

Biofuels: More than just ethanol

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As the United States looks to alternate fuel sources, ethanol has become one of the front runners. Farmers have begun planting corn in the hopes that its potential new use for corn will be a new income source. What many don't realize, is the potential for other crops, besides corn, to provide an alternate energy source to fossil fuels. Scientists studied the greenhouse gas emissions and bioenergy of corn, hybrid poplar, switchgrass, and other crops to determine the efficiency of various biocrops in terms of energy consumption and energy output.

The study, "Net greenhouse gas flux of bioenergy cropping systems using Daycent", was completed by Paul Adler (United State Department of Agriculture - USDA), Stephen Del Grosso (USDA and Colorado State University), and William Parton (Colorado State University). Results appear in the April issue of *Ecological Applications*.

"Biofuels have a great potential to reduce our dependence on gasoline and diesel fuel," says Parton. "We have performed a unique analysis of the net biofuel greenhouse emissions from major biofuel cropping systems by combining ecosystem computer model data with estimates of the amount of fossil fuels used to grow and produce crop biofuels."

Adler, Del Grosso and Parton used the Daycent biogeochemistry model, developed by Parton and Del Grosso to asses greenhouse gas fluxes and biomass yields for corn, soybean, alfalfa, hybrid poplar, reed canary grass and switchgrass.

The results of the study showed that when compared with gasoline and

diesel, ethanol and biodiesel from corn and soybean rotations reduced greenhouse gas emissions by almost 40 percent, reed canarygrass by 85 percent. Greenhouse gas emissions were reduced by about 115 percent for switchgrass and hybrid poplar. Both switchgrass and hybrid poplar offset the largest amounts of fossil fuels reduced emissions compared to other biofuel crops and offset two times as much fossil fuels if they are used for electricity generation via biomass gasification.

Study results showed that nitrogen (N_2O) emission resulting from production of the biofuel crops is the largest greenhouse gas source, while displaced fossil is the largest greenhouse gas sink followed by soil carbon sequestration.

This research shows that farmers will have a variety of biofuel crop options available in the future and that these biofuel crop rotations will have different environmental impacts. Detailed studies of the environmental impact of biofuel crops similar to this study need to be done at the regional and national levels before biofuel national policy decisions are finalized.

Source: Ecological Society of America

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