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Testing On-Farm Biodiesel Economics

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The average price for diesel across the U.S. was \$4.72/gal. on Memorial Day. A few days later, July soybean futures on the CBOT were at \$13.22 ³/₄. Despite high fuel prices and a drop in soybean futures prices, there was still good money to be made from soybeans...enough to dissuade growers from producing their own soy-based biodiesel anytime soon.

But what about biodiesel from other oilseeds or restaurant grease? Farmers around the country are attending workshops and participating in test programs to see what makes the most economic sense.

Some western-Wisconsin growers and the University of Wisconsin (UW) Extension Service, for example, are testing the concept. "In fall 2006, a lot of farmers were frustrated enough with fuel prices to ask about alternative sources of fuel," says Bill Halfman, UW Extension agent in Monroe County. "Some of this was spurred by claims of how inexpensive it was to grow and produce your own biodiesel. We couldn't find any unbiased research on small-scale biodiesel production."

So Halfman, five other Extension agents and UW soybean specialists evaluated the economics of on-farm biodiesel production. They organized several workshops covering the basics of growing alternative oilseed crops (canola and sunflower), production processes and costs and state regulations. Chris and Dustin Ellis, Independence, WI, were willing to set up a biodiesel production system on their farm. They already had experience using a 50/50 diesel/biodiesel blend from a local cooperative in their John Deere 8000 series equipment with no adverse effects. As temperatures dropped in the fall, they cut back to a B5 blend.

The Ellises and several other growers agreed to plant test plots for the Wisconsin project. Last year, several grew sunflowers.

Matt Danzinger, Alma, WI, grew 8 acres. Because this dairy producer's soil is so fertile, the sunflower heads grew to the size of basketballs and lodged. Danzinger also learned about shelling loss and sunflowers' drydown requirements.

This year, he's planted 4 acres to sunflowers, which average 1,500-3,000 lbs./acre. A 3,000-lb. yield would produce 140 gal./acre of biodiesel, he says. He is not motivated by cost savings. Rather, he looks

to biodiesel production as a way to improve land, air and water resources.

Danzinger says biodiesel would be a good fit on his 500-cow farm. He could use as much as 30,000 gal./year to fuel mixer trucks, forage harvesters, a payloader, skid steers and other equipment. Moreover, he could feed the oilseed meal back to his cattle. One of the study's goals is to examine the feed value of oilseed meal.

While the Wisconsin project's cooperators didn't have much success with sunflowers last year, some are trying it again this year. One grower also is planting a small canola plot.

Some cooperators planted strip trials of soybean varieties that were top oil producers in UW Extension trials.

"We've received donations to help pay for an oilseed press and a 100-gal.-batch oil processor system," Halfman says. "We don't know yet how feasible this is, but we think having an unbiased study will provide useful information."

The UW Extension has applied for an Agricultural Development and Diversification Grant from the state's Department of Agriculture to help with costs.

With sunflower and soybean seed harvested from the project last season, the Ellises began pressing oil and producing biodiesel in June. They are using equipment manufactured by Haas Converting, LLC, Neillsville, WI.

One reason this system was chosen was for alcohol removal, an important step in biodiesel production. Basic production steps can be found on the National Biodiesel Board's (NBB) Web site: www.biodiesel.org by clicking on "Fuel Fact Sheet" in the "Quick Links" box.

"Certain uses or sales of biodiesel made on farms are not legal unless the proper taxes and protocols are adhered to," cautions Amber Pearson, NBB's communications specialist. "It can be dangerous to handle methanol and is best left to commercial facilities designed with this in mind. Proper-quality testing equipment can be cost-prohibitive to the personal manufacturer. Biodiesel must meet the ASTM spec for the health of the industry."

Once the biodiesel and glycerin have been separated, excess alcohol in each phase should be removed with a flash evaporation process or distillation. In other systems, alcohol is removed and the mixture is neutralized before the glycerin and esters have been separated. In either case, alcohol is recovered using distillation equipment and is reused.

Stainless-steel tanks are an improvement over plastic because hot water can be used to heat tanks up to 175° F, says Mark Haas, president, Haas Converting. He recently formed a partnership with Farm Boy Energy, Inc., Des Moines, IA, to sell 100-gal. and 300-gal./day production systems and ion resin canisters.

Cheryl Haas, Mark's wife, owns Purification Plus, which markets ion exchange resin, Res-Mix, to be used in ion resin canisters for purifying biodiesel to the ASTM standard.

SAFETY IS A critical issue when producing biodiesel. Methanol is toxic and you must avoid its vapors. Catalysts require the use of eye protection and protective clothing.

Rick Boggan, B100 Supply, LLC, Altdore, AL, recommends locating the biodiesel storage and production area a distance from the residence in case of fire. Boggan markets safety and other production equipment, as well as a guide to making biodiesel. He also lists workshops at www.B100Supply.com.

The Biodiesel Technology Workshop, for example, is held three times a year, says Jon Van Gerpen, professor and department head, University of Idaho College of Agricultural and Life Sciences. The five-day workshops are geared toward those interested in producing biodiesel as a business. The next workshops are scheduled for October 6-10 in Ames, IA; and March 9-13, 2009 in Moscow, ID.

In North Carolina, the BioNetwork/BioAg Center offers free workshops in collaboration with biodiesel co-ops, community colleges, UNC-Pembroke and the North Carolina Cooperative Extension Service.

Ed Hunt, curriculum coordinator, BioAgCenter, RobesonCommunity College, Lumberton, NC, sees biofuel production technology evolving and expects that farmers will plant different feedstocks in the near future.

The cost to produce biodiesel is approximately 60¢/gal. including methanol, catalyst, amortization of plant cost, administrative and maintenance fees. This production estimate doesn't include the cost of the feedstock which, depending on commodity price, will vary. Many small producers don't consider their own time in the figure, Van Gerpen says.

Farmers who set out to produce biodiesel should be aware of applicable regulations. They can contact their local fire marshal or state department of environmental quality or similar agency for details.

If farmers sell biodiesel, their fuel must be analyzed to ensure it meets ASTM specification. They also must be registered with EPA under 40 CFR Part 79. If a farmer is producing biodiesel for on-farm only or is in a cooperative arrangement with others where no money changes hands, EPA registration is not required.

Registration is necessary to qualify for a tax credit with the IRS. Moreover, you must purchase health effects testing data, available through the NBB.

When it comes to on-farm biodiesel production, you must pencil out whether it makes economic sense for your operation and whether you want to take on the production process.

More education programs are coming on board, Haas says, adding that state governments could aid in cost-share programs for oilseed crushing and equipment.
