

GENETIC USE RESTRICTION TECHNOLOGIES (GURTs) OR TERMINATOR TECHNOLOGY

WHAT IS GURTs OR TERMINATOR TECHNOLOGY?

Usually simply called Terminator, GURTs is the term used at the United Nations and in the scientific community and is applied to plants that have been genetically engineered to restrict their ability to reproduce or to exhibit other specific traits.

V-GURTs (Varietal GURTs), which refers to restrictions on reproduction of a plant variety, also called the Technology Protection System (TPS) by the company holding its first patent, involves a several-step gene sequence that results in killing a plant's seeds at a specified time, usually very late in its development. Thus, these Terminator crop seeds are designed to be sterile, and can't be used to produce next season's crop.

T-GURTs (Trait GURTs) genetically modify plants so that particular commercially valuable traits, such as resistance to herbicides, are expressed only if the genes are "switched on" by spraying the young plants or soaking the seeds with a proprietary chemical. The viability of the seeds of these crops can (in theory) be designed to be unaffected. This kind of externally activated gene-switching molecular mechanism is called an inducible system, and can be used for both T-GURTs and V-GURTs.

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CLAIMED BENEFITS AND CONCERNS

WHAT POTENTIAL BENEFITS ARE CLAIMED FOR GURTs?

Socioeconomic

These technologies were developed primarily as a means of protecting companies holding patented crop varieties from the unauthorized use of seeds saved from earlier crops. Patent protection laws are the standard approach for this purpose, but are difficult to enforce; GURTs are intended to create built-in patent protection. Some promoters claim that, with better patent protection, more commercial effort can be expended to improve varieties of minor crops, with gains from added value and increased yields.

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CLAIMED BENEFITS (contd.)

T-GURTs have the questionable benefit of allowing farmers not to use the chemical treatment and therefore to continue to use ordinary methods and to save and use seeds, though the advantages of the engineered traits must be foregone.

Ecological

Transgenic plants have genetically contaminated other species, and many groups and individuals are alarmed about the unpredictable effects of genetically altered crops on wild plant populations. Promoters believe Terminator technology would reduce (though it would not eliminate) this threat, since wild plants that are pollinated by Terminator crops will produce (largely) sterile seeds. However, it should be noted that genetic engineering, like all technologies, will have a certain failure rate, which has not at this time been precisely determined; its success as a biosafety tool cannot be guaranteed.

Terminator technology may reduce the threat of transgenic plants spreading their genes into nearby wild plant populations.

Along similar lines, the biotechnology company Maxygen has been developing a technique to get rid of foreign DNA from genetically modified (GM) plants. The idea is to incorporate a gene that, alongside the other inserted genes, will snip out DNA sequences between genetic markers placed around the foreign gene sequence. It is not certain, however, whether the technique will work as intended, or what its failure rate might be.

WHAT SUSTAINABILITY CONCERNS HAVE BEEN RAISED?

Socioeconomic

The major issue is the impact on Indigenous peoples and the 1.4 billion people who depend on farmer-saved seeds for their lives and livelihoods.

Poor farmers, who make up about half the world's agricultural producers, mostly in the South, depend on saving seeds from previous crops and

Most poor farmers depend on saving seeds from previous crops and would not be able to afford commercial seeds each year or the chemicals required.

would not be able to afford commercial seeds each year or the chemicals required to switch on the value-added T-GURT characteristics.

Many Indigenous peoples view Terminator as an attack on cultural and spiritual traditions. Contamination through cross pollination could disrupt seed exchanges and other customary practices.

The greatly increasing consolidation and vertical integration of the agro-chemical/seed industry raises concerns about fewer options and reduced leverage for farmers. This ongoing trend toward control over the seed market by a few multinational companies is encouraged by GURTs, an approach which is very expensive to develop but which promises major new market opportunities for companies able to fund the research and development.

Ecological

The pollen from Terminator plants could contaminate and kill seeds of other nearby plants. Thus, neighbouring crop seeds in the first generation could be rendered sterile, unbeknownst to the farmers harvesting them. Wild plant populations could be reduced or endangered.

Treatments used to activate Trait technology in seeds or plants could be ecologically damaging in various ways. The antibiotic tetracycline, for instance, has been suggested as one such gene-switching substance, but increasing its use in the

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CONCERNS (contd.)

environment could add to the growing problem of anti-microbial resistance in disease-causing bacteria.

With commercialization of these technologies the genetic diversity of the world's major food crops will be narrowed, thus increasing their vulnerability to disease and insects and reducing local crop adaptation to local conditions.

WHAT IS THE STATUS OF THESE TECHNOLOGIES IN TERMS OF COMMERCIALIZATION?

In 1998 the first patent on Terminator was jointly awarded in the U.S. to a cotton and soybean seed company, Delta & Pine Land Company, and the U.S. Department of Agriculture. The "suicide seeds" gave rise to intense controversy, and in 1999, Monsanto, the world's largest GM seed company, declared that it would not commercialize the Terminator technology. Nevertheless, a number of multinational companies continued to do research in GURTs and to obtain patents. There have been greenhouse trials of the technology in the U.S., but no field trials to date there, in Canada, or elsewhere.

WHAT ABOUT GOVERNMENT OVERSIGHT AND POLICY?

In 2000, governments at the United Nations Convention on Biodiversity (CBD) created a *de facto* moratorium which recommends countries not approve Terminator technology for field testing or

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commercial use. Canada has ratified the CBD, but the United States has not. In March 2006, the Conference of the Parties (COP) to the CBD met in Curitiba, Brazil, and rejected language for a case-by-case risk assessment approach that would have undermined the moratorium, which is ongoing until ended by the parties. The next COP is in 2008. Some 500 civil society groups from around the world, including farmers' organizations, church groups, development agencies, and others supported the moratorium, and most are calling for a lasting ban as well as national bans.

Canadian Government policy

Canada states that it "neither promotes nor opposes" GURTs, but has taken actions in U.N. meetings to end the moratorium. Along with New Zealand and Australia, Canada is generally seen as allied with the U.S. and industry on Terminator; Agriculture and Agri-Food Canada is considered the main driver of government policy on GURTs.

There is no Canadian legislation that puts in place a liability regime.

Regulation

A number of different federal departments are involved in a patchwork of legislation originally created for controlling other products, substances, and processes. The main departments responsible for different aspects of biotechnology regulation include Health Canada, Environment Canada, the Department of Fisheries and Oceans (DFO), and the Canadian Food Inspection Agency (CFIA). The regulatory approach is explicitly science-based and in the main does not consider socio-economic concerns.

Liability

There is no Canadian legislation that puts in place a liability regime. In Canada, biotechnology issues are subject to the traditional common law rules of civil liability. If the use of biotechnology causes damage to a person, their property or their economic interests, the producer or user of that

GOVERNMENT OVERSIGHT (contd.)

biotechnology might or might not be held liable for that damage by a court. The common law, as it has developed in Canada, may not be flexible enough to meet the novel challenges raised by the potential for harm that biotechnology applications may cause. These technologies bring up general policy issues that are better resolved by legislators rather than judges. A strict liability regime, entrenched in legislation, would hold producers of biotechnology responsible for damage to human or environmental health.

There is no legislatively mandated labeling for foods or other commodities produced by transgenic organisms, including GURT. However, products generally cannot be certified as organic if they are from GM organisms, a fact which could

affect organic growers if Terminator crops (and potential contamination from them) became a reality.

WHAT INTERNATIONAL IMPLICATIONS ARE THERE?

As well as concerns about impacts on poor nations, farmers, and Indigenous peoples, there are unresolved questions about the rights involved in saving seeds. There are also potentially conflicting national approaches about intellectual property (patent protection) over genetically modified plant traits and about trade barriers related to biosafety and their justification. Such issues can produce strong political pressures both for and against harmonization internationally.

ADDITIONAL SOURCES OF INFORMATION

Specific to Terminator Technology:

- **ETC Group** - an Ottawa-based organization opposed to Terminator Technology
www.etcgroup.org
- **Ban Terminator Campaign**
www.banterminator.org

Concerned about Biotechnology

- **Union of Concerned Scientists**
www.ucsusa.org/
- **Greenpeace Canada**
www.greenpeace.ca

Pro-Biotechnology

- **Biotechnology – Good to Grow**
www.biotechgoodtogrow.com/
- **BIOTECCanada** – www.biotech.ca/
- **Council for Biotechnology Information**
<http://whybiotech.com/>

Government of Canada

- **The Government of Canada's BioPortal**
www.bioportal.gc.ca/
- **The Government of Canada's BioStrategy** <http://biostrategy.gc.ca/>
- **Canadian Biotechnology Advisory Committee** www.cbac-cccb.ca/

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