Postharvest Canola Stalks for Cellulosic Ethanol Production

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Fossil fuels produce 2/3 of the Earth’s greenhouse gases; biofuel reduces these emissions <86%. The U.S. commercially grows 2M acres of canola annually, leaving 25-30 cm of stubble/plant for biofuel. Canola stalk consists of 44% cellulose behind a lignin barrier; a challenge needing a pretreatment. This research investigated the effectiveness of pretreatments on canola stalk as a source for biofuel. Canola stalks were harvested and pretreated with 1M HCL, 1M NaOH, or chipping. Samples underwent enzymatic hydrolysis, deactivated, and 5 g of Saccharomyces cerevisiae was added for fermentation (72 hours at 32 °C). The CO2 gas produced, captured, and quantified. Utilizing stoichiometry, ethanol production was calculated. Using 0.4 g of canola stalk with a 1M HCL pretreatment produced an average of 30.5 mL±17.0 mL of CO2 (N=3), yielding 0.06 g of ethanol. Using 0.4 g of canola stalk with a 1M NaOH pretreatment produced an average of 39.9 mL± 25.3 mL of CO2 (N=3), yielding 0.07 g of ethanol. Using 0.08 g of canola stalk with a 1M HCL and chipping pretreatment produced an average of 21.5 mL±12.7 of CO2 (N=3), yielding 0.04 g of ethanol. Using 0.08 g of canola stalk with a 1M NaOH and chipping pretreatment produced an average of 17.53 mL±8.6 mL of CO2 (N=3), yielding 0.03 g of ethanol. A 1000-acre canola field could theoretically produce 5,000 L of biofuel.

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