Eucalyptus Tree: A Potential Global Source of Fuel and Fiber

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Eucalyptus trees are more than just food for koalas; researchers are now trying to harness their potential as a sustainable biofuel and biomaterials production source. (Photo: Fibria/Ehder Souza)

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Eucalyptus trees are more than just food for koalas; researchers are now trying to harness their potential as a sustainable biofuel and biomaterials production source.

Reported in the journal <u>Nature</u>, the study describes researchers' international effort to sequence and analyze the 640 million base pair genome of *Eucalyptus grandis*. They hope it could provide a stable year-round source of biomass that doesn't compete with food crops.

Collectively, they represent a major terrestrial source of carbon, constantly capturing and storing carbon dioxide (CO2) in their limbs. Eucalyptus trees, of which there are over 700 species, are so genetically diverse, they have over 36,000 genes - that's twice as many as the human genome. Researchers honed in on those that may influence the production of secondary cell wall material that can be processed for pulp, paper, biomaterials and bioenergy applications.

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"A major challenge for achieving a sustainable energy future is our understanding of the molecular basis of superior growth and adaptation in woody plants suitable for biomass production," lead author Zander Myburg, of the University of Pretoria in South Africa, said in a <u>statement</u>.

"Insights into the trees' evolutionary history and adaptation are improving our understanding of their response to environmental change, providing strategies to diminish the negative environmental impacts that threaten many species," added researcher Dario Grattapaglia of the Brazilian Agricultural Research Corporation.

Eucalyptus may be native to Australia, but they are planted all over the world. They can be found in 100 countries across six continents and account for over 40 million acres, making them a primary candidate for a biofuel source, especially given their energy-rich cellulosic biomass.

Understanding what genes give the trees their potential fuel properties is key. The research team identified genes encoding 18 final enzymatic steps for the production of cellulose and hemicellulose xylan, both cell wall carbohydrates that can be used for biofuel production.

The extensive catalog of genes contributed by the team will allow breeders to adapt Eucalyptus trees for sustainable energy production in regions, such as the Southeast United States, where it cannot currently be grown.

"Eucalyptus has a truly unique evolutionary history," said Gerald Tuskan of the BioEnergy Science Center. "This, along with its keystone ecological status and ability to adapt to marginal terrain, make Eucalyptus an excellent focus for expanding our knowledge of the evolution and adaptive biology of perennial plants."