Fuel Ethanol Potential of Barley, Phase II

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The purpose of my project was to determine which varied combination and concentration of enzyme ingredients produced the highest fermentation yield in barley. In my project, I used barley as my feedstock which has a food agronomic rotation value and can be used as a cover crop, as well as fuel ethanol potential. Last year, my project proved that you could make ethanol out of barley and that the best cook temperature to use was 85 degrees Celsius which I used again this year. I used ground barley, yeast, and water to make my mash, but this year, I used four different kinds and varied amounts of enzyme concentrations. The concentrations included 2x Urea + Glucoamylase, 2x Trehalase + 2x Glucoamylase + Protease, 0.5x Urea + Glucoamylase, 0.5x Trehalase + 0.5x Glucoamylase + Protease. Each mash sample was cooked for 90 minutes at 65 degrees Celsius and then for one hour at 85 degrees Celsius. After the cook process was complete and the enzymes were added, the mash underwent a fermentation process. During this process, weight loss occurred. I weighed my flasks containing the fermenting broth every 8 hours for a total of 72 hours and recorded the weight loss. After the fermentation process was finished the samples were ran through an HPLC to determine how much ethanol was made. I believed that the yield would be the highest with the 0.5x trehalase + 0.5x glucoamylase + protease concentration and that the yield would be more than 2.2 gallons of ethanol per bushel. After completing my project, the yield was the highest with the trehalase enzyme and smaller enzyme amounts. By using 0.5x Trehalase + 0.5x Glucoamylase + Protease concentration I was able to produce my highest yield, 2.225 gallons of ethanol per bushel, as well the highest concentration in ethanol.

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