The Global Status of Genetically Engineered Tree Development

A Growing Threat

Executive Summary

The global release of genetically engineered (GE or genetically modified) trees is closer than it has ever been.

Risks

Using genetically engineered trees in plantations, and even releasing GE trees into the wild, is being proposed despite the serious risks and vast uncertainties.

The processes of genetic engineering often result in unanticipated changes. The potential for unexpected genetic outcomes and environmental effects would increase and multiply over the long life of trees, because of the environmental extremes trees face, and because so many species interact with trees. The ability of trees to spread pollen and seeds over long distances increases the range of potential environmental and social impacts, across borders and in violation of Indigenous sovereignty.

The release of genetically engineered trees would be a threat to forests and forest ecosystems, with impacts on many local communities and Indigenous peoples. The potential negative impacts could be profound and irreversible.

Current status

China planted the first GE tree, an insect-resistant poplar, in 2002, but there is little information about this release. These GE poplars are the only commercially planted GE forest trees in the world. GE tree research is currently concentrated in the US and Brazil, and these countries may be the next to plant GE trees commercially. *There are also two other GE trees – a loblolly pine and eucalyptus – that are legal to be planted, in the US and Brazil, as of 2015, but have not been planted.*

A few key companies and university research teams are now leading the development and promotion of GE trees: Principally, pulp and paper company Suzano and its subsidiary FuturaGene; tree biotechnology company ArborGen; and research centres at the Oregon State University and State University of New York.

Most current GE tree research is focused on eucalyptus, along with pine and poplar, and is driven by the pursuit of more profitable plantations for industrial purposes such as pulp and paper production, timber and biofuel production. The most common traits being genetically engineered into forest trees are herbicide tolerance; cold and drought tolerance; pest and disease resistance; faster growth; and altered wood quality.

Regional summaries

Locations of field tests are one main indication of regions at most immediate threat of GE tree introduction, although very few GE field tests will lead to commercialized products.

LATIN AMERICA

In November 2021, Brazilian company Suzano, through its biotechnology subsidiary company FuturaGene, obtained approval in **Brazil** to plant GE eucalyptus trees that are genetically engineered to be tolerant to the herbicide glyphosate. This follows the earlier 2015 approval of FuturaGene's GE faster-growing eucalyptus tree, which has not been planted commercially. Brazil is the only country in Latin America where field tests of GE plantation trees appear to be currently taking place. However, there is ongoing GE tree research taking place in **Chile**, particularly at the University of Concepción.

AFRICA

There are no field trials of GE forest trees in Africa, and **South Africa** is the only African country where research into GE trees is taking place. Research is taking place at the University of Pretoria, funded by the pulp and paper companies Sappi and Mondi, as well as other timer companies and public institutions.

NORTH AMERICA

The **United States** is home to the most research and field testing of GE trees globally, as well as to two of the most prominent GE tree researchers globally. In 2020, university researchers asked the US to allow the release of a genetically engineered blight-tolerant American chestnut tree into the wild. This decision is pending.

NEW ZEALAND AND AUSTRALIA

There are current, long-term field tests of GE radiata pine in **New Zealand**, run by the government-owned forest research institute called Scion. These tests were approved in 2010 and will run for 25 years. There have been several past GE tree field trials in New Zealand, accompanied by protests. There are no field trials of GE plantation trees in **Australia**.

ASIA

Two varieties of GE insect-resistant poplar trees were widely planted in **China** in the early 2000s, but the planting was not closely monitored. There is a huge amount of laboratory research on various species in China and field tests are likely being conducted, but there is no public information available. **India** and **Malaysia** are both home to current field tests of GE rubber trees. There have been field tests of GE eucalyptus and poplar in **Japan**.

EUROPE

There are current field tests of GE trees – mostly poplar – in **Sweden**, **Finland** and **Belgium**. These field tests are conducted by universities and by the Swedish forest biotechnology company SweTree.

Glyphosate-Tolerant Eucalyptus

Aside from the Chinese release of a GE poplar tree in 2002, a GE herbicide-tolerant eucalyptus in Brazil may soon be the first GE plantation tree to be released commercially. On November 16, 2021, Brazil approved the planting and commercial use of a GE eucalyptus tree that is genetically engineered to survive spraying with the herbicide glyphosate. Use of this GE tree will likely result in increased glyphosate use on eucalyptus plantations that already negatively impact the environment as well as many local communities and Indigenous peoples. This GE tree was developed by the company FuturaGene, a subsidiary of the Brazilian pulp and paper company Suzano, and it follows a 2015 approval in Brazil of Suzano's GE fast-growing eucalyptus tree, which has also not yet been commercially released.

GE American Chestnut

Researchers at the State University of New York College of Environmental Science and Forestry (SUNY-ESF) have genetically engineered an American chestnut tree to be blight-tolerant, and are asking the US government to approve it for unrestricted planting in the wild. The American chestnut is an endangered species but researchers argue that releasing this GE tree will "restore" it to the forests of Eastern US and Canada. If approved, this GE tree would be first-ever GE plant released with the purpose of spreading freely through wild ecosystems. Its release would be a large-scale experiment, and there will be little or no potential to track or reverse its spread.

Living Carbon

The small US venture capital company Living Carbon is experimenting to genetically engineer poplar trees to capture and store more carbon. Field tests started in 2021 but the company is already selling uncertified carbon credits. The company promotes a wide range of intentions and ideas that do not appear to have any substantial research behind them. Living Carbon's GE tree is not proven to work and yet the company has raised $15-million USD from investors hoping to profit from it. Even without a GE tree, Living Carbon is already making money.

While research into GE trees has been accompanied by protest around the world, a few companies and a coalition of GE tree researchers have been actively campaigning for weaker regulation at the national and international levels, and for forest certification programs to allow the use of GE trees. In response, the Forest Stewardship Council has begun a process that could see them directly oversee some GE tree field tests and move them towards allowing certified companies to profit from GE trees. Such decisions by certification schemes could pave the way for the use of GE trees globally.

At the same time, national regulations are changing rapidly around the world. Many governments are removing their oversight over some plants developed with the new genetically engineering techniques of gene editing. These political developments could result in many unrecorded and unregulated field tests, as well as the release of some GE trees without government risk assessments or even notification to governments. This expansion of corporate self-regulation could speed up the introduction of some of the riskiest applications of genetic engineering, such as GE trees.