Paper

Economic opportunities for a sweet sorghum-based biorefinery in Florida

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Sweet sorghum is a grass with tall (3-5 m) stems that accumulate soluble sugars. These sugars can be easily extracted and fermented directly to ethanol or other renewable chemicals. The bagasse that remains can be used as a lignocellulosic feedstock. Sweet sorghum can be grown as a complement to sugarcane, or as a dedicated bioenergy crop, especially in areas that are too cold for sugarcane. Improved sweet sorghum cultivars developed at the University of Florida (UF) can generate over 1,000 gallons of ethanol per acre (10,000 L/ha) from juice and bagasse combined.

In order to determine sweet sorghum's economic potential, we have performed a techno-economic analysis of producing ethanol from sweet sorghum bagasse based on data obtained at the UF Stan Mayfield pilot biorefinery. The process combines phosphoric acid pretreatment followed by liquefaction plus simultaneous saccharification and co-fermentation by a recombinant *E. coli* strain. Several scenarios were modeled in SuperPro Designer and the most optimistic scenario resulted in a minimum ethanol selling price that was close to the price of gasoline.

An economic analysis conducted by ABF Economics indicated that the economic activity associated with a commercial biorefinery that produces 20 million gallons of ethanol per year from sweet sorghum bagasse could support >700 jobs and generate $6.3M in tax revenues. A life cycle analysis by Life Cycle Associates was performed to quantify the reduction in greenhouse gas emissions relative to the use of gasoline. The combined data underscore the economic potential of sweet sorghum. Supported by USDA-BRDI project 2011-10006-30358.