Employing in situ Generated Peracetic Acid and Fungal Biosynthesis to Produce Biofuels

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Fungal synthesis of lipids and ethanol using peracetic acid pretreated biomass was investigated. pentaacetate and hydrogen peroxide were reacted with sodium hydroxide to a pH of 11.5 to convert the pentaacetate to peracetic acid (C2H4O3). Solutions were prepared in three strengths to generate peracetic acid in 5%, 10%, and 25% concentrations. Corn stover and aspen biomass samples were then treated with the peracetic acid pretreatments. For fungal synthesis, a culture medium was created and added to the biomass and then autoclaved to eliminate undesirable organisms. Fusarium equiseti fungi was introduced into the biomass and culture and incubated at 27-degrees Celsius and 150 RPMs for ten days to create the ideal environment for optimal fungal growth and lipid and ethanol synthesis. The cultures were centrifuged and the filtrate retained to establish enzyme activity and ethanol percentages. High-performance liquid chromatography (HPLC) was employed to determine ethanol content. All samples underwent a chloroform and methanol solvent extraction to determine lipid content. After analyzing the test results, it was concluded that lipid and ethanol production from biomass—utilizing the peracetic acid pretreatment and fungal synthesis—can generate increased energy yields between 34 and 37 percent over the current industrial standards using enzymes and yeast.

Awards Won:

Second Award of $2,000