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Oklahoma switchgrass could fuel the future

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As experts turn against corn ethanol, Oklahoma is continuing to elbow for a spot in the so-called second generation of the biofuels movement — a generation that won't use food for fuel.

In recent months, turning corn into fuel has met criticism on two fronts: It's been blamed as a factor in sky-high food prices that have led to riots in [Asia](#), [Africa](#) and [Haiti](#); and it's been cast as an environmental villain, since studies say corn ethanol, on the whole, creates more greenhouse gas emissions than gasoline.

But Oklahoma's biofuels industry is growing down a different path.

Since last year, the state has been investing tax money in switchgrass — a potential biofuel that's no good for food and is praised for its environmental benefits.

The only problem: It's not proven to work on a commercial level.

Scientists say that may be changing soon.

This week, researchers announced they're planting a 1.5 square mile test plot of switchgrass in the [Oklahoma Panhandle](#). Smaller plots will go in Chickasha and Maysville, south of Oklahoma City. A biofuels plant in southwest Kansas says it will process the crops, which is the trickiest part of the scenario.

Officials are banking on that test working. As carbon dioxide emissions and traditional fuel prices continue to rise, a cost-effective and sustainable change has never been more needed, they say.

"Oklahoma is not dependent on corn to make the (biofuels) industry work," said [Joe Bouton](#), a doctor of agronomy and plant breeding at the [Noble Foundation](#), which will plant the test crop.

A fuel you can't eat

About one-fifth of the corn crop in the [United States](#) is converted into ethanol, a fuel that can be mixed with gasoline and then used in standard automobile engines.

Ethanol once was seen as a silver bullet in the nation's battle for energy independence, and, to some extent, the battle against global warming.

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AT A GLANCE

A fuel glossary

•**Fossil fuels:** Fuel made from long-dead biological material, like deposits of oil and natural gas that have been trapped underground for billions of years.

•**Biofuels:** Fuel made from biological material that recently was living. It's the broad category for the many types of fuel made from things like plants, oils and animal fats.

•**Ethanol:** An alcohol that can be burned as fuel. It's created by fermenting sugars. Ethanol can be used in gasoline engines when mixed with traditional gas. Some cars are fitted to use high-ethanol concentrations. Standard engines can take a 10 percent ethanol mixture without alterations.

•**Cellulosic ethanol:** Ethanol made from plants with high cellulose content. Commonly switchgrass, poplar trees or farm byproducts, like wheat stalks. Not available on commercial scales because the cellulose conversion process is complicated.

•**Corn ethanol:** Ethanol made from fermented corn. One in five acres of corn in the U.S. is turned into corn ethanol.

•**Biodiesel:** Fuel made from cooking grease, vegetable oil, soybeans or animal fat. The fuel is made through a chemical process that separates the oils from glycerin. Glycerin is a byproduct that's sold for use in soaps and cosmetics. As the name suggests, biodiesel runs in diesel engines, often with standard diesel fuel mixed in.

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But corn ethanol started drawing heated criticism late last year as food prices jumped around the world, putting basic nutrition out of the hands of many of the world's poor. Jean Ziegler, the U.N.'s independent expert on the right to food, called food-to-fuel schemes a "crime against humanity."

Officials say Oklahoma is free from any of that blame because it is not much of a corn-producing state. The 2008 corn crop here is expected to cover 330,000 acres, according to the U.S. Department of Agriculture. That's about 5 percent of the state's total crop acreage.

Researchers and officials say switchgrass, which is native to the state and the Great Plains, will do better here. It will grow on marginal land not suitable for food crops. If managed properly, it wouldn't contribute to food shortages.

Nathanael Greene, a senior policy analyst at the Natural Resources Defense Council, warned against taking the concept too far.

"It's important that we not latch onto a crop like switchgrass as a panacea, because we could start harvesting corn fields and planting them with switchgrass and cause the same amount of complications — and reduce the amount of food available — as we do now," Greene said.

"I don't think any technology is inherently evil, or inherently the solution," he added.

'Carbon neutral'

Independent of the food crisis, recent studies say corn ethanol creates high greenhouse emissions — more than those from gasoline.

Rainforests and grasslands are being mowed to plant profitable ethanol crops — or to plant food, since old cropland was turned over to produce biofuels. Left untouched, the forests would slurp huge amounts of carbon dioxide out of the atmosphere; and cutting down the forests also releases carbon.

A February study from the journal Science says extensive corn ethanol could create nearly twice as many greenhouse gas emissions as gasoline use.

Switchgrass may have the reverse effect.

"When you go to these green fuels, you're trapping the carbon to grow the plant," said Bouton of the Noble Foundation.

You release that carbon when you burn the plant for fuel, he said, but, during the growing process, the grass sucks it right back in.

"It's not just carbon neutral, it actually could be taking some (carbon dioxide) out of the system," Bouton said.

Researchers in Oklahoma also say switchgrass is far more efficient than corn. One acre of non-irrigated switchgrass in eastern Oklahoma could yield 600,000 gallons of fuel in a year, Bouton said. The same size corn field would require irrigation and would produce 300,000 to 400,000 gallons per year, he said.

Switchgrass has far-reaching environmental benefits, said Miles Tolbert, state secretary of the environment.

"The wonderful thing about switchgrass is that it is a native plant that can flourish under the conditions in Oklahoma with very little need for fertilizer or pesticides or even water," he said. "If we can successfully develop it as a crop, what we're really doing is creating an economic incentive to restore a native prairie grass."

More research needed

Despite the apparent benefits of turning nonfood crops into fuel, more research is needed for non-food biofuels to be profitable, said Greene, of the Natural Resources Defense Council.

"Cellulosic biofuels have been five to eight years away from commercialization forever," Greene said. "The reality is that it's a tricky thing to do — and to do economically."

Cellulosic biofuels are fuels made from plants with high cellulose content. Cellulose is a compound that gives structure to plant cell walls, acting like a skeleton. It can be broken down into sugars and then fermented into ethanol; but a scientific hang-up comes in converting the complex cellulose into sugar.

Greene said he's seen an "incredible explosion" in cellulosic ethanol research in recent years — with most of the interest and money coming from the private sector.

He praised Oklahoma's research to use land for grazing and switchgrass production.

At Gov. Brad Henry's request, the Oklahoma Legislature is expected to put \$40 million to cellulosic biofuel research over the next three years. Ten million already has been dedicated, but the projects focus mostly on the breeding side of the equation.

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Just across the border from the test crops in the [Oklahoma Panhandle](#), a biofuels processing plant in Kansas is expected to open in late 2010.

Researchers here are pinning their hopes on a successful — and sustainable — biofuels project there.

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► It really amazes me to what extent people will commit financial suicide. The entire state of Oklahoma that are along rail lines could use rail transit to get around and use Union Station. But Oklahomans aren't that smart to use existing infrastructure.

Richard, Oklahoma City - Apr 28, 2008 2:35 PM
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► Yes, Duane, we would be energy independent if we got that kind of production Maybe in our next life along with warp drive. One bushel of corn produces about 2.7 gallons of ethanol, so 200 bu/ac irrigated corn cranks out 540 gallons per ac. I think the ethanol production figures in the article reflect a section of land (640 ac), not a per ac basis. Even though switchgrass does have the potential for

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