



# LEADING EDGE

Leading Edge, supported by the Society for Engineering in Agriculture and the Australian Centre for Precision Agriculture, provides a local and worldwide window on engineering and PA research.

## Grow your own fuel

By Jeanne Berrick, US Farm Journal

**B**rian Schaumburg won't soon forget the day biodiesel came to his farm. The air just seemed a little clearer.

"The thing I noticed right away when I started using biodiesel was less black smoke, especially from our older tractor," says Brian, who farms 600 hectares of corn and beans in Chenoa, Illinois.

Last autumn, Brian's fuel supplier, offered him a trial tank of B2 fuel (blend of

two per cent biodiesel, 98 per cent petroleum diesel) for use during harvest. Brian was so smitten with the cleaner-burning fuel, he tried blends of five per cent and 20 per cent biodiesel this spring at planting. Biodiesel blends of up to 20 per cent can be used in any diesel engine, usually with no modifications.

"I didn't see any decline in power, and biodiesel's lubricity is helping prevent wear on my engines," Brian adds. "I have to say, I can't think of any disadvantages of using biodiesel."

Currently, two per cent blends of soy-

based biodiesel cost at least US2¢ per gallon (approximately AU1¢ per litre) more than No. 2 diesel. For a farmer who uses 3000 gallons a season — typical consumption for an 800-acre Midwestern corn-soybean farm — that equals about \$US60 more per season.

"The cost is minimal because using biodiesel is adding value to my beans," says Boone, Iowa, farmer Scott Chesnut, who has used a B2 blend in his tractor, combine and pickup year-round for over four years.

His co-op operates a soybean process-

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### WHAT IS BIODIESEL AND WHO PRODUCES IT?

Biodiesel is the methyl (or ethyl) ester of fatty acids and can be made from new or used animal fats or vegetable oil. Through the chemical process of transesterification, the triglycerides in the fat or oil are converted to the methyl esters of the contained fatty acids.

Free fatty acid, the fat or oil are converted using a similar process called esterification.

Alternative feedstocks which can be converted into biodeisel include palm oil, soybean oil, canola, corn oil, sunflower oil, olive oil and lard — in fact any biogenic fat or oil.

### World biodiesel production

Commercial production of biodiesel began in the early 90s and by 1998, 21 countries worldwide processed around 700,000 tonnes each year. Today, global annual production has leapt to 2.8 million tonnes with Europe accounting for 70 per cent of that. In recent times, Asia and North America have become bigger players with a combined annual production of over 700,000 tonnes.



Illinois farmer Brian Schaumburg fills up with biodiesel while Evergreen FS fuel specialist Jeff Todd looks on.

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ing plant and partly owns a fuel company which supplies biodiesel to his farm as a tank blend. While biodiesel can be made from any vegetable oil or fat, soy-based biodiesel is made by converting soybean oil into methyl ester, which mixes easily with petroleum diesel. Soybean oil makes up 18 per cent of every tonne of soybeans.

"We've had good luck with B2 in our equipment," Scott says. "It seems to be a better lubricant in the pumps and we haven't had any filter-plugging problems." Scott says he didn't notice any more fuel usage with biodiesel than with regular diesel. But Department of Energy studies have found that a 20 per cent blend of biodiesel should show an average two per cent reduction in fuel economy and power.

#### THE AUSTRALIAN INDUSTRY

Australian Renewable Fuels Pty Ltd is at the forefront of biodiesel development in Australia. ARF is planning construction, in the very near future, of the first of five commercial scale biodiesel plants. The first facility is targeted at 40 million litres of biodiesel a year and will use a blend of various feedstocks based on cost. Oilseeds as well as animal and waste fats will be used in the processing of biodiesel.

By-products will be raw glycerine and sulphate of potash fertiliser. There is no effluent to be disposed of. The production process involves heating the feedstock to 60°C and then adding chemical reagents (methanol and potassium hydroxide) inside sealed tanks.

**Contact ARF on Ph: 08 9325 8400**

Higher blends of biodiesel have been known to gel at starting in sub-zero weather, but neither Brian nor Scott have had problems as long as the fuel is properly blended.

In the US, equipment manufacturers John Deere, Caterpillar, Cummins and International have agreed to honour warranties on equipment using biodiesel blends of up to five per cent, provided the fuel meets certain standards (see panel).

"In my mind, every co-op should be using biodiesel at a minimum of a two per cent blend," says Scott. "Biodiesel is something we can grow right here, regenerate every year and reduce our reliance on foreign oil."

#### AVAILABILITY ON THE RISE

An increasing number of Midwestern fuel distributors began offering soy-based biodiesel for farm usage this spring. The trend is significant because although biodiesel is available nationwide, it has been mostly used by centrally fueled fleets, such as school buses and postal service trucks, leaving geographically dispersed farmers with little chance of getting blends of two per cent or higher.

Illinois-based fuel supplier Growmark, now offers on-farm delivery of B2 and B20 blends to farmers across Illinois, Iowa, Wisconsin and Ontario, Canada. A petroleum fuel distributor based in Iowa, sells B2 direct to farmers for a few cents more than No. 2 diesel.

And in Nebraska, Country Energy LLC is offering B2, B5, B20 and B100 (100 per cent biodiesel). B100, or neat

#### BEFORE YOU PUMP

Before pumping a biodiesel blend into your fuel tank, the US National Biodiesel Board suggests the following:

- Check fuel filters. Biodiesel blends have excellent solvent properties. In some cases, the use of traditional No. 2 diesel fuel can leave a deposit in the bottom of the fuel lines, tanks and delivery systems over time. Biodiesel can dissolve this sediment and mean more frequent filter changes when first using biodiesel blends.
- A 20 per cent blend of biodiesel raises the fuel's cold weather properties.
- As biodiesel is a good solvent, it can, if left on painted surfaces long, dissolve certain types of paint.
- Use stored biodiesel within one year. All fuels, including No. 2 diesel fuel, have a quality shelf life.

biodiesel, can cost up to \$US2.50 per gallon (approximately \$AU1.20 per litre) depending on the feedstock and supplier.

While US biodiesel sales are increasing, up from 500,000 gallons in 1999 to 20 million gallons last year, the product is still not available in many rural areas, particularly in the south and east of the US.

Fuel suppliers complain of storage and handling problems. A typical transport load of fuel is 7500 gallons. Yet many fuel distributors don't have the storage to dedicate to a large transport load of blended biodiesel fuel when they only sell it to farmers in 400-gallon quantities.

Supporters often retort that if more people demand it, most of the infrastructure problems will be resolved.

"Biodiesel just has to go through the same growing pains in terms of handling as ethanol did," says Paul Fauser, president of Fauser Oil in Elgin, Iowa, which sells B2 to distributors. "Demand for biodiesel is growing, but it is growing very slowly. Once demand is consistent, suppliers can justify buying a large load."

But the trucking and rail industries claim that without tax incentives, biodiesel use will be cost-prohibitive to everyone, including consumers. Unlike ethanol, biodiesel is not currently supported by a federal tax credit to offset costs and make it competitive with petroleum diesel.

The biodiesel industry does expect demand for B2 and B20 blends to rise dramatically over the next few years since the Environmental Protection Agency (EPA) has finalised a rule that requires a 97 per

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cent reduction in all sulfur levels in diesel fuel by the year 2007. When sulfur is taken out of petroleum diesel fuel, lubricity goes down. Biofuel advocates now hope that biodiesel will replace sulfur for its lubricity value. As little as a one per cent blend of biodiesel can increase diesel fuel lubricity by up to 65 per cent.

**AN AWARENESS ISSUE**

“When we pioneered the fuel industry in 1978, our dependency on foreign oil was 38 per cent. Now its 60 per cent and rising,” says Martin Andreas, senior vice president for ADM. “We’ve got to get the word out about home-grown biofuels.”

Farm-state legislators have answered that call with a \$US1 million per year inclusion in the Farm Act for biodiesel education over the next five years.

Back in Iowa, Scott Chesnut says he is doing his part to encourage other farmers to use biodiesel. “A lot of people don’t realise they can burn biodiesel in equipment without modification,” he says. “It’s a learning curve, like with ethanol. But if farmers aren’t willing to try biodiesel, we shouldn’t expect anyone else to.”

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Thanks to ARF for technical and Australian industry input. Phone 08 9325 8400.



## New Leading Edge editor

**W**elcome to Leading Edge. I’m Gary Alcorn your new editor. My aim is to reflect current and future developments in agricultural engineering and in particular the vital contributions made by both the Australian Society for Engineering in Agriculture (SEAg) and PA members.

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**Gary Alcorn: New editor for *Leading Edge* in *The Australian Cottongrower*.**