

Chinese Tallow eyed as stock for biodiesel fuel

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"Because of its prolific production of vegetable oil-bearing seeds, the Chinese tallow tree could become the third most productive source of vegetable oil for biodiesel production," Dr. Gary Breitenbeck, Professor of Plant, Environment, and Soil Sciences at LSU in Baton Rouge, told the Piney Woods Journal. "Only palm oil and algae have more potential for producing feedstock for biodiesel production. However, because the tallow tree can be grown on marginal land, not competing with good crop land, this gives it a huge advantage as feedstock."

The Chinese tallow tree (CTT) is a familiar sight growing in yards, along fence rows and among natural stands of timber. In southern Louisiana, it is commonly called "chicken" or "chickenfoot" tree, presumably because its seeds hang in clusters that often times show a resemblance to a chicken's foot.

In Cajun French, it is called boiré. Probably this is because of its preference for wet soils and strange locations. The USDA prefers the Chinese tallow tree's scientific name of *Triadica sebifera* or its earliest scientific classification of *Sapium sebiferum*.

"Palm oil and algae are nowhere close to being a viable biodiesel feedstock in Louisiana," Dr. Breitenbeck, a native of Florida pointed out. "The commercialization of the Chinese tallow tree offers many potential benefits for two reasons. First, because it can be grown on marginal crop land, and secondly, because it already grows on tens of thousands of natural timber stands in Louisiana."

"Anytime this subject is brought up, it usually starts a debate because of the invasive nature of the CTT," Dr. Breitenbeck, who has been at LSU for eighteen years explained. "Also, claims that the CTT exudes chemicals that inhibit the growth of other plant species appear to be unfounded."

Biodiesel, an alternative for petroleum diesel, is derived from natural fats and oils from vegetables or animal renderings. This alternative fuel can be used directly in tractors, pumps, and other equipment with diesel engines.

Currently, most biodiesel is produced in large refineries using soybean oil as a feedstock. However, its production is simple and safe enough to allow on-the-farm or on any location using commercially available processors.

In 2006, in Louisiana alone, it took farmers 57.1 million gallons of diesel to plant and harvest their crops. At today's diesel price, that calculates to nearly \$250 million. Nationwide, farmers used some 2.62 billion gallons of diesel to produce their crops which at today's fuel cost is nearly \$14 billion.

Loggers are the second biggest users of off road diesel. Those consumption numbers related to forestry are apparently not currently available, but would have to run into the billions of dollars nationwide.

"The principal limitation for on-farm or on-location production of biodiesel lies in the availability of suitable fat and oil feedstocks," Dr. Breitenbeck noted. "I think that the tallow tree offers the ideal energy crop for biodiesel along the US Gulf Coast."

"Because it thrives in wet areas and on marginal land where conventional farm crops cannot be grown profitably is only one of the advantages of tallow trees as a biodiesel feedstock," Dr. Breitenbeck said in elaborating on the virtues of the Chinese Tallow trees for certain applications. "Also, it has few insect pests and diseases. In addition, it is tolerant of salt, prolonged flooding, occasional freezing temperature and requires low nutrient and management."

Cultivation of the Chinese tallow tree is not new. It has been grown in China for at least 1500 years, partly for its vegetable wax used for making soap and candles, and because it is used as a black dye for silk production by boiling its leaves in alum.

In 1772, Benjamin Franklin sent a few Chinese tallow tree seeds to a Dr. Noble Wimberly of the Georgia colony with the brief comment, "Tis a most useful plant." Since then, the CTT has been used in the USA as an ornamental plant, a source for an oil crop to make soap, candles and lighting oil. It has also been used for erosion control along stream banks.

As an ornamental, it is highly prized for its brilliant fall foliage and its novel appearance of blooms and seeds. It is widely distributed as a landscape plant for yards and highway rightofways.

"Tallow seeds contain 40-60% vegetable oil which is about two to three times the amount found in an equivalent weight of soybeans," Dr. Breitenbeck, who started aggressively cultivating the Chinese tallow tree on certain acreage at the LSU farm in Baton Rouge eighteen months ago, explained.

"On a per-acre basis, the oil yields are 15 times more than soybeans, 10 times more than sunflower or safflower, seven times more than peanuts and five times more oil than rapeseed," Dr. Breitenbeck pointed out.

"Annual commercial statistics show that production averages between 645 and 970 gallons per acre or between 15.4 and 23.1 barrels of oil per acre," Dr. Breitenbeck said.

"Commercial plantations of Chinese tallow trees in other countries contain about 160 trees per acre trimmed low for hand harvesting."

The light colored, brittle wood of the Chinese tallow tree has virtually no value for lumber, chips, or even firewood. However, extracts of the bark, leaves and seeds are used in traditional and modern Chinese medicine.

"Here at LSU, we are not only researching the genetics, planting, and cultivation of the Chinese tallow tree, but also its harvesting," Dr. Breitenbeck stated. "With improvements in the seed genetics, the planting and mechanical harvesting, I sincerely believe that the Chinese tallow tree here in Louisiana can produce between 1,000 and 1,500 gallons of oil annually."

"In the event that the 'invasiveness' issue continues to be a critical point in commercializing the tallow tree, at LSU we are researching termination technology which is a genetic technique approved by the USDA to prevent germination of the seeds," Dr. Breitenbeck explained. "This will allow the control of the tallow trees in a plantation setting from becoming a nuisance on adjoining land."

"Very soon, here in Louisiana and along the Gulf Coast, we may see a trash tree, the Chinese tallow, become a treasure tree," Dr. Breitenbeck concluded.

Published in The Piney Woods Journal July, 2008. Reprinted
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