

# Genetically Engineered Trees and Bioenergy

## A Growing Threat to Forests and Communities



**Photo Captions in Clockwise Direction:**

1. Frankentrees protest at the UN Convention on Biological Diversity, Bonn, Germany, May 2008. Photo: Langelle/GJEP-GFC
2. Students Protest GE Trees at Sustainable Forest Initiative annual conference, Burlington, VT, US September 2011. Photo: Petermann/GJEP
3. Indigenous Peoples' Protest at the Belgian Mission in New York City, May 2009. Photo: Langelle/GJEP-GFC
4. GE Trees Boat Action, Charleston Harbor, Charleston, SC, US, October 2006. Photo: Langelle/GJEP



**Including a Brief History of the Campaign to Stop Genetically Engineered Trees**

[globaljusticeecology.org](http://globaljusticeecology.org) / [nogetrees.org](http://nogetrees.org)

## **Analysis of the State of GE Trees and Advanced Bioenergy, March 22, 2012**

*This new report by Global Justice Ecology Project is designed to provide key background information, especially from the years 2010-2012, that will help explain advancements in the area of genetically engineered tree research and development especially for the development of advanced bioenergy, as well as the history and current state of the global effort to prohibit the environmental release of GE trees.*

*Genetically engineered trees are also called genetically modified trees, GM trees, GMO trees or transgenic trees. The term refers to trees engineered to contain foreign DNA to give them unnatural characteristics, such as the ability to kill insects, tolerate toxic herbicides, grow abnormally fast, or have altered wood composition. While research and development of GE trees and the fight against them has been going on since the 1990s, the upcoming years will be critical ones for the campaign to stop this unproven and highly dangerous technology.*

### **Contents:**

Executive Summary	p. 3
The ArborGen-Monsanto-Government Revolving Door	p. 3
US Government Promotes & Streamlines GMOs for Bioenergy Production	p. 5
Genetically Engineered Eucalyptus Plantations in the US South: Legal Action Stalls GE Eucalyptus Commercialization Plans	p. 5
GE & Hybrid Poplars in the Pacific Northwest and the US Southeast	p. 7
GE Pines for Transportation Fuels: An Incendiary Idea	p. 7
GE trees and Forest Certification: the “Sustainability” Scam	p. 8
GE trees and International Climate Change Schemes	p. 8
Conclusion	p. 9
EndNotes	p. 9
Appendix: A Brief Timeline of The Campaign Against GE Trees	p. 10

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## **Executive Summary**

The years 2012 and 2013 are going to be significant ones for the campaign to stop genetically engineered trees. GE tree research and development company ArborGen has a request pending with the USDA to commercially sell hundreds of millions of cold-tolerant GE eucalyptus seedlings. Meanwhile, ArborGen is undergoing a major restructuring of their executive staff following the failure, in 2011, of the company going public on the NASDAQ. This decision to postpone their IPO came shortly after it was revealed that a lawsuit against GE trees was making it hard to find investors. ArborGen's new CEO, President, and Vice President, appear to have been selected for their ability to take companies into the public arena.

ArborGen has also been attempting to address their inability to win public acceptance of GE trees by strategically placing several of their personnel in key government and industry positions including the Department of Energy and the USDA that are influential in the future of GE trees.

Government, industry, universities and research institutions are colluding to use public concern about climate change to advance development of GE trees specifically designed for bioenergy production in the US and globally. These plans are moving forward despite the significant risks GE trees pose to carbon absorbing forest ecosystems and to the climate itself. Bioenergy, in this report, includes all forms of liquid transport fuels--from ethanol to diesel to jet fuel--as well as the burning of trees for energy production.

Additionally, the US government is introducing new regulations that would streamline and accelerate the review process for GMOs including GE trees, to help them get to the market faster. At the same time, on the industry side, activities are under way to develop so-called "sustainability criteria" for GE trees that would help them become eligible for certification under bodies such as the Forest Stewardship Council, which currently prohibits GE trees from being certified.

While the efforts of GE trees proponents to bring these highly dangerous trees to commercialization are mounting, so is public opposition. The number of people and organizations signing onto the call to prohibit the release of GE trees into the environment grows daily. The international Campaign to STOP GE Trees now includes 245 organizations and Indigenous Peoples' Organizations from 49 countries who endorse its call for a total global ban on genetically engineered trees. In addition, news outlets throughout the US South have been increasingly critical of ArborGen's plans for massive GE eucalyptus plantations--referring to them as the new kudzu, due to their invasiveness.

This public outrage is well justified, given the dangers posed by GE trees--from flammability, to invasiveness, to the potential to contaminate native forests with engineered traits. These dangers, should GE trees be released *en masse*, are both inevitable and irreversible.

This report is an attempt to outline the rapid developments in the field of genetically engineered trees over the years 2010 and 2011, and to examine what is likely to be in store for 2012.

## **The ArborGen-Monsanto-Government Revolving Door: Promoting Trees to Energy**

In 1999, Monsanto joined with International Paper and two other forestry companies to form the "forestry biotechnology joint venture" that later became ArborGen.<sup>1</sup> Monsanto dropped out of the partnership very shortly after, Westvaco became MeadWestvaco and Fletcher Forests became Rubicon. ArborGen is headquartered in Summerville, South Carolina in the US, and also has operations in Brazil, New Zealand and Australasia.



Although Monsanto is not directly involved in ArborGen, there are very close ties between the two companies. Barbara Wells, who was ArborGen's CEO and President from 2002-2012 spent seventeen years working for Monsanto, including as the head of their RoundUp Ready soy division in Brazil.

ArborGen's new CEO and President Andrew Baum also previously worked for Monsanto as their Director of Business Development, Sustainable Development sector.

Additionally, David Nothmann, ArborGen's Vice President of Business and Product Development previously spent 13 years at Monsanto, including leading the Americas product management group for their vegetable business.

ArborGen is also actively placing their executives in key government and industry positions to ensure their GE tree "products" are included in the production of "advanced biofuels" under The Energy Independence and Security Act. The Act mandates 36 billion gallons of biofuels to be produced by 2022, of which 16 billion gallons must come from cellulosic biofuel by 2022 and 1 billion gallons must come from biomass-based diesel by 2012.<sup>ii</sup>

In June 2011, ArborGen executive David Nothmann was appointed to serve with the US Department of Energy (DoE) and the USDA on their Biomass Research and Development Technical Advisory Committee--a supposedly "independent" body--until November 2013. According to a release by ArborGen, "the committee's work will aid the DoE and the USDA in building a sustainable [sic] biomass energy industry."<sup>iii</sup>

In September 2011, ArborGen's lead scientist, Maud Hinchee became ArborGen's representative on the Southeast Partnership for Integrated Biomass Supply Systems (IBSS). In their press release, ArborGen stated, "ArborGen expertise will be critical in meeting one of the IBSS partnership goals of exploring the inherent performance and cost advantages of short rotation woody crops such as eucalyptus, pine and poplar...[and]...optimizing wood characteristics for optimal conversion to advanced 'drop in' biofuels..." A key component of the IBSS partnership will be "to help land owners, rural communities and the emerging biofuels industry make decisions that promote sustainable development."

In 2006, ArborGen formed a partnership with New Zealand Crown Research Institute Scion to identify gene-traits associated with wood quality in pine toward the development of bioenergy and other bio-based products.<sup>iv</sup> In December 2010, Scion ruled that outdoor test plots of GE trees could be developed in New Zealand, overturning a ban on such test plots.<sup>v</sup>

Through their eucalyptus and poplar genome sequencing work, ArborGen is also tied to the Department of Energy's Oak Ridge National Laboratory and the Laboratory Science Program (LSP), which focuses on "genomes to energy." The LSP is a project of the Joint Bioenergy Institute and the Department of Energy. ArborGen is on the industry advisory committee of the Joint BioEnergy Institute.

The Joint BioEnergy Institute (JBEI) is a San Francisco Bay Area scientific partnership led by Lawrence Berkeley National Laboratory and includes the Sandia National Laboratories, the University of California campuses of Berkeley and Davis, the Carnegie Institution for Science, and the Lawrence Livermore National Laboratory. JBEI's primary scientific mission is to advance the development of the next generation of biofuels.<sup>vi</sup> One of the methods being used in pursuit of this mission is synthetic biology.

Synthetic biology is the manipulation of DNA to manufacture completely new life forms designed explicitly for use in the production of cellulose-based fuels, chemicals, textiles and other products currently made from petroleum. Synthetic biology has been subject to a firestorm of criticism due to the



unknown risks associated with creating new life forms that have never before existed, especially if they accidentally “escaped” into the environment.<sup>vii</sup>

## **US Government Promotes & Streamlines GMOs for Bioenergy Production**

The US government has doled out numerous grants totaling well over \$1 billion to bioenergy companies and scientists to accelerate the development of new bioenergies.<sup>viii</sup>

In April 2011, the USDA announced a new plan that would allow biotech companies to conduct their own environmental assessments. Under the National Environmental Policy Act, the USDA is responsible for studying the environmental risks of GMOs. Part of the strategy of the USDA’s new plan is to speed up the deregulation process and take it out of the public arena, reducing the ability of GMO watchdog groups to weigh in. This plan is a direct result of the numerous cases that the USDA has lost in court due to their poorly conducted environmental assessments of potentially dangerous GMOs.<sup>ix</sup>

On February 22, 2012, the USDA announced a plan to cut in half the review time for new GMO products from 3 years to 13-16 months. Part of this acceleration would be accomplished by accepting public comments *after* making the final decision in the Environmental Assessment, eliminating any real ability for the public to have input.<sup>x</sup> ArborGen’s GE eucalyptus trees would be included in this accelerated review process, despite the fact that GE eucalyptus trees are unlike any other GMO crop, and would have very different environmental impacts.

## **Genetically Engineered Eucalyptus Plantations in the US South: Legal Action Stalls GE Eucalyptus Commercialization Plans**

In January 2011, ArborGen petitioned the US Department of Agriculture for permission to commercially sell their genetically engineered cold-tolerant eucalyptus tree seedlings. If granted permission, ArborGen plans to sell half a billion GE eucalyptus trees annually for bioenergy plantations across the US South.<sup>xi</sup>

This GE eucalyptus tree is a cross between *Eucalyptus grandis* (a known invasive species in Florida) and *Eucalyptus urophylla*. The original eucalyptus hybrid was developed in Brazil, shipped to New Zealand for genetic transformation, and sent to the US for outdoor field trials, which at that time were not legal in New Zealand. Because these GE eucalyptus have been transformed to withstand temperatures down to 16° Fahrenheit, their geographic range has been greatly expanded. International Paper envisions millions of acres of eucalyptus tree plantations across the US South to meet the emerging demand for bioenergy feedstocks and the increasing demand for paper pulp and timber.<sup>xii</sup>

A report released in May 2011 by the US Forest Service and the Southern Group of State Foresters titled *Forest Service unveils first comprehensive forecast on southern forests* identified the major threats to the forests of the South over the next 50 years. The report states, “...bioenergy use...and invasive species will significantly alter the South’s forests between 2010 and 2060...23 million acres of forest are projected to decrease.” They further project an increase in impacts on water and more frequent and severe wildfires.<sup>xiii</sup>

Commercial plantations of GE eucalyptus would greatly exacerbate these problems. Eucalyptus trees are already a documented invasive plant in both Florida and California.<sup>xiv</sup> The Georgia Department of Wildlife submitted comments to the USDA highlighting their concerns about GE eucalyptus plantations:

“... We have serious concerns about potential impacts on hydrology, soil chemistry, native biodiversity and ecosystem functions... We are also concerned about the potential impacts of eucalyptus plantations on other ecosystem processes, including fire frequency and intensity. The leaves of eucalyptus trees produce large amounts of volatile oils... consequently, dense eucalyptus plantations are subject to catastrophic firestorms. The eucalyptus trees will lower water tables and decrease ground moisture... increasing the chance of wildfire ignition.”<sup>xv</sup>

The US Forest Service also submitted comments to the USDA regarding ArborGen’s GE eucalyptus. In their comments, they projected that eucalyptus plantations would likely use twice as much water as native forests and would reduce stream flow 20% more than existing pine plantations.<sup>xvi</sup>

Large portions of the US South have already been coping with drought conditions for years.

These comments were submitted to the USDA in response to a draft Environmental Assessment they released in 2009 which recommended approving a request by ArborGen to plant more than 260,000 GE eucalyptus trees in test plots across seven southern states.

When the USDA made its final decision to allow the test plots to move forward, Global Justice Ecology Project, Dogwood Alliance, Sierra Club, the Center for Food Safety and Center for Biological Diversity filed a lawsuit in July 2010 to stop the development of these large-scale test plots of GE eucalyptus trees.

This lawsuit had chilling effects on the GE trees industry. In January 2011, the *Des Moines Register* published an article titled, “Court Challenges Stall New Biofuel Crops,” that explained how legal challenges were slowing down the process to commercialize GE eucalyptus trees for biofuels.<sup>xvii</sup> Another article titled, “Lawsuit Highlights a Barrier to Biotechnology Advancement in the US,” published in *Biomass & Thermal Magazine* on April 29, 2011 clearly spelled out the impact of the lawsuit,

“Lawsuits like the one involving the genetically engineered eucalyptus trees have become a hindrance to biomass development, as they discourage investment. ‘Obviously, the litigious environment we have seen in the past couple years is representing a tremendous deterrent to investment in [biotechnology], especially on the biomass side, where a lot of them are start-up companies.’ [Karen] Batra [of the Biotechnology Industry Organization] says. ‘It’s making it very hard to get investments and to see their way through what could be five and 10 years in development of a product, if when you finally do get to a point where you’re close to commercialization, you’re going to have to deal with litigation. It is creating a huge barrier.’”<sup>xviii</sup>

As a result of the legal barriers and the negative publicity created by the lawsuit, on May 11, 2011, ArborGen made the last-minute decision not to begin selling shares on the NASDAQ.<sup>xix</sup> Rubicon reported that this decision had a knock-on effect that dramatically impacted the value of their stock, which has yet to recover.<sup>xx</sup>

Ultimately, the judge in the lawsuit allowed the GE eucalyptus field trials to go ahead. However, attorneys for the environmental coalition determined that the court’s ruling set no negative legal precedents. Following the legal decision, the *Commercial Appeal*, the largest newspaper in Memphis, Tennessee, where International Paper’s headquarters are located, ran a feature titled, “Court Loss Won’t Stop Environmentalists’ Battle Against Modified Eucalyptus Trees.” In the article, GE eucalyptus trees were referred to as “a 21<sup>st</sup> century kudzu vine, an environmental disaster waiting to happen.”<sup>xxi</sup>

Following this failure of ArborGen’s plans to go public with their stock, in March 2012, their Board announced a shake up in their senior management--choosing a new CEO/President and Vice President based on their experience in developing start up companies.

## **GE & Hybrid Poplars in the Pacific Northwest and the US Southeast**

In addition to GE eucalyptus trees, universities, timber corporations and seedling manufacturers in the Pacific Northwest are teaming up to develop genetically engineered poplars for bioenergy production.

A major collaborative effort between the University of Washington, Washington State University, Oregon State University, Weyerhaeuser and others received \$136 million from the USDA--it's largest grant ever--to research how to turn trees into liquid fuels.<sup>xxii</sup> Another half million dollars will go to tree engineer Steve Strauss of OSU to research GE poplar trees for biofuels. Strauss has written several articles promoting deregulation of the biotechnology industry.<sup>xxiii</sup>

OSU is also partnered with Greenwood Resources, which operates the country's largest irrigated tree farm, with 7.5 million hybrid poplar and alder trees.<sup>xxiv</sup> In March 2011, ArborGen made a "strategic alliance" with Greenwood Resources in order to advance the development of hybrid and other poplar trees for plantations in the US Southeast.<sup>xxv</sup>

The dangers of releasing GE poplar trees in large plantations is even greater, in some ways, than the dangers from GE eucalyptus due to the fact that there are large numbers of wild poplars throughout North America. Richard Meilan, a faculty member at Purdue University points out that, "the genus *Populus* includes about 30 species that grow across a wide climatic range from the subtropics in Florida to subalpine areas in Alaska, northern Canada and Europe."<sup>xxvi</sup> This raises a serious red flag concerning the irreversible and inevitable genetic contamination that would be caused by the commercial release of GE poplar trees in plantations.

The escape of GE poplar pollen or seeds carrying traits for insect resistance or reduced lignin, for example, would wreak havoc on native forest ecosystems. Insects are key components of the forest ecosystem and reduced lignin trees would be more susceptible to disease, fungus and other environmental stresses. Low lignin trees would also rot more quickly, disrupting forest soils and releasing their carbon rapidly into the atmosphere.

## **GE Pines for Transportation Fuels: An Incendiary Idea**

Besides researching GE eucalyptus and poplar trees for biofuel feedstocks, ArborGen is also teaming up with the University of Florida, UC Berkeley's National Renewable Energy Laboratory and the Joint BioEnergy Institute to develop genetically engineered loblolly pine trees as part of a \$6.3 million Department of Energy grant.<sup>xxvii</sup> These GE pines are being designed to have five times the amount of terpene, for use as a transportation fuel.<sup>xxviii</sup> Increasing the level of terpene in loblolly pine trees, however, is likely to greatly increase the flammability of these trees<sup>xxix</sup> raising concerns about wildfire potentials.

The dangers of the escape of the pollen or seeds from these GE pines cannot be understated. Pines are widely found throughout North America and spread their pollen up to 3,000 kilometers.<sup>xxx</sup> The irreversible contamination of forests with genes from pine trees engineered for increased content of flammable terpenes could have serious ecological and social ramifications by increasing the potential for wildfires in forests throughout North America.



## **GE trees and Forest Certification: the “Sustainability” Scam**

Genetically engineered trees cannot currently be certified as sustainable by the Forest Stewardship Council (FSC), the Sustainable Forestry Initiative (SFI) or any other wood certification schemes. This is creating a significant barrier to private investment, since it is likely that even if GE trees receive permission to be commercially developed, there will be no market for them. For this reason, there is a concerted effort to get the FSC and the SFI to change their guidelines to accept GE trees through the creation of sustainability criteria.

Last July at the Tree Biotechnology 2011 Conference in Arraial D’Ajuda, Brazil, this strategy was clearly spelled out. During the session on “Biosafety, Certification and Economics of Tree Biotechnology,” Adam Costanza of the Institute for Forest Biotechnology made a presentation titled *“Highly regulated but can’t be certified as sustainable. Responsible use principles are bridging the gap for biotech trees.”*<sup>xxxix</sup> In this presentation, Costanza laid out plans emerging in the US and Europe to bring together stakeholders for the purpose of developing GE tree sustainability criteria.

In November 2011, Global Justice Ecology Project attended an event called “The Forest Dialogue,” at Yale University. The event brought together NGO representatives, academics, scientists and timber industry representatives to discuss the future of GE trees. GJEP Executive Director Anne Petermann attended this event, as did Simone Lovera, Executive Director of Global Forest Coalition, and Dr. Ricarda Steinbrecher, of EcoNexus, who is the scientific advisor to the Campaign to STOP GE Trees.

One of the organizers of the event was an executive from MeadWestvaco--one of the joint owners of ArborGen. Another participant was a staff member of ArborGen. The event was organized with the intent to find common ground among various stakeholders in an effort to help identify a way to advance public acceptance of genetically engineered trees. Global Justice Ecology Project, Global Forest Coalition and EcoNexus, however, repeatedly pointed out that there could be no common ground between parties intent on commercially developing GE trees for profit, and those whose goal is to ban them permanently.

When a path forward was proposed that included assessing the potential risks of GE trees, Dr. Steinbrecher pointed out that a thorough examination of the social and ecological risks of GE trees is not possible at this time because there is not even enough knowledge yet about the questions that need to be asked in order to be able to assess those risks.

## **GE trees and International Climate Change Schemes**

Always on the look out for new markets for their GE tree “products,” ArborGen is exploring the potential of climate mitigation strategies involving trees, despite the fact that several of their GE trees are likely to contribute to, rather than mitigate, greenhouse gas emissions. GE eucalyptus trees, for example, are highly flammable and likely to increase the incidents of wildfires where they are planted. Likewise, high-terpene content GE pines are also very volatile and likely to cause wildfires. Low-lignin GE trees, designed for biofuel production, are more susceptible to wind, insects, fungus and other environmental stresses. When they die, low lignin trees release their carbon into the atmosphere much more quickly.

In addition, a study by the World Resources Institute and the US Environmental Protection Agency found that monoculture tree plantations only store one-fourth the carbon of a native forest.<sup>xxxii</sup> When a native ecosystem is converted to a tree plantation, significant amounts of carbon are released. Another study by the Manomet Center for Conservation Sciences found that the burning of trees to produce biomass electricity results in more atmospheric carbon, not less.<sup>xxxiii</sup>

Never the less, ArborGen's climate mitigation strategies include developing GE tree plantations to take advantage of the forest carbon offsets piece of the **REDD+** (Reducing Emissions from Deforestation and Forest Degradation) scheme of the UN and World Bank. The UN Framework Convention on Climate Change decided in Milan in 2003 that GE trees could be included in forest carbon offset plantations. Additionally, the UN's definition of forests is so weak that developing GE tree monocultures can be counted as reforestation.

ArborGen also foresees developing GE tree plantations to sequester carbon as part of the **New Zealand** Emissions Trading Scheme and **California's** Global Warming Solutions Act (AB32).

ArborGen also sees potential in the **European Union**. Because the EU's Emissions Trading Scheme excludes forest carbon offsets, however, ArborGen envisions their GE trees fitting into the EU's "Renewable Energy Standard," which requires 33% of electricity generation to be from "renewables" by 2020. In this case, they envision their GE trees being burned for wood-fired electricity production to meet the European demand.

In **Brazil**, GE trees could be used for charcoal and bioenergy production. In **China** they could be used for biomass electricity and forest carbon sinks. In **Australia** they might be used for "carbon farming."<sup>xxxiv</sup>

## Conclusion

While the efforts of GE trees proponents to bring these highly dangerous trees to commercialization are mounting, so is public opposition. The number of people and organizations signing onto the call to prohibit GE trees into the environment grows daily. The international Campaign to STOP GE Trees now includes 245 organizations and Indigenous Peoples' Organizations from 49 countries who endorse its call for a total global ban on genetically engineered trees. This public outrage is well justified, given the dangers posed by GE trees--from flammability, to invasiveness, to the potential to contaminate native forests with engineered traits. These dangers, should GE trees be released *en masse*, are both inevitable and irreversible.

## EndNotes

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<sup>i</sup> PR Newswire, "[Fletcher Challenge Forests, International Paper, Monsanto Company and Westvaco Corporation Announce Forestry Biotechnology Joint Venture](#)," Company Press Release, 6 April 1999

<sup>ii</sup> Institute for Energy Research, 17 October 2011 "National Academy of Sciences: Renewable Fuel Standard Goals Unlikely To Be Met"

<sup>iii</sup> Enhanced Online News, 2 June 2011, "[David Nothmann will join independent body to provide technical input and guidance to policy makers on biomass research and development](#)."

<sup>iv</sup> [ArborGen \(US\) and Scion \(NZ\) Make Agreement re: GE Trees](#)

<sup>v</sup> <http://www.ermanz.govt.nz>

<sup>vi</sup> ArborGen website: <http://www.arborgen.com>

<sup>vii</sup> ETC Group, January 2007, [Extreme Genetic Engineering: An Introduction to Synthetic Biology](#)

<sup>viii</sup> *New York Times*, "[Government Backs \\$1 Billion Plan to Make Gasoline from Wood](#)"

<sup>ix</sup> *Capital Press*, "[USDA plans to outsource biotech studies](#)."

<sup>x</sup> *Bloomberg News*, 9 March 2011, "[Monsanto, Dow gene-modified crops to get faster U.S. reviews](#)."

<sup>xi</sup> [Rubicon Annual Review 2010](#).

<sup>xii</sup> *Bloomberg News*, 28 August 2009, "[International Paper Treads Monsanto's Path to 'Frankenforests'](#)."

<sup>xiii</sup> US Forest Service Southern Research Station, 17 May 2011, "[Forest Service unveils first comprehensive forecast on southern forests](#)."

- <sup>xiv</sup> [Comments received by the USDA from the Florida Exotic Pest Plant Council](#) regarding large proposed field trials of GE eucalyptus trees.
- <sup>xv</sup> [Georgia Department of Wildlife official public comments](#) regarding large proposed field trials of GE eucalyptus trees.
- <sup>xvi</sup> [USDA Final Environmental Assessment](#), April 2010, "APPENDIX III: USDA Forest Service assessment of impacts on hydrology," p. 59.
- <sup>xvii</sup> *Des Moines Register*, 22 January 2011 "[Court Challenges Stall New Biofuel Crops.](#)"
- <sup>xviii</sup> *Biomass Power & Thermal*, 29 April 2011, "[Genetic Engineering Hang-Up: Lawsuit highlights a barrier to biotechnology advancements in the U.S.](#)"
- <sup>xix</sup> *E&E*, 11 May 2011, "[Biotech: Tree developer postpones IPO.](#)"
- <sup>xx</sup> [Rubicon Annual Review 2011](#)
- <sup>xxi</sup> *Commercial Appeal*, 23 October 2011, "[Court loss won't stop environmentalists' battle against modified-eucalyptus trees.](#)"
- <sup>xxii</sup> *Seattle Times*, 28 September 2011, "[UW, WSU to get \\$80M to develop biofuels.](#)"
- <sup>xxiii</sup> *Nature Biotechnology*, June 2009 "[Strangled at Birth? Forest Biotech and the Convention on Biological Diversity](#)"
- <sup>xxiv</sup> *Sustainable Business Oregon*, 17 November 2011, "[Greenwood Resources positions poplars for biofuels.](#)"
- <sup>xxv</sup> [ArborGen press release](#), 16 March 2011
- <sup>xxvi</sup> Purdue University Release, August 24, 2006, "[GM Tree Could be Used for Cellulosic Ethanol, Fast-Growing Trees Could Take Root as Future Energy Source.](#)"
- <sup>xxvii</sup> <http://advancedbiofuelsusa.info/arborgen-partners-with-university-of-florida-to-advance-pine-based-biofuels-as-part-of-6-3-million-doe-arpa-e-grant>
- <sup>xxviii</sup> ArborGen press release, 4 October 2011
- <sup>xxix</sup> <http://www.forestencyclopedia.net/p/p532>
- <sup>xxx</sup> *American Journal of Botany*, March 26, 2010, "[Long-distance pine pollen still germinates after meso-scale dispersal.](#)"
- <sup>xxxi</sup> <http://www.treebiotech2011.com/program.html>
- <sup>xxxii</sup> World Resources Institute, March 1995, "Keeping it Green: Tropical Forestry Opportunities for Mitigating Climate Change."
- <sup>xxxiii</sup> [Manomet Study of Woody Biomass Energy](#), 10 June 2010
- <sup>xxxiv</sup> [Rubicon Annual Review 2011](#)

## Appendix: A Brief Timeline of the Campaign Against GE Trees

**June 2000:** Campaign against GE trees launched at Biodevastation protest during Biotechnology Industry Organization national conference in Boston. *Washington Post* runs front page article about the campaign.

**May 2001:** Chapter on the dangers of GE trees published by GJEP Co-Founder Orin Langelles in the book *Redesigning Life*.

**July 2001:** Native Forest Network (NFN) report released *From Native Forests to Frankentrees: The Global Threat of Genetically Engineered Trees*.

**July 2001:** NFN organizes protest at GE tree conference at Skamania Lodge in Washington state.

**March 2003:** Action for Social and Ecological Justice, Rainforest Action Network and Northwest Resistance Against Genetic Engineering organize GE tree protests at the World Trade Organization agricultural negotiations in Sacramento, CA.

**December 2003:** UN Climate Convention's Ninth Conference of the Parties (COP 9) in Milan, Italy decides that GE trees can be used in carbon offset forestry plantations.



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**April 2004:** STOP Genetically Engineered Trees Campaign founded. Founding members include [Global Justice Ecology Project](#), [Sierra Club](#), [Southern Forests Network](#), [Dogwood Alliance](#), [Forest Ethics](#), [Forest Guild](#), [GE Free Maine \(now Food for Maine's Future\)](#), [Institute for Social Ecology](#), [Klamath-Siskiyou Wildlands Center](#), [Northwest Resistance Against Genetic Engineering](#), [Canadian Biotechnology Action Network \(CBAN\)](#), [Rainforest Action Network](#).

**April 2004:** GJEP presents dangers of GE trees to delegates at the UN Forum on Forests in Geneva, Switzerland.

**September 2004:** GJEP launches collaborative partnership with Indigenous Mapuche group Konapewman against GE trees and plantations in Chile.

**October 2004:** GJEP presents social and ecological dangers of GE trees during founding meeting of the Durban Group for Climate Justice in Durban, South Africa.

**December 2004:** World Rainforest Movement (WRM) report released, [\*Genetically Engineered Trees, the Ultimate Threat to Forests\*](#).

**December 2004:** GJEP and WRM organize side event and press conference on social and ecological dangers of GE trees at the UN Climate Convention COP 10 in Buenos Aires, Argentina. Mapuche participant presents threats to Indigenous peoples.

**September 2005:** Award-winning GE trees documentary released: *A Silent Forest: The Growing Threat, Genetically Engineered Trees*, narrated by renowned geneticist Dr. David Suzuki.

**November 2005:** Global Justice Ecology Project, World Rainforest Movement and FASE host joint international strategy meeting on GE trees in Vitoria, Brazil. Participants attend from five continents.

**March 2006:** Campaign to STOP GE Trees and EcoNexus campaign against GE trees at UN Biodiversity Convention COP 8 in Curitiba, Brazil. UN decides to warn countries about GE trees, calls for application of the Precautionary Principle and launches a study into the ecological and social impacts of GE trees.

**July 2006:** UN Food and Agriculture Organization releases a report titled, [\*Preliminary Review of Biotechnology in Forestry, Including Genetic Modification\*](#). In it, a survey of GE tree researchers reveals that their topmost concern about GE trees is the “unintentional contamination of non-target species.” Their second greatest concern is public opinion of GE trees.

**October 2006:** Campaign to STOP GE Trees, Rising Tide and Katuah Earth First! organize protests and a boat action organized around the International Union of Forest Research Organizations “2006 Forest Plantations Meeting” in Charleston, South Carolina, US.

**May 2007:** Campaign to STOP GE Trees launches “National Effort to Stop Genetically Engineered Eucalyptus Plantations in US Southeast.”

**June 2007:** Campaign to STOP GE Trees issues press release asking US health and environmental agencies to investigate link between pathogenic fungus and genetically engineered eucalyptus trees.

**November 2007:** Global Justice Ecology Project and Global Forest Coalition publish the report, [\*The True Cost of Agrofuels: Impacts on Food, Forests, People and the Climate\*](#).

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**February 2008:** GJEP, EcoNexus, GFC and WRM organize GE trees protest inside a UN Convention on Biological Diversity (CBD) meeting in Rome.

**April 2008:** Global Justice Ecology Project, Global Forest Coalition and the Campaign to STOP GE Trees release, [\*GE Trees, Cellulosic Biofuels and Destruction of Forest Biological Diversity\*](#).

**May 2008:** A major series of protests and side events are organized by a large international alliance of groups and Indigenous Peoples' Organizations at the UN CBD convention in Bonn, Germany calling for a global ban on GE trees. Unanimous support for the ban received from entire African delegation, many Latin American and Asian country delegations, and all NGOs and IPOs present.

**November 2008:** World Rainforest Movement releases [\*GE Tree Research: A Country by Country Overview\*](#).

**May 2009:** Belgium Permanent Mission in Manhattan protested by Indigenous Peoples during the UN Permanent Forum on Indigenous Issues due to Belgium's development of test plots of GE poplar trees.

**May-June 2009:** Living On Earth, an NPR program, interviews GJEP on the impacts of GE trees.

**June 2009:** Tree Engineer Steve Strauss, of Oregon State University, writes article "Strangled at Birth? Forest Biotech and the Convention on Biological Diversity" in *Nature Biotechnology* magazine which criticizes international regulatory hurdles created by GJEP's efforts to ban GE trees internationally.

**June 2009:** The Campaign to STOP GE Trees and allies submit nearly 17,500 public comments to the USDA opposing the USDA's recommendation for approval of an ArborGen proposal to plant over a quarter of a million GE eucalyptus trees in test plots across seven states. Only 39 favorable comments were received by the USDA.

**August 2009:** Jim Hightower national commentary airs: "The Invasion of Genetically Engineered Eucalyptus."

**October 2009:** La Via Campesina, the world's largest peasant farmer organization, organizes protests outside of the XIII World Forestry Congress in Buenos Aires, Argentina. GJEP speaks about GE trees.

**February 2010:** Groups Force USDA to re-release Draft Environmental Assessment on genetically engineered eucalyptus trees after their original EA lacked key US Forest Service hydrological studies.

**May 2010:** USDA approves ArborGen request to plant 260,000 genetically engineered eucalyptus trees in test plots across the US South despite overwhelming public opposition.

**June 2010:** Global Justice Ecology Project, Global Forest Coalition and Biofuelwatch release new report, [\*Wood-based Bioenergy: The Green Lie\*](#), at the UN climate talks in Bonn, Germany during a European tour on the issues of GE trees and wood-based bioenergy.

**July 2010:** Global Justice Ecology Project, Dogwood Alliance, Sierra Club, Center for Food Safety, International Center for Technology Assessment and Center for Biological Diversity file suit against the USDA over their approval of ArborGen's large-scale test plots of GE eucalyptus trees.

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**August 2010:** *Charlotte Observer* editorial, "[Could eucalyptus trees be the kudzu of the 2010s?](#)" [Note: the *Charlotte Observer* is the largest newspaper near ArborGen's headquarters.]

**September 2010:** Global Justice Ecology Project, Dogwood Alliance and the Campaign to STOP GE Trees release a [5 minute video](#) on the dangers of industrial tree plantations and GE trees.

**October 2010:** ArborGen announces plan for Initial Public Offering (IPO) to raise funds for research.

**2007-2010:** GJEP organizes side events and press conferences with World Rainforest Movement, Global Forest Coalition, Climate Justice Now!, Indigenous Environmental Network and other groups at annual UN Climate Conferences linking GE trees to the REDD (Reducing Emissions from Deforestation and Forest Degradation) scheme and denouncing the UN's definition of forests.

**January 2011:** ArborGen partner Range Fuels shuts taxpayer-subsidized cellulosic ethanol plant in Georgia, due to their inability to manufacture affordable cellulosic ethanol.

**January 2011:** ArborGen submits request to USDA for full deregulation and commercial approval of their GE eucalyptus trees.

**January 2011:** *Des Moines Register* article, "[Court challenges stall new biofuel crops.](#)"

**April 2011:** *Biomass Power & Thermal Magazine* article, "[Genetic Engineering Hang-Up: Lawsuit highlights a barrier to biotechnology advancements in the US](#)"

**May 2011:** ArborGen postpones IPO indefinitely.

**June 2011:** Campaign to STOP GE Trees Action Alert against ArborGen coincides with Tree Biotechnology 2011 conference in Brazil.

**September 2011:** Protest organized to counter the push for GE tree sustainability criteria at the 2011 conference of the Sustainable Forestry Initiative in Burlington, Vermont.

**October 2011:** USDA grants \$136 million for research into GE trees and other wood for bioenergy.

**October 2011:** Judge in GE trees test plot lawsuit rules in favor of USDA.

**October 2011:** *Commercial Appeal* article, "[Court loss won't stop environmentalists' battle against modified-eucalyptus trees](#)" [note: the *Commercial Appeal* is the largest newspaper in Memphis--home to ArborGen co-owner International Paper

**November 2011:** article, "[GE Trees in Sweden Cause Concern.](#)"

**January 2012:** New video [A Darker Shade of Green Documents Critical Perspectives on REDD](#) reveals global resistance to forest-carbon projects as well as GE trees.

**February 2012:** COST Alliance formed in EU to advance GE tree "sustainability criteria" by "...improving the scientific basis for safe tree development...with the intent to supply the world with fuel, fibre and energy."



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**March 2012:** Action Alert launched to stop the expansion of ArborGen's GE eucalyptus test plots in the US South.

**March 2012:** ArborGen Board announces major changes to Senior Management.

**April 2013:** The USDA announces they will prepare a draft Environmental Impact Statement on the request by ArborGen to commercially sell billions of GE freeze-tolerant eucalyptus trees. They open a public comment period on ArborGen's deregulation petition.

**April 2013:** The USDA public comment period ends with 99.99% of comments opposing the release of GE eucalyptus trees.

To view this *Brief History of the Campaign to Stop GE Trees* online, with photos and functioning links, please go to: <http://wp.me/pDT6U-3VS>

**For details on the Campaign to STOP GE Trees and a list of reports and documents of the dangers of GE trees, go to [nogetrees.org](http://nogetrees.org)**