BACKGROUNDER

Flowering Permit for Important Biomass Crop Awaiting Evaluation by USDA Biotech Regulatory Service

USDA's Biotechnology Regulatory Service (BRS) opened a public comment period for the "Availability of an Environmental Assessment for Controlled Release of a Genetically Engineered Eucalyptus Hybrid," on June 3, 2009. The public comment period closed on July 6, 2009.

The tree being considered under the permit is a Eucalyptus variety that has been grown for many years sustainably in Brazil, but which has an introduced trait that enables it to withstand the type of freezing conditions experienced in portions of the Southeast of the United States.

The permit filed for ArborGen's Freeze Tolerant Eucalyptus will determine if existing field trials will be allowed to flower. Several of the field trials planted to test the level of freeze tolerance and the geographic range of ArborGen's first biotech tree offering for commercial forestry are approaching three years, an age at which Eucalyptus would normally start to flower.

By allowing all trials to flower and reach the normal harvest age of seven years, ArborGen can complete important research for end-use purposes, including critical wood quality studies that will show how the tree performs as both a biomass and pulping feedstock.

Eucalyptus for Woody Biomass

The Obama administration is committed to renewable energy and the recent American Recovery and Reinvestment Act of 2009 echoes the objectives of the 2007 Energy Independence and Security Act (EISA) and the Food, Conservation and Energy Act of 2008 (2008 Farm Bill), allocating more than $16.8 billion for renewable energy and energy efficiency projects over the next 10 years.[1]

South Eastern States have developed policy initiatives to encourage the development of the bioenergy industry including consumption standards, tax incentives, subsidies, and loans. Renewable energy from biomass sources fall into two major categories of interest: production of liquid transportation fuels (biofuels) and electricity generation through direct firing or co-firing of biomass with coal (biopower).

These emerging markets have the potential to significantly expand the demand for woody biomass in the Southeast providing a valuable source of revenue for local landowners with positive overall economic impact on the local community. A grassroots renewable energy advocacy organization, 25x25 Alliance, has estimated that the Southeastern U.S. would need to contribute 258 million tons of wood annually towards the national goal of providing 25 percent of total U.S. energy needs from renewable resources by the year 2025. Reaching these goals, while ensuring the retention of native forests, will require a significant increase in renewable woody biomass production grown in a sustainable way.

Eucalyptus is one of the world's most productive hardwood tree species and is an ideal source of renewable woody biomass. Purpose grown eucalyptus forests have been planted and sustainably

[1] Overview of Renewable Energy Provisions in the American Recovery and Reinvestment Act of 2009. ACORE

managed in many countries around the world including Brazil, Uruguay, Argentina, Chile, Australia, New Zealand, China and India.

Eucalyptus species including *E. grandis* have also been grown with great success in Florida for several decades. Their yields are significantly greater than native hardwood species. However, these trees are unable to withstand sudden drops in temperature experienced in the zones to the north of Florida and consequently have not been planted in those regions.

ArborGen Freeze Tolerant Eucalyptus can tolerate most severe drops in temperature and also excels at biomass production. ArborGen Freeze Tolerant Eucalyptus therefore provides Southeastern landowners with an economically viable plantation hardwood option, something no other hardwood species has to date been able to provide.

The trees in trial (shown in the photos below) clearly demonstrate the success of ArborGen's freeze tolerance technology. The photo on the left of a freeze tolerance trial shows uniform freeze damage of the control plantings compared to those trees with freeze tolerance. In addition, the two photos on the right (at age 27 months) show that the growth rate of ArborGen's FTE is similar to those achieved in Brazil for a non-freeze tolerant product.

For these reasons and more, ArborGen's technology should become an important component of the United States energy independence story, reducing our dependence upon the petroleum based economy and help to spur rural economic development.

Freeze Tolerant Eucalyptus Facts

1. The BRS Environmental Assessment associated with this permit is meticulous and complete, covering all considerations for the approval of a flowering permit for Freeze Tolerant Eucalyptus.
2. ArborGen's Freeze Tolerant Eucalyptus has a restricted ability to produce pollen. There is therefore an extremely low risk of gene flow spread into the environment.
3. Biodiversity is often higher in plantation forests when compared to other land uses such as agriculture.
4. Numerous Eucalyptus species, including *E. grandis*, have been grown in Florida for decades and have not demonstrated any invasive characteristics. While a few Eucalyptus species are considered by some groups to be invasive in California, none of these species are in ArborGen

field trials. In addition, *E. grandis* has been grown on a large scale for decades in Brazil with no evidence of invasiveness.

5. There are no concerns for livestock or native wildlife consuming DNA from Freeze Tolerant Eucalyptus. DNA is a component in all living things and is therefore a normal component of the food chain. The DNA from a biotech improved tree is essentially the same as DNA from an unimproved tree. More than 1.4 billion cumulative acres of biotech food and feed crops have been grown and consumed world wide in the past 12 years.
6. It is highly unlikely that the Freeze Tolerant Eucalyptus will introduce a pathogen into the United States. The trees were subject to Plant Quarantine and APHIS inspection, and are produced from material grown in tissue culture in the laboratory under clean conditions that do not allow the presence of fungi or bacteria. Therefore, there is a negligible risk that these trees used in the field trial could be or have been contaminated by pathogens such as *C. gattii.*
7. Reaching goals set by President Obama's current administration for renewable energy will require a significant increase in biomass production. Landowners will make decisions about what to plant based upon market demand and economic returns and based upon sustainability practices. It is most likely that a mix of existing biomass and purpose grown crops, including short rotation woody biomass, perennial grasses, energy cane and others, will meet the full demand for biomass.
8. ArborGen Freeze Tolerant Eucalyptus provides Southeastern landowners for the first time an economically viable plantation hardwood option to address the unmet needs demands for wood, fiber and energy.
9. High yielding purpose grown forests planted with ArborGen Freeze Tolerant Eucalyptus will enable the United States to retain and secure greater areas of its native forests for future generations.

About ArborGen

- ArborGen is a leader in tree improvement and commercial production of forest trees.
- ArborGen uses conventional breeding to discover, produce and deliver superior tree seedlings to growers and landowners as well as advanced genetic technologies to produce purpose grown trees for lumber, pulp and paper, and bioenergy.
- ArborGen conducts groundbreaking research with the highest ethical standards to mitigate uncertainties and realize potentials of biotech trees.
- ArborGen follows all guidelines set by the U.S. federal government in its lab research and field trials, and works closely with regulators to ensure the highest safety standards.
- ArborGen is dedicated to using biotechnology to improve the productivity and quality of the wood products we use and need as a society, thereby relieving pressure on native forests.
- ArborGen's research and field trials, including Freeze Tolerant Eucalyptus, benefit society and the environment. Purpose grown trees have the potential to increase the yields per acre, to enable the production of more wood from less land, thereby reducing the pressure to harvest native forests.
- At ArborGen we are foresters, scientists, business people and neighbors, who share a passion for trees, forest conservation and the environment in general.