

Effect Of Inoculum Size And Substrate Concentration On Glucoamylase Production By *Saccharomyces Cerevisiae*

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Structured Abstract

Background: Glucoamylase is a key enzyme in starch hydrolysis because it is able to catalyze the conversion of starch into glucose which is an important process with broad applications in industries like food fermentation plus biofuel production. This study investigated the influence that two critical fermentation parameters possessed, inoculum size as well as starch concentration, on glucoamylase production by *Saccharomyces cerevisiae* because commercially available Mauripan yeast was serving as the microbial source.

Methods: The yeast was cultured in starch-yeast medium containing yeast extract, ammonium sulfate, KH_2PO_4 , and MgSO_4 , with batch fermentation under optimized conditions of 150 rpm agitation, 25 °C, and 72-hour incubation. We monitored biomass while it grew. Also, monitored glucose upon its release and enzyme activity.

Results: Glucoamylase activity was greatly improved with a 1.5% inoculum size along with 10% starch concentration compared to lower levels. Enzymes showed activity to the tune of 101.19 U/mL reaching this level at 48 hours given the inoculum was 1.5% as well as 546.86 U/mL at 72 hours given starch concentrated to 10%. Under all tested conditions, glucose and biomass were produced more. Statistical analysis (One-way ANOVA, $p > 0.05$) revealed that specific growth rate together with specific glucose formation rate not significant which indicated that the glucoamylase production is not growth-associated. In contrast, both parameters greatly affected enzyme activity ($p < 0.05$), as this confirms inoculum size with starch concentration influence the enzyme production.

Conclusion: In conclusion, the effect of fermentation parameters such as inoculum and starch concentration have been proved significantly to increase the glucoamylase production with concerning the enzyme activity while the growth and glucose production were not influence by starch concentration and inoculum size within the study range.

Keywords: Glucoamylase production, Inoculum size, Starch concentration, *Saccharomyces Cerevisiae*, Batch fermentation.

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