



Solving the Biofuels vs. Food Problem

By Bryan Walsh , Monday, Jan. 07, 2008

The fastest way to start a fistfight among environmentalists is to bring up the topic of biofuels — plant-based liquid fuels like ethanol that could potentially take the place of petroleum. Biofuel revolutionaries — like Silicon Valley venture capitalist Vinod Khosla — see plant power as a way to break America's dependence on foreign oil, and produce auto fuel that doesn't kill the climate. Opponents dismiss biofuels — most of which are currently distilled from crops like corn and sugar cane — as a blind alley, one that drives up food prices without saving the earth.



Arvid Boe, a professor in South Dakota State University's plant science department, looks out from a field of switchgrass on the campus in Brookings, S.D.

Dirk Lammers / AP

In that last point of food versus fuel, the naysayers have so far had the upper hand. Corn — the main source of ethanol in the U.S. — isn't a very rich source of energy, and it's difficult to understand how a world that still has nearly a billion hungry people could dedicate a sizable chunk of its corn harvest to fuel. The 4.86 billion gallons of corn ethanol produced by the U.S. in 2006 has already had a measurable impact on grain prices, which are hovering at world highs.

But what if biofuels could be made without food crops, using an inedible plant grown on less than optimum farmland? That's exactly the thinking behind the push to develop cellulosic ethanol from the waste plant switchgrass, which grows throughout the Midwestern prairies, with little input from farmers. Instead of fuel from food, switchgrass cellulosic ethanol promises fuel from virtually nothing — and a new paper in the *Proceedings of the National Academy of Sciences (PNAS)* argues that it's worth making the switch.

In the biggest such study to date, scientists led by Kenneth Vogel from the U.S. Department of Agriculture and the University of Nebraska-Lincoln performed long-term, large-scale field studies on raising switchgrass as an energy crop. Farmers in 10 fields of 15 to 20 acres each in Nebraska and North and South Dakota grew switchgrass over five years, and kept track of how much fuel and fertilizer they used during the trials. Vogel and his colleagues showed that switchgrass yielded 540% more energy as a biofuel than the amount of energy used to grow, harvest and process it. (Corn ethanol yields just 25% more energy.) Greenhouse gas emissions from switchgrass fuel would be 94% lower than emissions from petroleum fuel — almost carbon neutral. Previous studies had come up with similar numbers in small-scale trials, but this

was the first study on the level of a working farm. "The idea is that we won't be replacing food with fuel on prime land," says Vogel. "This study shows you can use switchgrass as an energy crop on marginal land and get the same environmental benefit."

Farmers don't have a lot of experience growing switchgrass for fuel, but Vogel points out that as the crop is more widely adopted on farms, we can expect the yield to grow — perhaps even double, as corn yields have over the past few decades. But there's still a long way to go before you'll be able to fill your tank with switchgrass. Getting energy out of the tough cellulose molecules in a stalk of switchgrass is much more difficult than distilling it from corn, or better, sugar cane. Both the Department of Energy (DoE) and private companies like Broomfield, Colo.-based Range Fuels are developing the technology to commercialize cellulosic ethanol, but that day might still be years away. "We're doing serious technological innovation on this," Khosla told TIME recently. "Oil is a big market, and there will be breakthroughs."

Let's hope those breakthroughs come soon. Another new paper in *PNAS* underscores just how vital it is to make the transition to low-carbon transport fuels. Scientists at the Center for International Climate and Environmental Research in Oslo quantified the full impact of all our driving, shipping and flying on the climate, and found that transport accounts for around 16% of all man-made carbon emissions — with auto fuel taking the largest chunk. That percentage will only increase over the coming decades — unless we can switch to something cleaner.