

# Optimization Modeling of Ethanol Production from *Shorgum bicolor* grain: Comparison between Separate Hydrolysis Fermentation and Simultaneous Saccharification Fermentation

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Two different process configurations, simultaneous saccharification and fermentation (SSF) and separate hydrolysis and fermentation (SHF), were compared for ethanol production from *Shorgum bicolor* grain. Optimization modeling for glucoamylase and *Zymomonas mobilis* concentration in both of SSF and SHF were carried out to obtain optimal concentration of ethanol production. The optimum condition was achieved using 0.021 % v/v of glucoamylase and 30.19% v/v of *Zymomonas mobilis* for SHF. In contrast, the optimum condition for SSF was 0.021 % v/v of glucoamylase and 17.51% v/v of *Zymomonas mobilis*. The model predicted SHF processing to be superior. The superiority of SHF over SSF was confirmed experimentally, the result showed ethanol yield of SHF was 134.80 g/L and ethanol yield of SSF was 115.66 g/L after 72 hours incubation time. A high similarity was observed between the predicted and experimental results, demonstrating the accuracy of the model.

**Keywords:** ethanol, *Shorgum bicolor*, separate hydrolysis and fermentation, simultaneous saccharification and fermentation.

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