

BIODIESEL:

Energy from and for the Farm



Biological engineer Sandun Fernando, foreground, and graduate assistant Prashanth Karra are working to develop a new type of catalyst for converting soy oil to biodiesel.

Bob Ratliff

Record high oil prices are focusing a lot of attention on alternative energy sources, including biodiesel, a fuel derived from vegetable oils.

Since soybean oil is the most commonly used vegetable oil in biodiesel, it would seem soybean producers would be among its biggest fans. Farm use of biodiesel, however, is not widespread, and that concerns Thomas Howarth, who grows soybeans on his Circle H Farm near Cleveland.

"I would like to see more farmers aware of biodiesel," he said. "I'm lucky to live in an area where it's available."

Howarth is one of about a dozen Delta farmers who are regular customers for the biodiesel sold by Farmers Inc. in Greenville, one of the few sources for the product in Mississippi. Farmers Inc. sells a blend that is 2 percent biodiesel made from soybean oil and 98 percent regular diesel. Their supplier is West Central Soy in Ralston, Iowa.

"The price difference between the 2 percent biodiesel blend we sell and regular diesel currently is 3 cents a gallon," said Farmers Inc. manager Floyd Trammell. "Transportation costs from a Midwest supplier are high and we hope to find a supplier closer to the Delta."

Concern about voiding manufacturers' warranties has been one reason farmers and others have avoided biodiesel, but Morgan Beckham, chairman of the Mississippi Soybean Promotion Board said major equipment manufacturers Case IH and John Deere now warrant their engines to operate on biodiesel blends up to 5 percent.

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MORGAN BECKHAM

"Soybean producers who use biodiesel are helping their industry," he added. "Its use also will help diesel producers meet upcoming federal regulations."

Federal Environmental Protection Agency regulations, Beckham said, require that sulfur additives in diesel be eliminated by October 2005 for on road vehicles and by October 2009 for off-road vehicles.

Ironically, lack of government support is one of the stumbling blocks to widespread acceptance of biodiesel by farmers and others large-scale diesel users.

"Legislation that would provide a tax incentive on biodiesel of 1 cent per gallon for each percent of biodiesel blended has been introduced in Congress, but has yet to pass," Beckham said. "That incentive would be enough to offset the difference in the cost of blended biodiesel compared to regular diesel."

Bill Webster, owner of Biodiesel Fuels of Mississippi in Meridian, agrees that a tax break is needed.

"Congress needs to pass an energy bill that will increase demand for alternative forms of energy by making prices competitive," he said. "I have the capacity to make 1,000 gallons a day using mostly recycled soybean oil from catfish restaurants, but right now demand is sporadic."

Since last October, one of Webster's customers has been the Lauderdale County School System, which has been running nine of its buses on a blend containing 10 percent biodiesel.

"We've had no problems whatsoever with the buses that are running on the biodiesel," said Roger Wright, the school district's transportation director. "From a maintenance standpoint we've seen no differences in the vehicles running on regular diesel and the ones using the blend."

Webster noted that there is one very noticeable

difference.

“The tailpipes on the buses running on the blend are clean; they don’t have the black soot you usually see on diesel exhausts,” he said.

The reduced emissions from the blend are the reason one of his regular customers uses it for tractor pull competitions in enclosed stadiums. Another customer operates a swamp tour business and uses the biodiesel in his airboats so his customers don’t have to smell diesel fumes.

The time and energy needed to convert soy oil into fuel are among the factors that push up costs and limit interest in large-scale production of biodiesel. The Mississippi Soybean Promotion Board and MAFES actively support research aimed at simplifying the biodiesel production process.

MAFES biological engineer Sandun Fernando in the Department of Agricultural and Biological Engineering is conducting one such project. He is developing a new catalyst for converting soy oil to biodiesel.

“The catalysts currently in use are homogenous—they dissolve during the process and have to be refined out,” he said. “We are working with a catalyst that does not dissolve, making its removal much easier.”

Fernando is still evaluating his process, but his research indicates the use of the new catalyst can reduce the amount of time needed to convert soy oil to biodiesel from about one hour to just a few minutes—maybe just five minutes.

“Reducing the amount of refining needed to remove the catalyst also lowers the amount of heat and pressure required for the process,” he said. “As a result, the cost of product should be significantly reduced.”



Photos by Greg Ward

WHAT IS BIODIESEL?

Biodiesel is the name of a clean-burning alternative fuel, produced from domestic, renewable resources. Biodiesel contains no petroleum, but it can be blended at any level with petroleum diesel to create a biodiesel blend. It can be used in compression-ignition (diesel) engines with little or no modifications. Biodiesel is simple to use, biodegradable, nontoxic, and essentially free of sulfur and aromatics.

HOW IS BIODIESEL MADE?

Biodiesel is made through a chemical process called transesterification whereby the glycerin is separated from the fat or vegetable oil. The process leaves behind two products—methyl esters (the chemical name for biodiesel) and glycerin (a valuable byproduct usually sold to be used in soaps and other products).

IS BIODIESEL THE SAME THING AS RAW VEGETABLE OIL?

NO! Fuel-grade biodiesel must be produced to strict industry specifications (ASTM D6751) in order to insure proper performance. Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Clean Air Act Amendments. Biodiesel that meets ASTM D6751 and is legally registered with the Environmental Protection Agency is a legal motor fuel for sale and distribution. Raw vegetable oil cannot meet biodiesel fuel specifications, it is not registered with the EPA, and it is not a legal motor fuel.

For entities seeking to adopt a definition of biodiesel for purposes such as federal or state statute, state or national divisions of weights and measures, or for any other purpose, the official definition consistent with other federal and state laws and Original Equipment Manufacturer (OEM) guidelines is as follows:

Biodiesel is defined as mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats which conform to ASTM D6751 specifications for use in diesel engines. Biodiesel refers to the pure fuel before blending with diesel fuel. Biodiesel blends are denoted as, "BXX" with "XX" representing the percentage of biodiesel contained in the blend (ie: B20 is 20% biodiesel, 80% petroleum diesel).

Source: The National Biodiesel Board