

Turning Fuel Ethanol Into Beverage Alcohol

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Fuel ethanol could be cheaply and quickly converted into the purer, cleaner alcohol that goes into alcoholic drinks, cough medicines, mouth washes and other products requiring food-grade alcohol, say Iowa State University researchers.

But there's still a lot of purifying and studying to be done before fuel made from corn is turned into your next vodka or mixed into your morning mouth wash.

Jacek Koziel, an Iowa State assistant professor of agricultural and biosystems engineering, is leading a research project that's attempting to develop and refine two technologies that work together to efficiently purify and remove bad-tasting components from fuel ethanol. The project is partially supported by a \$79,900 grant from the state's Grow Iowa Values Fund.

Koziel is collaborating on the project with Hans van Leeuwen, the vice president of MellO3z, a Cedar Rapids company that has developed technology for purifying alcoholic beverages. Van Leeuwen is also an Iowa State professor of civil, construction and environmental engineering.

Iowa certainly has an abundance of fuel ethanol for the researchers to work with. Iowa is the country's leading producer of fuel ethanol. The Iowa Corn Promotion Board says the state has 25 plants capable of producing 1.5 billion gallons per year with more plants on the way.

Van Leeuwen said the fuel produced by those plants and the alcohol produced for the beverage industry are very similar. But alcohol produced for fuel isn't made with the same care and purity as alcohol for consumption, he said. The multiple distillations required to make food-grade alcohol raise production costs to about 50 cents per gallon more than it costs to produce fuel ethanol.

Van Leeuwen said the researchers are working to develop technologies that can purify fuel into beverage alcohol for less than an additional penny per gallon.

"That's the whole point," van Leeuwen said. "And based on my experience treating water and wastewater with these technologies, this could cost a lot less than a cent per gallon."

The potential to cut costs has one large producer of ethanol and food-grade alcohol interested in the research project, van Leeuwen said.

Koziel said the researchers are using two purification technologies: they're bubbling ozone gas through the fuel to remove impurities and they're filtering the fuel through granular activated carbon to absorb impurities. A patent for the process is pending.

Underpinning the research is sophisticated chemical and sensory analysis of the raw fuel and the purified alcohol. Koziel will use a technology called solid phase microextraction to collect samples of the compounds in the alcohols. He'll also use a technology called gas chromatography-mass spectrometry to identify and quantify all the compounds in the samples. And he'll use his lab's olfactometry equipment to separate and analyze the smells created by the various compounds.

"If this is viable," Koziel said, "we are looking at adding a lot of value to relatively cheap fuel-grade ethanol."

Source: Iowa State University

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