An Investigation into the Improvement of Switchgrass Biofuel Production, Phase II

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As time progresses, the world is looking for an energy that can replace the nonrenewable fossil fuels: coal, natural gas, and gasoline which release greenhouse gases into the atmosphere. I explored the production of ethanol production from switch grass. Switch grass is a perennial grass that is big and tough, reaching up to 10 feet tall that grows quickly and uses its water efficiently. It is almost considered a weed in most Great Plains areas. What makes it suitable for bio fuel production is its ability to capture large amounts of cellulose, chemical energy that can be used as any type of fuel. My experiment tested which factors will increase the efficiency or in other words, produce the highest percentage of ethanol in the final step of distillation. There are 4 steps to successfully producing ethanol: pretreatment, enzymatic hydrolysis, fermentation, and distillation. In this project, I was testing two variables: concentrations of chemical added to the switch grass and ground grass versus unground grass. The six concentrations of potassium hydroxide were: 0%, 5%, 10%, 15%, 20%, and 30%. After adding the chemical to the grass and letting it sit for a week, I balanced the pH and added 5 grams of cellulase to each sample to convert them to glucose. Later, I added 10 grams of yeast to turn the glucose into ethanol. In the final step, I distilled all my samples and used a hydrometer to measure the percentage of alcohol. The sample with a 15% chemical content proved to produce the most amount of ethanol at 21%.

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