

UI RESEARCHER AIMS TO JUMP-START BIODIESEL

Scientist's goal is to get more value out of the raw material

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MOSCOW -- Biodiesel research at the University of Idaho has come a long way since the alternative fuel program germinated in the late 1970s.

But over the years, the clean-burning, agriculturally derived product has hit a major obstacle to wider commercial acceptance: its price.

"When you produce biodiesel, you need \$1.50 for the raw materials only (to produce a gallon)," says Brian He, a biodiesel researcher at the UI. "On top of that, you have the operating costs and the labor costs. Eventually, we are talking about \$2.50 to \$3 per gallon."

So He (pronounced "huh") has been exploring ways to make the biodiesel production process more profitable, thereby reducing the cost of the end product.

He aims to do this by transforming the waste and byproducts from production into valuable commodities that can be sold to defray operating costs.

Biodiesel is made by combining vegetable oil, usually from crushed rapeseed or mustard seed, at high speed with methanol or ethanol. The result forms a two-layer fluid, with usable biodiesel on top and impure glycerol on the bottom.

The glycerol has little economic value since it is too costly to purify by conventional means. But He is testing a bacterial fermentation process that can cheaply convert it into propanediol, one of the valuable raw materials for making common polyester.

"I realized in the fermentation process of converting glycerol into propanediol, there is also ethanol produced," He says. The bonus ethanol can then be cycled back into the production process.

"In that case we utilize the byproduct and make it valuable to the process. The overall cost can be reduced."

He also is exploring ways of increasing the value of the seed meal left over from the crushing process. By using solvents to extract toxic chemicals like cyanide from the meal, He can transform it from its current use as fertilizer into much more valuable animal feed.

"(The meal) contains about the same amount of proteins as soy meal, about 40 percent. They are also quite balanced proteins. To use it as fertilizer is kind of a waste."

Another high-value product contained in the seed oil is a fatty acid called erucic acid. He wants to isolate the erucic acid and sell it separately.

It is used in more than 200 different products, He says, including plastics, pharmaceuticals, lubricants and ink.

While all these methods have been accomplished elsewhere, he says, they have never been integrated into a biodiesel production line. One of his next projects will be the construction of a model production line to squeeze every last cent from the tiny seeds.

Charles Peterson, the scientist who pioneered biodiesel research at the UI in 1979, says He's research is critical to the future of biodiesel.

"In the Palouse country, it's very difficult for oil seed crops to be economically viable if you're just looking at the oil alone," Peterson says. "So the more we can do to increase the value of the byproducts, such as meal, the bigger potential we have of actually growing these crops for commercial production."

A typical rapeseed field will yield about 100 gallons of biodiesel per acre, he says, putting the value at today's diesel prices at around \$110 to \$120 per acre.

"That's not enough to make the crop viable. So you have to do some of these other things that add some return to the value of that crop."