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Canadian Government use of terms: genetic modification/genetic engineering

Below are the definitions of "genetically modified" and "genetically engineered" provided by regulatory departments, the voluntary standard for labelling in Canada, with some notes on the use of these terms. Government text is in italics.

Canadian regulatory agencies

Canadian Food Inspection Agency

***GM** stands for "**genetically modified**". An organism, such as a plant, animal or bacterium, is considered genetically modified if its genetic material has been altered through any method, including conventional breeding. A "GMO" is a genetically modified organism.*

***GE** stands for "**genetically engineered**". An organism is considered genetically engineered if it was modified using techniques that permit the direct transfer or removal of genes in that organism. Such techniques are also called recombinant DNA or rDNA techniques.*

Health Canada

***What is genetically modified (GM) food?** Essentially, a GM food is one derived from an organism that has had some of its heritable traits changed. This can involve:*

- *Traditional techniques of **crossbreeding**.*
- *Using chemicals or radiation to alter the genetic make-up of the organism's cells in a process called **mutagenesis**.*
- *Applying **recombinant DNA or genetic engineering techniques** - for instance, introducing a gene from one species into another species.*

In practice

The CFIA refers to the non-browning "Arctic Apple" as genetically modified. While this is correct under the CFIA's broad definition of GM, the Arctic Apple fits the definition of genetically engineered. In fact, CBAN corresponded the company Okanagan Specialty Fruits to confirm the technology used, and the corresponding terms. The "Arctic Apple" is also technically "transgenic" because of the use of genes from other species and is referred to as such in US regulatory documents (Okanagan Specialty Fruits Petition (10-161-01p) for Determination of Non-regulated Status of Arctic™ Apple Events GD743 and GS784, Draft Environmental Assessment, August 2013.)

Canadian Standard for Voluntary Labelling – Canadian General Standards Board

The standard refers to products of genetic engineering:
"Voluntary Labeling and Advertising of Foods that are or are not products of genetic engineering"

Genetic engineering *(Génie génétique):*

> *Refers to techniques by which the genetic material of an organism is changed in a way that does not occur naturally by multiplication and/or natural recombination. Examples of the techniques used in genetic engineering include but are not limited to the following:*

1. *recombinant DNA (rDNA) techniques that use vector systems*
2. *techniques involving the direct introduction into the organism of hereditary materials prepared outside the organism*
3. *cell fusion (including protoplast fusion) or hybridization techniques that overcome natural physiological, reproductive, or recombination barriers, where the donor cells/protoplasts do not fall within the same taxonomic family*

Unless the donor/recipient organism is derived from any of the above techniques, examples of excluded techniques include but are not limited to the following:

1. *in vitro fertilization*
2. *conjugation, transduction, transformation, or any other natural process*
3. *polyploidy induction*
4. *mutagenesis*
5. *cell fusion (including protoplast fusion) or hybridization techniques where the donor cells/protoplasts fall within the same taxonomic family.*

It has been recognized that the term genetic modification is sometimes used as a synonym for genetic engineering as defined in this standard. However, to genetically modify a plant, animal, or micro-organism implies making any change to the genetic makeup of the organism by any intentional means whatsoever and is defined in this manner in the Food and Drug Regulations. Because of the broad nature of this definition, many food products would be considered genetically modified, and very few could be considered non-genetically modified. In order to meet the needs of consumers for information about the application of specific techniques of biotechnology, the standard limits itself to claims about the use of genetic engineering in the production of foods and food ingredients.

The standard is posted here: http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/programme-program/normes-standards/internet/032-0315/index-eng.html

Agriculture and Agri-Food Canada, Low Level Presence policy proposal

Agriculture and Agri-Food Canada is proposing a new policy called Low Level Presence (see www.cban.ca/llp) and uses the term genetic modification, instead of the term genetic engineering, to describe rDNA technology.

Genetically modified (GM) *refers to plants that have been modified using recombinant DNA technology.*

GM crop *refers to a plant with one or more specific or novel traits that have been introduced via recombinant DNA technology*

http://www.agr.gc.ca/eng/about-us/public-opinion-and-consultations/update-on-domestic-low-level-presence-policy-development/revised-draft-policy-on-the-management-of-low-level-presence-of-genetically-modified-crops-in-imported-grain-food-and-feed-and-its-associated-implementation-framework-for-grain/?id=1425927067839#a2-2.

From the CFIA, Modern Biotechnology: A Brief Overview

Accessed Dec 1, 2015

There are numerous terms and acronyms used in the area of biotechnology that can be confusing. Also, many countries use the same term to mean different things. For example, the European Union's definition of GM is the same as Canada's interpretation of GE. The following is the Canadian Food Inspection Agency's (CFIA) attempt at addressing some commonly used terms, of which only "biotechnology" and "novel trait" are used in CFIA legislation.

*"**Biotechnology**" means the application of science and engineering in the direct or indirect use of living organisms, or parts or products of living organisms, in their natural or modified forms. This term is very broad and includes the use of traditional or conventional breeding, as well as more modern techniques such as genetic engineering.*

*"**Modern biotechnology**" is used to distinguish newer applications of biotechnology, such as genetic engineering and cell fusion from more conventional methods such as breeding, or fermentation.*

Most often the term "biotechnology" is used interchangeably with "modern biotechnology".

*"**Conventional breeding**" or "**selective breeding**" means propagating plants or animals sexually, selecting for certain traits. Using selective cross-breeding, people can produce different varieties of plants and breeds of animals.*

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*Some international agreements like the Cartagena Protocol on Biosafety use terms like "**living modified organism**" (**LMO**). The Protocol defines a LMO as a microorganism, plant, or animal that has been derived through modern biotechnology-using techniques such as recombinant*

DNA-that is capable of transferring or replicating its genetic material (DNA, or "deoxyribonucleic acid", is the genetic material found in all living organisms).

*"**Transgenic**" organisms have a gene from another organism moved into them. For example, the plant product known as "Bt. corn" is a transgenic plant because it has a gene from the bacterium Bacillus thuringiensis, or Bt.. That gene produces a protein with pesticidal properties that, when incorporated into a plant, allows the plant to produce this protein, thus transferring the bacteria's natural defence to the plant.*

*"**Mutagenesis**" is the use of methods to physically change or "mutate" the genetic sequence, without adding DNA from another organism. Various chemicals and ionizing radiation can be used to invoke these changes. "Site-directed mutagenesis" can also be used to invoke changes in specific genes. In plants, such agents are used to change a plant's genetic sequence, and the plant can pass on these new characteristics to its offspring.*

*A new product may be considered "**novel**" if it has:*

- *a new trait(s) or characteristic(s), or*
- *a changed trait(s) or characteristic(s), or*
- *a new use as a food or livestock feed*

***PNT** stands for a "**Plant with a Novel Trait**". The word "novel" may remind you of a work of fiction, but it also means "new"-a PNT is a plant that has a new trait or characteristic. A plant is considered to be a PNT if has trait(s) that are novel to that species in Canada. That is:*

- *the new trait is not present in stable, cultivated populations of the plant species in Canada, or*
- *the trait in the plant species is present at a level significantly outside the range of that trait in stable, cultivated populations of that plant species in Canada.*

Traditionally, plants have been given new traits through selective breeding. Modern science gives plant breeders newer methods of introducing novel traits into plants, including mutagenesis and genetic engineering/rDNA. Canada is the only country that assesses plants and novel livestock feeds that have new traits introduced by any technique, including traditional breeding techniques and mutagenesis because the new traits may have an impact on the environment.

*A "**novel feed**" is livestock feed comprising an organism or organisms, or parts or products thereof, that:*
a) is not set out in Schedule IV or V of the Feed Regulations, or
b) has a novel trait (as defined in the Feeds Regulations).

Novel livestock feeds are composed of or derived from one of these sources: microbial, plants, or animal.

http://www.inspection.gc.ca/plants/plants-with-novel-traits/general-public/overview/eng/1337827503752/1337827590597