 84.5% of all the grain corn grown in Quebec and 79.5% of grain corn in Ontario was GM.⁴⁸ Also in 2014, 58% of soybeans grown in Quebec and 61.5% of soybeans grown in Ontario were GM.⁴⁹ **This is the totality of official government statistics on GM crop plantings in Canada.**^e While Ontario and Quebec are the two largest producers of corn and soy in Canada, these crops are also grown in other provinces, and Canadian farmers also grow GM canola and GM white sugar beet. Given the limits of current data collection, we assume that Statistics Canada would not track the use of any new GM crops that could be imminently approved or introduced, such as the GM “non-browning” apple or GM alfalfa.

The **US Department of Agriculture (USDA)**, which publishes annual reports on Canada’s use of agricultural biotechnology, estimates that 80% of corn and 66% of soy grown in Canada is GM.⁵⁰ This information is based on the Statistics Canada data mentioned above, and “discussions with industry”.⁵¹ **The Canola Council of Canada** puts GM canola in Canada at 95% and the sugar beet industry puts GM sugar beet at around 95%. Additionally, **ISAAA** estimates, for the first time, that in 2014 approximately 1,000 ha of GM sweet corn were grown in Canada and the US, which accounts for 0.3% of all sweet corn grown around the world.⁵² The source for this information is not provided.

The **USDA** also estimates that total GM crop plantings in Canada in 2014 added up to “about 10.2 million hectares.”⁵⁴ This number is based on extrapolated figures from the Statistics Canada data mentioned above, as well as on “discussions with industry.”⁵⁵ **ISAAA**, on the other hand, estimates that Canada

“ Actual Canadian data on biotech production are limited...

— United States Department of Agriculture, 2014⁵³

grew 11.6 million hectares of GM crops in 2014.⁵⁶ Similarly, the industry lobby group **CropLife** most recently told a House of Commons hearing that, in 2012, 97.5% of canola planted in Canada was GM and “more than 80% of corn and 60% of soybean crops”.⁵⁷ However, the **European Union** estimates that, in 2013, approximately 90% of soybean⁵⁸ and 98% of corn grown in Canada was GM.⁵⁹

These discrepancies between numbers reported by the US government, the European Union, ISAAA, and industry and commodity groups emphasize that no one – including our major trading partners – knows exactly how many hectares of GM crops are grown in Canada.

CANADA’S FOUR GM CROPS

In 1995, the company Monsanto advertised:

“A wide variety of biotechnology products will become available in Canada in the next five years. Monsanto has developed canola that tolerates Roundup herbicide during the growing season and insect-protected potatoes that allow farmers to use fewer pesticides. Other modified crops such as soybeans, alfalfa, corn, flax and tobacco will become available to Canadian farmers in the near future. Canadian consumers will also enjoy imported biotechnology products, such as better-tasting, longer-lasting tomatoes that will be available year-round.”⁶⁰

Today, 20 years later, three of these eight GM foods and crops are on the market in Canada.

e Statistics Canada started gathering data for GM corn and soy in Quebec and Ontario in 2000, from June and November farm surveys each year. The Institute of Statistics in Quebec breaks down Statistics Canada data for GM corn and soy production by region and posts this information online. In 2011, CBAN wrote to Statistics Canada to request that data be collected for all GM crops, in all regions.

GM CANOLA IN CANADA

Approximately 95% of Canada's canola is GM.

GM CROP/TRAIT: The GM canola varieties on the market are herbicide-tolerant, to Monsanto's glyphosate-based herbicide Roundup (Roundup Ready) or Bayer's glufosinate ammonium herbicide Liberty (Liberty Link).^f

HOW MUCH: According to ISAAA, based on communication with the Canola Council of Canada, 8 million hectares, or 95% of Canada's canola was GM in 2014.⁶¹

GM canola was first approved in 1995, and was grown under restricted conditions until 1997.⁶² However, by 1998, GM canola was already 50% of all the canola grown in Canada⁶³ and, by 2001, it had increased to 80%.⁶⁴

Canada is the world's largest producer of canola, and the almost-complete saturation of Canadian canola hectares with GM seeds makes Canada the fifth largest GM producer in the world. Based on ISAAA's data, in 2014, 69% of Canada's total GM hectares were planted to GM canola.⁶⁵

WHERE: Canola is mostly grown in Saskatchewan, Alberta and Manitoba. British Columbia, Ontario, and Quebec also grow canola, though the areas in these provinces together add up to less than 1% of the total,⁶⁶ with a small amount possibly also grown in PEI.

SOURCE OF INFORMATION: ISAAA cites the Canola Council of Canada as the source of its number on GM canola plantings. The Canola Council represents canola growers and companies, and is currently funded by biotechnology companies including BASF, Syngenta, Dupont Pioneer and Monsanto.⁶⁷

ORGANIC CANOLA: Organic canola accounts for less than 1% of all canola grown in Canada.⁶⁸ Contamination from GM canola has made it almost impossible for most organic farmers to grow canola. This contamination was due to cross-pollination during the growing season, which led to the emergence of GM volunteer canola in fields in subsequent years, as well as to the documented contamination of non-GM canola seed. Organic standards prohibit farmers from knowingly using GMOs, thus farmers needed to find uncontaminated seed and land that was not subject to the risk of cross-pollination. In 2002, Saskatchewan's certified organic farmers initiated a legal action, to take Monsanto and Bayer Crop Science to court to get compensation for losses due to contamination of their crops and fields by GM canola. However, the case was not heard in court because Saskatchewan's Appeal Court denied the farmers class action status and, in 2007, the Supreme Court of Canada refused to hear an appeal.⁶⁹ *Future GMO Inquiry reports will discuss the economic impacts of GM contamination.*

NON-GM CANOLA: Non-GM canola is grown in small pockets, where farmers can keep their fields isolated from GM canola fields. In 2010, 15 PEI farmers grew 1,200 hectares of non-GM canola for the Japanese market.⁷⁰ There is not enough non-GM canola being grown in Canada to meet the current market demand.⁷¹

USES: Canola is an important oilseed crop that is processed into cooking oil and widely used as an ingredient in processed foods; according to a 2013 report by the Canola Council, 64% of all vegetable oil consumed in Canada comes from canola.⁷² The byproduct, canola meal, is used as a protein supplement in animal feed, including feed for aquaculture.⁷³ It is also used to produce biodiesel and other commercial products including industrial lubricants and inks.⁷⁴

MARKETS: Ninety percent of Canada's canola seed, oil and meal is exported, and 93% of that is shipped to four markets: the US, China, Japan and Mexico.⁷⁵

^f Canola was developed from rapeseed by Canadian public researchers through traditional selection breeding. It did not originate as a genetically engineered crop.

GM CORN IN CANADA

There are at least four different types of corn grown in Canada: grain corn for food processing and animal feed, silage corn for animal feed, seed corn for seed, and sweet corn. Sweet corn has more sugar and less starch than varieties of grain corn, which are processed into food ingredients, animal feed, biofuels and materials such as plastics.

GM GRAIN CORN

Over 80% of the grain corn grown in Canada is GM.

GM CROP/TRAITS: Grain corn varieties are genetically engineered to be insect-resistant and/or herbicide-tolerant. According to ISAAA, 80% of all GM corn in Canada is stacked with both traits.⁷⁶ The CFIA lists 29 different stacked GM corn events that could be on the market.⁷⁷ Monsanto's GM "SmartStax" corn, for example, produces six different insecticidal toxins and is tolerant to two herbicides.⁷⁸

HOW MUCH: According to Statistics Canada, 84.5% of Quebec's grain corn and 79.5% of Ontario's grain corn was GM in 2014.⁷⁹ Statistics Canada does not monitor GM corn grown in other provinces. The USDA estimates that 81% of the corn grown in Canada is GM,⁸⁰ though ISAAA estimates that this number is much higher, at 93%.⁸¹ Corn is the third largest grain crop in Canada, after wheat and canola.⁸²

WHERE: Ontario grows around 60% of all Canada's grain corn, and Quebec grows almost 30%.⁸³

SOURCE OF INFORMATION: Statistics Canada collects data from farm surveys for GM corn plantings in Ontario and Quebec. The USDA extrapolates from these numbers, "based on discussions with industry," to get a Canada-wide estimate.⁸⁴

USES: Grain corn is processed into cooking oil and food ingredients such as cornstarch and corn syrup. Corn processing by-products are used for animal feed and some grain corn is fed directly to animals. There are no official statistics for the amount of corn directed to biofuel (ethanol) production in Canada.⁸⁵

GM SWEET CORN

There is a very small, unknown amount of GM sweet corn grown in Canada.

GM CROP/TRAITS: A small, undetermined amount of GM insect-resistant sweet corn, from Syngenta, has been on the market for over 10 years in North America. From CBAN's discussions with farmers and seed dealers, we know that only a few of these GM varieties were suited to the Canadian climate and they were not very popular. However, in late 2011, Monsanto also launched a line of GM sweet corn varieties. There are now 16 varieties of GM sweet corn seed sold on the Canadian market, all of which are both herbicide-tolerant and insect-resistant.⁸⁶ There are no GM popcorn seed varieties on the market anywhere in the world.

HOW MUCH: In its global reporting, ISAAA estimates, for the first time, that in 2014, "Biotech sweet corn is estimated to be at a minimal and nominal hectareage of 1,000 hectares of the sweet corn hectareage of an estimated 300,000 hectares."⁸⁷ However, whether this sweet corn is grown in just Canada and the US, or in other countries as well, is unknown, as is the source of this number. **This would mean that 0.3% of all the sweet corn grown globally was GM in 2014.**

In 2014, the Canadian Biotechnology Action Network and Vigilance OGM tested samples of fresh sweet corn and found only one GM sample out of 137 samples from nine provinces. These test results are not statistically significant but indicate that there is very little GM sweet corn on the market. Earlier test results (2012/2013) from Vigilance OGM, CBAN, Friends of the Earth U.S., and the Quebec TV show "Verts contre-attaquent", are consistent with this result.⁸⁸

WHERE: According to CBAN's 2014 survey of seed catalogues available to Canadian farmers, GM sweet corn varieties are only marketed to farmers with orders of 25,000 seeds or more, and are not advertised in seed catalogues that serve smaller market gardeners.⁸⁹ Sweet corn is the most widely planted vegetable in Canada, and is grown in all provinces.⁹⁰ 46% of Canada's sweet corn is grown in Ontario, 39% in Quebec, and 7% in Alberta and another 5% in British Columbia.⁹¹

USES: About 25% of all sweet corn in Canada is sold in season as fresh produce/corn-on-the-cob, while the rest is processed as a canned or frozen product.⁹²

GM SOY IN CANADA

At least 60% of the soybeans grown in Canada are GM.

There are two types of soybeans grown in Canada: beans for the “crush” market, used for oil and meal production and as a protein supplement in livestock feed; and food-grade soybeans used to make tofu, soy milk and other soy foods. These different types of soybeans have different markets, and GM soy varieties are used for some markets more than others. For example, there is a significant export market for Canada’s non-GM food-grade soybeans.

GM CROP/TRAITS: All the GM soybeans on the market are herbicide-tolerant, to glyphosate or glufosinate-ammonium. There is some restricted cultivation of 2,4-D-tolerant soy and test plantings of high oleic soy.⁹³

HOW MUCH: According to Statistics Canada, 58% of soybeans in Quebec and 61% of soybeans in Ontario were GM in 2014.⁹⁴ However, Agriculture Canada analysis provided to the former Canadian Soybean Council (now Soy Canada) adjusts these numbers upwards, based on conversations with industry, to estimate approximate annual seed sales.⁹⁵ For example, in 2013, according to the Soybean Council, 27% of soybeans grown in Quebec were non-GM, 20% in Ontario, 10% in the Maritimes and 4% in Manitoba.⁹⁶

According to the USDA, approximately 62% of the soybeans grown in Canada were GM in 2014 (down from 66% in 2012 and 2013).⁹⁷ ISAAA, however, estimates that there are approximately 2.2 million hectares of GM soybean in Canada, which would be approximately 98% of total soybean hectares.⁹⁸

WHERE: Soybean is a major crop in Canada, with 2.25 million hectares cultivated annually.⁹⁹ Over half of Canada’s soybeans are grown in Ontario, around 23% in Manitoba, 15% in Quebec, and a small amount in Saskatchewan and the Maritimes.¹⁰⁰

NON-GM SOY: Canada has valuable export markets for non-GM, food-grade soybeans to Asia – Japan, Malaysia, Vietnam in particular – and the United States. Ontario and Quebec are global leaders in producing non-GM soybeans,¹⁰¹ largely because of identity preservation protocols⁹ that allow for

non-GM soy production. (Cross-pollination is not a contamination threat in soybeans because the plants are self-pollinating, and segregation is therefore easier to maintain than in corn and canola production, for example.) Although Japan imports both GM and non-GM soybeans for different uses, soybeans imported for food use are all non-GM. Estimates suggest that Canada produces and exports approximately 800,000 to 1.2 million tonnes of non-GM soybeans annually.¹⁰²

USES: 85% of the world’s soybean crop is processed into meal and vegetable oil, with virtually all the meal used in animal feed.¹⁰³ Food-grade soybeans are processed into tofu and soy milk. Soybeans are also used to make soaps, cosmetics, and other consumer and industrial products.

MARKETS: Canada exports soy for animal feed and food processing to the US, Netherlands, China, Japan, and Belgium, among others. Canada also exports non-GM food grade soybeans to Japan, the US, Malaysia, and Vietnam and Norway.

Stacked Traits

Stacked GM crops do not always appear on the list of approved “Plants with Novel Traits” in Canada. This is because if a product is stacked with GM traits that have already been individually approved, Canada does not assess the stacked event itself for environmental or health safety. However, in response to pressure from CBAN, the CFIA now posts a list of stacked trait GM products that could be on the market.¹¹¹ Companies are asked to notify the CFIA before they introduce stacked products. According to this list, there are two stacked soybean varieties and 29 stacked corn varieties that could be on the market.¹¹²

⁹ Identity preservation is a process to ensure the purity or identity of soybeans that have unique attributes, to meet the demands of specific markets. It means that quality measures are documented from seed to export, and beans can be segregated by variety, quality, or specialty trait. For example, before harvest, equipment and storage bins are cleaned to prevent contamination. Identity preserved soybeans are stored in separate bins based on variety or specialty trait and segregated from other grains and oilseeds.

GM SUGAR BEET IN CANADA

Almost 100% of all the white sugar beets grown in Canada are Monsanto's GM herbicide-tolerant Roundup Ready sugar beets.

GM CROP/TRAIT: Monsanto's GM Roundup Ready sugar beets are grown in Canada. These are white sugar beets that are processed into sugar, not vegetable (red table) beets.

HOW MUCH: GM Roundup Ready sugar beet became available in the 2008-09 growing season and **in 2010, the Alberta Sugar Beet Growers said that at least 98% of the sugar beets grown in Alberta was GM.**¹⁰⁴ According to the company Lantic Inc., Alberta farmers planted about 90% of their 2009 sugar beet crop and 100% of their 2010 crop with Roundup Ready beets.¹⁰⁵

Sugar beet is a minor crop in Canada. In 2014, 400 Alberta farmers grew 8,900 hectares of sugar beet¹⁰⁶ on contract for Lantic Inc. (down from 9,700 in 2013 and 12,100 in 2012).¹⁰⁷ In Ontario, 100 farmers grew 4000 hectares of sugar beets to send to the Michigan-based grower cooperative, Michigan Sugar, for processing.¹⁰⁸

WHERE: Sugar beet is grown close to sugar processing facilities. All white sugar beet in Canada is grown in Alberta and Ontario under contract to the two sugar companies Lantic and Michigan Sugar respectively.

USES: White sugar beet is processed into sugar, including icing sugar and liquid sugar. Beet pulp, a by-product of sugar beet processing, is used for livestock feed.¹⁰⁹ Varieties of GM Roundup Ready "energy beets" for ethanol production have been developed, but biofuel production from beets is not yet at a commercial scale.¹¹⁰

MARKETS: White sugar beets in Canada have a limited market: There is one sugar beet processing plant in Canada, owned and operated by Lantic Sugar, in Taber, Alberta. All other sugar processing in Canada uses imported sugar cane.

WHAT GM CROPS AND FOODS ARE **NOT ON THE MARKET** IN CANADA?

✗ BOVINE GROWTH HORMONE

Monsanto's first genetically engineered agricultural product was supposed to be its recombinant Bovine Growth Hormone (rBGH), a GM veterinary drug designed to make dairy cows produce more milk. It was close to being approved in Canada in 1994 but, after 10 years of protest from consumers and farmers, which culminated in a public disclosure of concerns from Health Canada regulators, Health Canada rejected rBGH in 1999, based on animal health concerns.¹¹³ However, rBGH is still used in the US and, though it is not approved for use in Canada, milk products produced with rBGH can be legally imported. While Canada imports some milk, whey products, cheeses, and milk protein substances from the US, most of Canada's milk and dairy products are produced domestically.¹¹⁴ Currently, rBGH use in the US is estimated to be below 15%.¹¹⁵

✗ GM TOMATOES

There are four different GM tomatoes that have been approved in Canada (three for delayed ripening and one for insect resistance) but none of them are on the market anywhere in the world. The delayed-ripening GM "Flavr Savr" tomato, developed by the company Calgene, was test-marketed under the brand name MacGregor in one grocery store in Toronto for a few weeks,¹¹⁶ but the others do not appear to have ever made it to Canada. By the summer of 1995, Calgene was close to bankruptcy and was bought out by Monsanto in 1996.

The infamous GM fish-tomato was engineered with anti-freeze protein genes from flounder by the company DNA Plant Technology.¹¹⁷ However, it was only ever an experiment; the company never sought regulatory approval and it was never commercialized anywhere.

X GM POTATOES

Consumer rejection has kept GM potatoes off the global market since 2001. Canada has approved many varieties of Monsanto's insect-resistant (Bt) "New Leaf" potatoes (1995-2001), but in 1999, the major potato processing company McCain Foods declared it would not use the potato, and in 2001 Monsanto withdrew it from the Canadian and US markets.¹¹⁸ In 2013, the company BASF also abandoned efforts to seek European approval of its GM potato, which was developed for starch production.¹¹⁹

In 2014, the company Simplot received US approval for a potato that is genetically engineered to resist bruising and reduce asparagine (an amino acid that reacts with some sugars to oxidize into acrylamide, a possible carcinogen, at around 120°F, especially during high-temperature frying). This potato is not yet on the market and is not yet approved by Canadian regulators. www.cban.ca/potato

X GM FLAX

In the mid-90's, Canada approved a GM flax developed at the University of Saskatchewan, called "Triffid".¹²⁰ However, it was deregistered in 2001 after repeated objections from Canadian flax growers.¹²¹ The flax growers feared that GM contamination of their flax would harm valuable European export markets. Unfortunately, despite the actions of farmers to prevent it, GM contamination was found in flax exports to 36 countries in 2009 and Canada's flax exports to Europe were halted.¹²² Flax farmers have since borne the cost of testing for contamination and the flax industry has worked hard to remove contamination and rebuild markets. For many farmers, this has meant buying certified seed to replace farm-saved flax seed. www.cban.ca/flax

X GM WHEAT

There is no genetically modified wheat grown or eaten anywhere in the world, and it has never been on the market. In 2004, Monsanto withdrew requests for government approval of its GM herbicide-tolerant Roundup Ready wheat in Canada and the US because of widespread farmer and consumer opposition in both countries, as well as in major international wheat markets. www.cban.ca/wheat

X GM PIG

The genetically modified pig called "Enviropig" was set to become the world's first GM food animal but was shut down because of Canadian consumer and farmer protest.¹²³ In 2010, Environment Canada granted approval for the University of Guelph in Ontario to reproduce and export the GM pig but, in 2012, after a sustained campaign coordinated by CBAN and Beyond Factory Farming, the hog industry group Ontario Pork stopped funding the GM pig research at the university. The university then closed down its active research and ended its breeding program. The pig was engineered with genetic material from a mouse to reduce phosphorous in its feces. www.cban.ca/enviropig

WHAT GM CROPS AND FOODS COULD BE NEXT?

GM FISH

Canada's Minister of the Environment approved the commercial production of AquaBounty's genetically modified Atlantic salmon in November 2013.¹²⁴ However, the GM fish has not yet been approved for human consumption in Canada, or anywhere else in the world, though the Canadian and/or US governments could approve the GM fish for eating at any time. Two Canadian environmental groups, the Ecology Action Centre and Living Oceans Society, are challenging Canada's environmental approval in court.¹²⁵ The company's initial plan is to produce the GM fish eggs in Prince Edward Island and ship them to Panama for grow-out and processing.¹²⁶ The salmon are engineered with a growth hormone gene from Chinook salmon and genetic material from ocean pout (an eel-like creature) to grow faster. If approved, this GM fish would be the first GE food animal in the world. www.cban.ca/fish

GM APPLE

The BC company Okanagan Specialty Fruits (acquired by the synthetic biology company Intrexon in February 2015) received Canadian approval for its GM "non-browning" apple on March 20, 2015. It was also approved for growing

and sale in the US and could be on the market in 2016. The apple is genetically engineered so that it does not brown when sliced, for 15 days or more:¹²⁷ The company says the GM apples “have more eye appeal: no yucky browning”.¹²⁸ However, a 2012 poll showed that 69% of Canadians did not want it approved.¹²⁹ The BC Fruit Growers Association and the Federation of Quebec Apple Producers were opposed to the approval of the GM apple because they believe consumers will reject it,¹³⁰ and organic apple producers are concerned about possible contamination.¹³¹ www.cban.ca/apple

GM HIGH OLEIC SOYBEANS

New varieties of soybeans that are genetically engineered to have less saturated fat could be commercialized soon. These soybeans would allow for the production of soybean oil without the introduction of trans-fat (the oil is more stable and therefore does not need the hydrogenation that produces trans-fat). Dupont (Pioneer Hi-Bred) calls its “Plenish” high oleic soybean “a soy-based solution to transfats” and Monsanto has a similar “Vistive Gold” GM trait. Both are waiting for approval in the European Union before commercialization. Dupont Pioneer is currently growing its “Plenish” soy in Canada under controlled conditions; a few thousand acres were grown in Canada in 2010¹³² and they are also being field tested on some US farms.¹³³ The soybeans would be used to produce cooking oil for frying and food processing, and in industrial lubricants.¹³⁴

GM WHEAT

Monsanto withdrew its requests for approval of its GM Roundup Ready herbicide-tolerant wheat in Canada and the US in 2004. However, in 2009, Monsanto re-launched research into GM wheat, and the biotechnology industry is now engaged in a campaign to create a favourable economic and political climate for its introduction.¹³⁵ The grain industry is focused on lobbying for national policies that accept GM contamination (“low level presence”) in order to avoid market rejection of wheat exports if and when contamination occurs. Canada is a global leader in pushing for “low level presence” policies and is in the process of finalizing this policy change in Canada.¹³⁶ www.cban.ca/wheat and www.cban.ca/lip

GM ALFALFA

Farmer and consumer protest, culminating in a national Day of Action to Stop GM Alfalfa in 2013, has delayed the release of GM alfalfa in Canada. The company Forage Genetics International (FGI) already sells its GM alfalfa with Monsanto’s GM Roundup Ready trait in the US (used exclusively for animal feed) but has not yet started selling the seed in Canada. However, in late 2014, Monsanto was granted approval in both Canada and the US to sell its GM low-lignin alfalfa (though no varieties are registered yet in Canada). Monsanto has stated its plans to stack GM low-lignin alfalfa with its Roundup Ready trait, but farmer and consumer opposition in Canada to Roundup Ready alfalfa has been strong, driven by concerns of GM contamination. The future of both types of GM alfalfa in Canada is uncertain. www.cban.ca/alfalfa

2,4-D- AND DICAMBA-TOLERANT CROPS (CORN AND SOY)

Extensive use of the herbicide glyphosate on GM glyphosate-tolerant crops has led to the emergence of glyphosate-resistant weeds. In response, biotechnology companies have developed new GM crops that are tolerant to the older herbicides 2,4-D and dicamba. These GM crops are in various stages before full commercial release in Canada and the US :

- Dow AgroSciences has genetically engineered “Enlist” corn and soy to tolerate their “Enlist Duo” herbicide, which combines glyphosate and 2,4-D choline. The Enlist corn will also be stacked with Monsanto’s Roundup Ready Corn 2 and SmartStax.¹³⁷ The company started limited production of their 2,4-D-tolerant corn in Canada in 2014, where the corn was restricted to on-farm use (livestock feed).¹³⁸ Dow wants full commercial release of Enlist corn, in Eastern Canada in 2015, and soybeans in 2016.¹³⁹
- Monsanto’s dicamba-tolerant soy has been approved in Canada though no varieties are registered yet.¹⁴⁰ It was approved in January 2015 in the US and is pending approval in China. Monsanto says it is planning a commercial launch for 2016.¹⁴¹ Monsanto will also stack glyphosate and dicamba tolerance traits together.

www.cban.ca/24Dcrops

Conclusion

WHERE IN THE WORLD ARE GM CROPS AND FOODS?

- Four GM crops – soy, corn, canola and cotton – account for almost all – 99% – of the world’s GM crops.
- Almost all GM crops are engineered with one, or both, of two traits: herbicide tolerance and insect resistance. 85% of GM crops are herbicide-tolerant.
- Ten countries account for 98% of the global hectares of GM crops. Most countries are not growing GM crops.
- Only 3.7% of the world’s agricultural land is being cultivated with GM crops, and less than 1% of the world’s farmers are growing GM crops.

WHERE IN CANADA ARE GM CROPS AND FOODS?

- Four GM crops are grown in Canada: canola, corn, soy and sugar beet. Approximately 95% of all the canola grown in Canada is GM and almost 100% of all the white sugar beet grown is Monsanto’s GM herbicide tolerant Roundup Ready sugar beet. Over 80% of the grain corn grown in Canada GM, but there is a very little, unknown amount, of GM sweet corn on the market. At least 60% of the soybeans produced in Canada are GM.
- The US is our major trading partner and the first and most extensive GM crop adopter; many of the foods Canada imports from the US have GM ingredients.

It’s Important to Know Where GM Crops and Foods Are

The underlying assumption behind the lack of public information and data collection in Canada is that GM crops and foods do not need to be tracked in the fields or identified on the market. The assumption is that there will not be any adverse impacts or risks that require monitoring or analyzing, that any benefits or risks can be managed by the industry, and that consumers do not need to know where GM foods are.

However, Canadians want to know where GM foods are in their grocery stores. For 20 years, polls have shown that over 80% of Canadians want mandatory labelling.¹⁴² Despite this, **the government is still not a transparent source of information for consumers on GM foods, and relying on government information alone commonly leads to confusion.** For a clear listing of what GM foods are on the market in Canada, Canadians need to turn to other sources, such as CBAN, that do the additional research required. *Future GMO Inquiry reports will look at the concerns of consumers.*

In Canada, statistics are limited and we rely primarily on industry sources for estimates. This lack of basic monitoring of GM crops and foods obstructs our ability to understand the reality of GM crops in the ground, and GM foods on our plates. It undermines our ability to assess the economic reality of GMOs, to examine the successes and failures of the technology after 20 years, and to investigate their impacts and risks.

Statistics themselves, even when accurate, do not always tell the whole story. Numbers leave many questions unanswered and stories untold. These are the questions that CBAN is interested in investigating in *GMO Inquiry 2015*.

Now that we have established a basic picture of GM crops and foods in Canada and around the world, we can move ahead to document and evaluate what they mean for people and the planet. Join us as we answer important questions about the impacts of GM crops on our environment, economy and human health.

POLICY RECOMMENDATIONS

CANADA:

The Canadian government should collect reliable data on crops grown in the country. This includes:

- Tracking the area of all GM crops and non-GM crops across Canada.
- Tracking organic crop area.¹⁴³
- Monitoring which GM crops, GM traits and foods are on the market and providing Canadians with a clear list of the GM food crops and traits on the market.
- Establishing mandatory labelling of GM foods.

GLOBAL:

The United Nations Food and Agriculture Organization should encourage national governments to track GM crop plantings and should initiate independent global reporting of GM crops statistics, as provided by those governments.

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**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.**

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Collaborative Campaigning for Food Sovereignty and Environmental Justice