Grass to Gas, Phase IV

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The purpose of my project is to compare the ethanol yield and the protein values of the distiller grains of switchgrass and prairie cordgrass pretreated with elemental sulfur, compared to nontreated. I hypothesized that pretreatment will have a significant difference ($p<.05$) in the total ethanol yield with both grasses along with a significant difference in the protein levels of the distiller grains. My procedure involves harvesting grasses, pretreatment for 24 hours at 55 C, and then using alpha amylase, glucoamylase, and yeast to produce ethanol samples through fermentation. After distillation, samples were then professionally analyzed with HPLC and NIR analysis. My data indicated that pretreatment of prairie cordgrass with elemental sulfur caused a significant difference ($p=.01$) in the total ethanol yield, increasing ethanol by 67.69%. Switchgrass failed to produce a significant difference in the total ethanol yield; however, pretreatment increased ethanol yield by 11.96%. Prairie cordgrass has a higher lignin concentration, so when pretreated, lignin is degraded, causing the cellulose to be more exposed. With NIR analysis, pretreatment failed to produce a significant difference in protein values of the distiller grains, the byproducts of the ethanol process. This project applies to lands currently in the Conservation Reserve Program (CRP). Both grasses grow well in these lands, which are unsuited for agricultural use. If these lands could be used for ethanol production from these grasses, ethanol can be produced, more than corn-based ethanol, without competing with the food supply, while also providing wildlife habitat and erosion control.

Awards Won: