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Microbial Genomics for Biofuels and Co-Products from Biorefining Processes

Integrated GE³LS Research The social and economic costs of large-scale biofuel production

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Summary

The use of biological material for fuel production raises some important societal questions. Perhaps the question foremost on the minds of many is the effect on food costs as production of biofuel displaces food in large areas of land. Related to this is the environmental sustainability of biofuels based on the suggestion that the environmental footprint of biofuels may be even larger than that of carbon-based energy. We will approach these questions with the aid of computer-based economic simulations. These will use current agronomic data as the basis for developing models for possible future effects of growing biofuel crops.

Although environmental biofuel-impact studies generally find a net energy gain and a reduction of greenhouse-gas emissions, it is possible that production of some biofuels could have serious environmental and social consequences. One of the best ways to evaluate this is by analyzing biofuel production so as to take into account all processes throughout its entire life cycle. The first phase of our study will be an analysis using data from southern Manitoba, in which energy-input and- output data for each step of the process is defined. This will be the basis for assessing potential environmental impacts at all stages. We will emphasize impact categories such as water quality, water use, climate change and energy balance.

Second, we will determine how changes in the prairie agricultural ecosystem could be affected by growing different kinds of biofuel feed-stock, using southern Manitoba as an example. We will evaluate the production characteristics of several different feed-stocks in order to determine their environmental value. These data will provide the basis for calculating the dollar value of changes due to environmental variables. Third, we will identify patents that have the potential to retard biofuel research. It is often the case that successful research must overcome obstacles that exist due to the difficulty of using methods patented by others. Our aim is to help the biofuel industry identify, and ultimately avoid, impediments to research due to the existence of patents.