Switchgrass produces biomass efficiently

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A USDOE and USDA study concluded that 50 million U.S. acres of cropland, idle cropland, and cropland pasture could be converted from current uses to the production of perennial grasses, such as switchgrass, from which biomass could be harvested for use as a biofuel feedstock. Economically viable production of a perennial grass monoculture from which substantial quantities of biomass are removed annually is expected to require nitrogen fertilizer.

An agronomist at Oklahoma State University, Regents Professor Emeritus Charles Taliaferro, designed and conducted an experiment to determine biomass yield from alternative levels of nitrogen fertilizer for a single and double harvest per year system for four perennial grass species (bermudagrass, flaccidgrass, lovegrass, and switchgrass). Agricultural economics graduate student, Mohua Haque, used the data produced in the field experiments to determine the most economical species, level of nitrogen, and harvest frequency for several sets of nitrogen fertilizer prices and hypothetical biomass prices. The study was funded by the USDA Cooperative State Research, Education, and Extension Service and by Oklahoma State University. Results from the study were published in the November-December issue of the Agronomy Journal.

Haque explains, "For the soil and weather conditions that prevailed at the experiment site for the duration of the study, switchgrass clearly produced more dry biomass per dollar cost than the other three species. If perennial grass for biofuel feedstock is the best alternative for a field, and if the biomass price exceeds the cost of production, the optimal

strategy would be to establish switchgrass, and in post-establishment years, to fertilize with 60 pounds of nitrogen per acre per year, and to harvest once per year after senescence."

If an economically viable system for conversion of biomass from perennial grasses to biofuels is developed, millions of acres may be bid from current uses and seeded to switchgrass.

Results from the study will be incorporated into a model at Oklahoma State University to evaluate the economic potential of alternative cellulosic biofuels production systems for Oklahoma. The goal of the research effort is to construct and solve models to determine the optimal number, size, and locations of cellulosic biorefineries, feedstock production counties, harvest months, fertilizer levels, number of harvest machines, storage strategy, and feedstock transportation flows.

More information: The scientific article is available for no charge for 30 days following the date of this summary. View the abstract at agron.scijournals.org/cgi/cont … /abstract/101/6/1463 .

Source: American Society of Agronomy