BRC Science Highlight
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Increasing Ethanol Yield through Fiber Conversion in Corn Dry Grind Process

Background/objective

Bioethanol, produced via fermentation of sugars, is one of the most promising renewable liquid fuels for transportation. While starch is easily hydrolyzed to monomeric sugars, plant fiber remains unconverted during saccharification in conventional dry grind process and is therefore an abundant untapped resource. Previous studies indicated that addition of cellulolytic enzymes increased ethanol production from corn. In this study, researchers built on this work by elucidating the influence of cellulase dosage on corn ethanol yield.

Approach

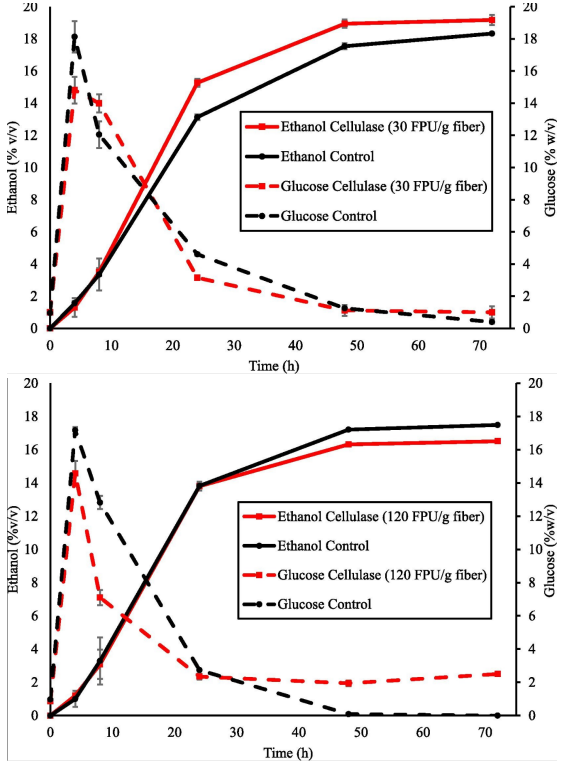
- Ethanol production from corn fermented with cellulase additions of 30 and 120 FPU/g fiber were compared to a control in which the cellulase enzyme was not added.

Results

- Cellulase added at 30 FPU/g fiber resulted in increased ethanol production of 0.14 gal. ethanol/bushel when compared to a control.
- The 120 FPU/g fiber treatment showed reduced ethanol production compared to the control. This decrease may be the result of phenol toxicity to yeast cells.

Significance

- Bioethanol production from corn is a well-understood process, making it an ideal system on which to elucidate the impacts of novel approaches to fiber hydrolysis on fermentation.
- Future efforts to expand bioethanol production to incorporate more fibrous feedstocks will benefit from the fundamental understanding of cellulytic activity gained from corn.



Adding 30 FPU/g fiber cellulase (top) increased ethanol production in comparison with a control, whereas adding 120 FPU/g fiber (bottom) resulted in reduced ethanol production and left residual glucose, indicating fermentation inhibition.

Kurambhatti et al. 2018. "Increasing Ethanol Yield through Fiber Conversion in Corn Dry Grind Process." ***Bioresource Technology****, 270:742-745,* DOI: 10.1016/j.biortech.2018.09.120.

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