

Genetically modified low-lignin eucalyptus yields twice the sugar

By [Luke Geiver](#) | May 17, 2011



A few modifications to the eucalyptus tree can go a long way, and ArborGen has the research data to prove it. Since May 2010, the Summerville, S.C., company has been developing genetically modified eucalyptus trees and, now with the help of the National Renewable Energy Laboratory, it has identified a lignin-modified eucalyptus tree that can release twice as much sugar in comparison to unmodified versions.

The modified trees are able to counteract the process of recalcitrance the cell walls use to fight against processes that attempt to break down the lignin. Typically, to access the sugars in the biomass, pretreatment applications involving heat, pressure and chemicals are used to break down the biomass into sugar, but ArborGen has found that by down-regulating the lignin pathway in the cinnamate-4-hydroxylase (C4H), the trees are able to release more sugar. And while the down regulation of the C4H has hindered the growth of some species, the *E. grandis* x *E. urophylla* tree lines grow well. The C4H lines, ArborGen estimates, can produce roughly 10 dry-tons per acre per year of biomass, and could also produce nearly 1,000 gallons of biofuels per acre.

Angela Ziebell with NREL noted that what makes this eucalyptus research interesting is the “increased ease with which the sugars are released,” also adding that “the challenge is not just how much sugar a plant contains, but whether the plant will release that sugar without excessive processing.”

In May 2010, the USDA’s Animal and Plant Health Inspection Service approved a permit submitted by ArborGen to plant and grow the GM trees on 29 separate sites, which, among other aspects, would also test for cold tolerance. According to NREL researchers the C4H modified line of trees has only half of the lignin, and the GM trees also release an astounding 99 percent of their sugar compared to 50 percent in unmodified plants. “We think the result of this technology may increase the potential of Eucalyptus as a biomass source for liquid fuels,” Ziebell said. “This result is particularly exciting given that efficient sugar release from plants is an obstacle to achieving affordable biofuels.”