GE Trees: Threatening North America's Native Forests

A genetically engineered (GE) tree is a tree whose DNA has been modified using genetic engineering techniques. In most cases the aim is to introduce a novel attribute to the plant which does not occur naturally within the species, such as resistance to a certain pest or herbicide. The commercialization of GE trees, like eucalyptus and poplar, would have major irreversible environmental and social implications. Especially for the forests and peoples of the southeastern and northwestern US. The US Federal government support and millions of dollars in funding have been granted to tree biotechnology research. Test plots for GE trees in the US span 19 states and over 600 acres of field trials (1).

Support for GE trees is part of a broad and multifaceted strategy to use living plant biomass as a substitute for coal and petroleum in energy, manufacturing and production. This strategy is sometimes referred to as the 'bioeconomy.' Wood, for example, is used as chips and pellets to burn in place of coal, even though CO_2 and other pollutant emissions from wood burning can be higher than those from burning coal (2).

Wood is also targeted for refining into liquid transportation fuels, for aviation and military use as well as various other chemicals and compounds for industrial manufacturing (see article "Plants designed for deconstruction? The use of wood cellulose for fuels" in this Bulletin). Since 2013, the US Renewable Fuel Standard mandates that a portion of the 'biofuels' mixed into gasoline include 'advanced cellulosic' fuels, largely derived from agricultural 'waste' such as corn stover, and wood. This has proven challenging however, and as yet, virtually none of these fuels are being produced commercially. Nonetheless, tree biotechnologists are working to engineer trees that grow very fast and can be more easily 'deconstructed' into fuels, chemicals and more. Companies like ArborGen, a US developer of biotechnology tree seedling products, seek to fulfill this insatiable demand for wood, proclaiming to offer "more trees on less land." They are seeking approval to commercialize, also known as deregulation because it will no longer be regulated by the USDA if approved, of a cold-tolerant GE eucalyptus, coded EH1, with the intent of growing vast plantations of these trees across the southern US.

Meanwhile, GE poplars are a focus of research in the Pacific Northwest, where there is a specific interest in aviation fuels. Tom Vilsack, secretary of the US Department of Agriculture (USDA), has been an avid supporter of 'biofuels' and GE trees. He sees in them a means for producing vast amounts of biomass required to supply a very tiny portion of overall energy demand.

Under his leadership, and in partnership with the Department of Energy, at least US$136 million have been granted to support research on 'biofuels' in the Pacific Northwest. Researchers include private companies and universities such as the University of Washington, the Washington State University and Oregon State University, where research on GE poplar is underway. Currently, there are almost 100 thousand acres of fast-growing hybrid poplar plantations spanning the Pacific Northwest, from

southern Oregon to British Columbia, Canada. Hybrids differ from GE trees as they are cross-breeds of two different poplar species. When a tree is hybridized, it is an act that is possible to happen in nature, unlike when it is genetically modified. Advocates envision an increase of these plantations in the area by 400% to meet ‘biofuel’ and paper industry demands, with a transition from hybrid to genetically engineered (GE) trees.

However, the cold tolerant GE eucalyptus tree (EH1) and GE poplars are riddled with complications. EH1 is made of two hybrids: *Eucalyptus grandis* and *Eucalyptus urophylla*. Both are documented as invasive species in Florida, US, where there are currently test plots. EH1 is known by the US Forest Service to take up 20% more water than native tree species. It is also highly flammable, with the nick-name ‘flammable *kudzu* (a highly invasive plant)’. EH1 is being engineered for cold-tolerance, with the intent to expand its hardiness, increasing the risks of eucalyptus competing with native forests. ArborGen is working to engineer sterility in their trees, but 100% sterility is simply impossible to guarantee.

Poplars are being genetically engineered for disease resistance, herbicide tolerance, fast growth, reduced lignin and more. Lignin is the part of the tree that is fibrous and help keeps it strong. It also happens to be the barrier that scientists have to break down in order to process the trees into liquid ‘biofuels’. There are 30 species of poplar native to the northern hemisphere, making the risks of contamination deeply troubling given that poplars can spread pollen over hundreds of miles. Containment is not feasible and once contamination occurs, there is little possibility to reverse it. As poplars can sprout from stumps as well, and testing in the US of GE poplars has been conducted for over 13 years, contamination of native poplars in the US may have already occurred.

Test plots for EH1 have been authorized in 7 southern US states and right now ArborGen's petition for deregulation is being reviewed by the USDA, the same institution which funds GE tree research and is notoriously lax in its regulation of biotechnology. The Environmental Impact Statement, an analysis of its cumulative impacts to water, human health, air quality, land etc., is expected to be publicly released soon, but resistance to GE trees is growing, as people become increasingly aware of their dangers. Before the USDA closed the public comment period on the Environmental Impact Assessment regarding the GE eucalyptus tree test plots, over 40 thousand people submitted public comments opposing the tests. In May 2013, the largest protest against GE trees converged when hundreds of protestors demonstrated outside the bi-annual Tree Biotechnology Conference, hosted by the International Union of Forest Research Organizations. In November 2013, a strategy meeting of GE trees opposition took place in the US comprised of many of the groups working to expose the risks of GE trees. On May 14, 2014, protestors disrupted a corporate event sponsored by ArborGen. Now, the Campaign to STOP GE trees is an international coalition of groups from all over the world calling for a ban on GE trees and is growing in public support.

Resistance to GE trees has already faced state repression in the US. When presenters from the organizations Global Justice Ecology Project and Everglades Earth First! went on an outreach tour in the southeastern US in October 2013, one event was cancelled by the University of Florida, four days before it was scheduled to happen. The University is involved in GE tree research and has test plots of GE Loblolly pine. After cancelling, the University made no attempt to assist the presenters. When the presenters tried to talk to someone on campus about the cancellation, they were banned from the university for three years. At their next university stop in Florida, the Federal Bureau of Investigations contacted the provost of the campus and, although negotiations allowed them to give the presentation, an armed guard waited outside until the event ended.

Tree plantations are not forests and GE trees, which are meant to be grown in plantations, are not

trees. Industry's plan for a GE tree future is one more example of the twisted disconnect from nature that industrial capitalism facilitates. Presented as a “solution to climate change,” GE trees threaten only to worsen the impacts on forests and on people whose lives depend on healthy forests. Global players are moving quickly to release GE trees, so it is imperative for the resistance to grow in order for us to save the future of forests, which is also our future.

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(1) APHIS Notification, Permit, and Petition Data. Biotechnology Regulatory Services, APHIS, USDA. Last updated September 2, 2014. Accessed September 3, 2014.

(2) Partnership for Policy Integrity. *Trees Trash and Toxics: How Biomass Energy Has Become the New Coal.* April 2014.

Further reading

- Reuters. “ArborGen Partners with University of Florida to Advance Pine-Based Biofuels as Part of a 6.3 Million Dollar DOE-ARPA-E grant.” October 4, 2011.

- Center for Food Safety. Genetically Engineered Trees: The New Frontier of Biotechnology. November 2013.

http://www.earthisland.org/journal/index.php/elist/eListRead/anti_ge_tree_activists_kicked_off_florida_university_campus_spied_on_by_fbi/

- Mitra, Maureen Nandini. “Anti GE Tree Activists Kicked Off Florida University Campus, Spied on by FBI. *Earth Island Journal.* December 2, 2013,