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Sorghum: The sweet alternative

The little-grown crop's potential in ethanol field draws support, skepticism

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Lee McClune has sweet dreams of turning sorghum into ethanol.

McClune, a retired engineer who lives near Knoxville, envisions farmers owning the ethanol production stream from seed to fermentation tanks. He sees them substituting sweet sorghum, a little-grown crop, for corn. Sweet sorghum is raised mainly for cooking into a syrup that can be substituted for honey or molasses.

As the United States boosts its production of renewable energy sources, researchers are looking at more efficient ways of turning crops into fuel. **Researchers at Iowa State University** say sweet sorghum could play an important role as an energy crop in five years.

McClune, 71, was born on a farm near What Cheer. He retired in 1999 after working with rockets in the military and as an engineer at 3M Co. His boyhood years on the farm gave McClune hands-on mechanical training, and the military pointed him in the direction of engineering.

Using his mechanical acumen and engineering education, McClune has invented a sorghum harvester. The harvester cuts the stalks and squeezes the juice out of them as it runs through the field. McClune is still tinkering on his harvester-presser while he looks for a manufacturer to make the machines commercially.

He's also crossing the country promoting his sweet sorghum dream. McClune calls the fuel made from sweet sorghum "Sorganol," a term he has registered as a trademark.

Corn, by far the most common feedstock for ethanol in the United States, must be converted from a starch to a sugar before it can be distilled into alcohol, McClune tells anyone who will listen.

Sweet sorghum yields a sugary juice when pressed, McClune said, so it can skip the starch-to-sugar conversion process and go directly from the field to the fermentation tank.

That makes Sorganol easier and cheaper to process than corn-based ethanol, McClune said, and opens up a possible opportunity for farmers, or groups of farmers, to make their own ethanol.

An acre of sweet sorghum can produce more ethanol than corn, McClune said, and the crop doesn't need fossil fuels to provide heat for processing.

Its tall, abundant stalks, as well as other biomass crops like switchgrass, can be burned to convert plant matter to ethanol, he said.

Morris Bitzer, executive secretary of the National Sweet Sorghum Producers and Processors Association in Lexington, Ky., has doubts that U.S. farmers can profit from turning sweet sorghum into fuel.

Bitzer, a professor emeritus at the University of Kentucky, where he was a grain crop specialist, said turning sweet sorghum into ethanol isn't feasible in the United States, where only one crop of sweet sorghum can be grown a year.

Another problem, Bitzer said, is that there isn't enough sweet sorghum seed for large-scale production of the crop in the United States. And, he said, McClune is overestimating potential yields from sweet sorghum's current genetics.

Norman Olson, manager at the Biomass Energy Conversion facility, is studying sweet sorghum's energy potential at the Iowa Energy Center in Nevada.

Several varieties of sweet sorghum were planted last year at the Iowa State University Research Farm west of Ames, Olson said.

Olson is using the sorghum from those tests to compare storage methods and their impact on sugar content, he said, which will determine how much ethanol can be produced from sweet sorghum. The sorghum results will be compared with ethanol made from corn and sugar cane, Olson said.

Although final results from the research won't be known until August, Olson said, sweet sorghum shows potential as an energy crop.

Sweet sorghum grows well in Iowa, it has lower input costs and produces more per acre, Olson said.

It can fit into a crop rotation well where it can break disease cycles after corn and soybean crops are grown, he said.

When breakthroughs are made in turning plants like switchgrass, straw and other biomass crops into ethanol and other petroleum substitutes, sweet sorghum could become a big crop in Iowa, Olson said.

"It could take five years," said Olson. "It takes a while to get a new crop established and have a market for it. When that happens, sweet sorghum can become a viable third crop in Iowa."

A five-year timeline for developing sweet sorghum as an energy crop would match the U.S. Department of Energy's target for producing energy from cellulose, he said.

Research at Oklahoma State University has shown that ethanol can be produced from sweet sorghum in the field, as McClune maintains, said Dani Bellmer, associate professor of biosystems engineering.

"He came to us with this idea of making Sorganol in the field and he has developed a harvester-press that can collect the juice in one pass," Bellmer said. "Our efforts focused on determining how efficient fermentation is in the field."

The sweet sorghum juice from McClune's machine was pumped into a storage tank in the field, yeast was added and the potion was left to ferment, she said. "We found out that it can ferment just fine at those temperature extremes in the field, although colder weather can slow down the process."

The biggest problem was that the experimental harvester-press McClune is working on didn't perform as well as it might have.

Bellmer wants to do some large-scale fermentation studies using tens of thousands of gallons to see what scaling up production means. "We're not done," she said.

Robert Brown, director of Iowa State's office of biorenewable programs, said he thinks McClune's dream of Sorganol has merit.

"It makes sense in terms of straight out economics," Brown said.

"The difficulty is logistical. You are asking farmers to produce a crop they are not used to working with and you are asking ethanol distillers to work with a beer that is much different than what they are used to working with. . . . It's a radically different approach and any radical idea is going to take a while to gain acceptance.

"There will be a learning curve, but that was what had to be done for turning corn into ethanol."

McClune knows he is in a long distance race, not a sprint.

"I'm hoping that within five years, we'll have 50,000 acres of sweet sorghum

growing here in the Midwest, and we'll use it to make ethanol out of it," he said.