



GENETICALLY ENGINEERED TREES IN CANADA

Research to genetically engineer trees is an immediate environmental threat. The first-ever genetically engineered (GE, also called genetically modified) tree was approved in Canada in 2015: a GE apple tree. Research on GE poplar trees continues in Canada and the US.

GE APPLE TREES

On March 20, 2015, Canadian regulators approved the first genetically modified (GM, also called genetically engineered) tree, and first GM fruit, for growing in Canada. The apple is genetically engineered so that the apple flesh does not brown after being cut, for 15-18 days.²⁴⁷ These GM apple trees can now be legally planted in Canada (and the US), with apple blossoms flowering in Canada as early as 2016. Though it takes several years to establish an apple orchard, the company says that some GM apples could be on the market in late 2016.²⁴⁸

Apple trees are pollinated by bees. There are more than 450 bee species in BC²⁴⁹ and many small orchards support a great variety of these wild and native bee species, which can travel long distances. The company, Okanagan Specialty Fruits, argues that the risk of cross-pollination is low because bees will stay close to their hives when there is enough food, such as when an orchard is in bloom, and that "dense orchard plantings and buffer rows make it very difficult for bees to

maneuver far, so the risk of bees carrying pollen far enough to be an issue is almost nonexistent."²⁵⁰ But many orchardists disagree, especially when they consider the behaviour and diversity of native bees.²⁵¹

Contamination through seeds is also a potential threat. Apple blossoms that are pollinated with pollen from GM trees will produce apples whose seeds could contain the new gene sequence. Although commercial producers do not usually grow apple trees from seed, GM apple seeds could germinate and grow into viable fruit trees. Seeds can spread through the environment from discarded apple cores, including when eaten and spread by animals.

cban.ca/apple

GE FOREST TREES

The release of GM trees has begun. In addition to the GM apple trees, in 2014 the US government approved a loblolly pine that is genetically engineered for altered wood composition (for biofuel production) (this approval only

came to light in 2015)²⁵² and the Brazilian government approved the commercial growing of GM eucalyptus on April 9, 2015. The Canadian government has allowed field tests of GM trees beginning in 1997,²⁵³ and has invested in ongoing GM tree research through the Canadian Forest Service of Natural Resources Canada.²⁵⁴

Researchers at the University of British Columbia are part of a project that has genetically engineered poplar trees to have a lower lignin, so the trees will be easier to break down to produce paper and biofuel. The research was conducted in a US-Canada collaboration over many years, involving researchers from the Great Lakes Bioenergy Research Centre, the University of Wisconsin-Madison and Michigan State University.

Experiments with GM trees have enormous potential for gene flow because trees are large, long-living organisms that produce abundant pollen and seed that are designed to travel long distances,²⁵⁵ through wind dispersal as well as with help from animals.²⁵⁶ There is a very high risk that GE trees will contaminate native forests, with unpredictable and complex impacts on forest ecosystems.

Once such contamination begins, it cannot be stopped. GM trees will contaminate native forests, which themselves will become contaminants, in a never-ending cycle.

Scientists at the Canadian Forest Service have already warned that, "gene flow from genetically modified trees will occur unless they are strictly made unable to reproduce."²⁵⁷ Suggestions about the role of sterility technologies in relation to releasing GM trees are common because of the recognized contamination threat²⁵⁸ but these technologies would not be reliable and pose their own environmental risks (see cban.ca/terminator for information on the risks of "Terminator technology"). Despite the warning of inevitable contamination, Canadian government experimentation with GM trees continues.

GM trees threaten forest ecosystems. Forests include some of the world's most important biodiversity reserves, with some forest soils alone containing thousands of species. Canada's boreal forest is one of the largest and most ecologically significant ecosystems on the planet. It moderates the climate, produces oxygen, purifies the water that we drink, stores billions of tons of carbon, and is home to thousands of tree, plant, animal, bird and insect species.

The commercial introduction of GM trees could also have indirect impacts on the environment. Commercial and industrial scale biofuels production is already driving the conversion of forests and other natural ecosystems to the cultivation of crops and trees for fuel.²⁵⁹ Historically, the use of tree monocultures throughout the world has resulted in the widespread simplification of ecosystems and extinctions of endemic species.²⁶⁰ Genetically engineering trees in order to more efficiently manufacture them into biofuels and pulp and paper, for example, could increase the economic pressure to convert land into plantations.

CBAN, in community with groups across the world, has reached the conclusion that "The only reliable method for preventing the escape of genetic material such as transgenes from genetically engineered trees is to not release such trees into the open environment."²⁶¹ In 2008, CBAN and groups across the world supported a call for a global ban on GM trees at the United Nations Convention on Biological Diversity (CBD).²⁶² The call was supported by African governments but opposed by Canada and others, with the outcome that the UN CBD made several recommendations to strengthen national regulation and reaffirmed "the need to take a precautionary approach when addressing the issue of genetically modified trees".²⁶³

REFERENCES: All citations numbered here can be found in the GMO Inquiry 2015 report *Are GM Crops Better for the Environment?* gmoinquiry.ca/environment

For more information, updates and to take action see cban.ca/trees

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