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Forest Service scientist honored for improving processes to make ethanol from wood

MADISON, Wis.—For more than 20 years, Dr. Thomas W. Jeffries, a research microbiologist at the USDA Forest Service Forest Products Laboratory in Madison, Wis., has sought to improve the process for making ethanol and other important chemicals from wood. "Converting wood or plant waste, called 'biomass,' into fuels and chemicals could have important economic, political and environmental benefits," according to Jeffries.

Dr. Jeffries modified yeast DNA to increase the amount of ethanol produced when the yeast metabolizes certain components of wood. His approach has resulted in four U.S. patents; three additional patent applications are pending. The patented technologies have been licensed for use by an ethanol manufacturer.

In recognition of his achievements, Dr. Jeffries received the 2006 Chief's Honor Award for Technology Transfer. The award was presented in a recent Washington ceremony by Dale Bosworth, chief of the Forest Service, who cited Dr. Jeffries for his "exceptional creativity and determination in the development and commercialization of technology for converting wood sugars into fuels and chemicals."

Jeffries' research has aimed at improving the ability of yeast to ferment xylose, a type of sugar found in hardwoods and agricultural residues. Xylose is much more difficult to break down than the sugar in corn starch, which is currently widely used to make ethanol.

"The ability to make ethanol and other valuable chemicals from xylose is important for several reasons," Jeffries says. "One, the plant-based fuels tend be to be clean, producing few if any pollutants or

by-products, including greenhouse gases. Also, chemicals made from biomass are usually biodegradable, unlike many petroleum-based chemicals."

Jeffries notes that there is enough available woody biomass to produce 60 to 100 billion gallons of ethanol each year, which could significantly reduce the country's dependence on foreign oil and other fossil fuels.

"By deriving fuels from biomass, it is possible to reduce the accumulation of greenhouse gasses. Plant matter traps carbon dioxide from the atmosphere, so there would be no net contribution to the atmosphere as happens when fossil fuels are burned. Also, new uses for forest and agricultural products can lead to the creation of business and employment opportunities, especially in rural communities that have fallen on tough economic times. Finally, biomass-based fuels have the potential to help reduce our country's dependency on overseas supplies of petroleum," Jeffries said.

Jeffries received bachelor's and master's degrees in microbiology from California State University at Long Beach in 1969 and 1972 respectively. He received a Ph.D. degree in microbial biochemistry from Rutgers University in 1975 and worked at Lawrence Livermore National Laboratory and Columbia University from 1975 to 1979.

Jeffries, who is also a professor in the Bacteriology and Food Science departments at the University of Wisconsin, Madison, joined the USDA Forest Service Forest Products Laboratory (FPL) in 1979. The FPL had established a reputation as a leader in research into uses for wood waste and by-products. As early as 1916, the FPL was working to improve the conversion of waste wood into ethanol. This research proved valuable during WWI and again in WWII, when the nation's military effort required increased quantities of ethanol.

A native of Jennings, La., Jeffries now lives in Madison, Wis., with his wife, Giovanna.

The USDA Forest Service Forest Products Laboratory was established in 1910 in Madison, Wis., with the mission to conserve and extend the country's wood resources. Today, FPL's research scientists work with academic and industrial researchers and other government agencies in exploring ways to promote healthy forests and clean water, and improve papermaking and recycling processes. Information is available at FPL's Web site: www.fpl.fs.fed.us. Through FPL's Advanced Housing Research Center, researchers also work to improve homebuilding technologies and materials.

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