Fuel Ethanol Potential of Barley, Phase Four

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The overall objective of this study was to examine the ethanol yield potential of barley by experimenting with starch degrading enzymes and with starch degrading enzymes plus cellulose degrading enzymes on the overall fermentation yield and ethanol concentration. The project consisted of 2 different trials which included alpha-amylase and beta glucosidase trial vs alpha-amylase, beta glucosidase and cellulose trial. In Phase I, I studied the probability of producing ethanol from barley. In Phase II, I determined that by using the trehalase enzyme and using smaller dosages, I was able to produce the highest yield. In Phase III, I determined the best cook solid percentage and incubation temperature. In Phase IV, I created two different trials using the best condition based on prior phases of my research. The second condition is based on using a cellulosic process and adding to the ideal starch condition the potential for conversion of grain fiber to ethanol. In my project, I took ground barley along with other products including yeast, water, and different enzymes to create a mash. The mash was cooked and underwent the cellulosic process. The mash was washed through a filter where fiber was collected. The additional fiber was washed and then pretreated and added back into the mash. Next, the mash underwent a 72-hour fermentation loss where weight loss occurred. After the fermentation process was finished, I ran my samples through an HPLC to determine how much ethanol had been produced. The results indicated that by using the condition consisting of alpha-amylase, beta-glucosidase and cellulosic activity, an increased yield of 2.8 gallons of ethanol per bushel was produced.

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