Biodiversity key to sustainable biofuel according to University of Minn. researcher's findings

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Ecosystems containing many different plant species are not only more productive, they are also better able to withstand and recover from climate extremes, pests and disease over long periods of time.

These findings, published in the June 1 issue of Nature, are the culmination of 12 years of experiments conducted by David Tilman, Regents Professor of Ecology at the University of Minnesota, to explore the value of biodiversity. The research was carried out at Cedar Creek Natural History Area, near Cambridge, a field station operated by the university's College of Biological Sciences.

"This is exciting because it shows that biodiversity can be used to produce a sustainable supply of biomass for biofuels," Tilman says.

For more than 50 years, scientists have debated the hypothesis that biodiversity stabilizes ecosystems. The University of Minnesota study is the first to provide enough data -- gathered over a sufficient time period in an experiment that controlled biodiversity – to confirm the theory. The time period of the study allowed researchers to evaluate the average net effects of diversity on resistance to and recovery from drought, pests, disease and other disturbances. Tilman and his collaborators began the work in the early 1990s and began publishing a series of landmark papers in 1994.

Biodiversity of global ecosystems has decreased as global population has increased because diverse ecosystems such as forests and prairies have been cleared to make way for agricultural fields planted with monocultures, buildings and roads.

Tilman's research has shown that ecosystems containing many different plant species are more productive than those containing only one of those species. A return to biodiversity may prove to be the key to meeting energy needs for the growing number of people on the planet and for restoring global ecosystems.

"Diverse prairie grasslands are 240 percent more productive than grasslands with a single prairie species," Tilman says. "That's a huge advantage. Biomass from diverse prairies can be used to make biofuels without the need for annual tilling, fertilizers and pesticides, which require energy and pollute the environment. High diversity allows us to produce biofuels with low inputs, and this means that we can get more energy from an acre of land, year after year, with high certainty. Because they are perennials, you can plant prairie grass once and mow it for biomass every fall essentially forever."

The research was carried out in 168 plots, each of which was randomly planted with 1-16 perennial grasses and other prairie plants. Over 12 years, rainfall during the growing season varied more than twofold and average daily high temperatures ranged from 21.5 C to 24.4 C. Stability was dependent on diversity and root mass. Roots store nutrients and buffer against climate variations. Prairie plants, which are perennials, have far more root mass than crops such as corn, which must be replanted annually.

Source: University of Minnesota