

## CELLULASE PRODUCTION BY SOLID STATE FERMENTATION ON WET CORN DISTILLERS GRAINS

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The effects of temperature and initial moisture content on cellulase production by solid state fermentation (SSF) were investigated using wet distillers grain (WDG) from a dry grind corn ethanol production process as a substrate. The CO<sub>2</sub> evolution rate was measured to indicate fungal activity of the microorganism used, *T. reesei* NRRL 11460. The substrate weight loss and the moisture content were also monitored throughout the fermentation. The highest yield of cellulase was 28.8±0.8 filter paper units (FPU) per gram of substrate. The effectiveness of the crude enzyme cocktail was tested by hydrolyzing WDG to monomeric sugars. Approximately 0.44 g of WDG is required to produce a sufficient quantity of enzymes to hydrolyze 1 g of WDG. A 100 million gal/yr ethanol production process could increase production by up to 6.4 million gal/yr if a portion of the WDG was used for cellulase production to hydrolyze the remaining balance of dilute acid pretreated WDG. Because the monomeric sugar solution from hydrolysis is relatively dilute compared to sugar concentrations used for corn ethanol production, the hydrolysate would likely be used as dilution water to produce the slurry for corn ethanol production thereby utilizing existing fermentation and distillation equipment. The residual spent SSF substrate was investigated as an animal feed product. Significant reductions in acid detergent fiber (ADF), neutral detergent fiber (NDF), and phytate phosphorus coupled with residual cellulase enzymes make the fermented WDG an attractive feed for ruminants and nonruminants. Hydrolyzed WDG was also investigated for feed quality.