



Zuraida Ahmad

# SAGO

*(Metroxylon Rottb)*

*And Its Applications*

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# **Sago** **(*Metroxylan Rottb*)** **and Its Applications**

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Editor  
Zuraida Ahmad



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# Chapter 5

## Optimizing Bioethanol Production from Sago Starch in Bioreactor for Renewable Energy

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**Preview.** The two-step enzymatic hydrolysis of sago starch was performed by commercially available  $\alpha$ -amylase and  $\beta$ -glucoamylase and further ethanol fermentation of the obtained hydrolyzates by *Saccharomyces cerevisiae* were studied. The optimized glucose concentration produced from hydrolysis was used in the fermentation process. The fermentation was carried out in a 2 L stirred tank bioreactor (Sartorius) by using process conditions that are aeration and agitation. Agitation speed was varied from 50 to 100 rpm and aeration was varied from 0.05 to 0.1 vvm. Nine runs were conducted from the experimental design of central composite design (Minitab software v 14.01). Each running was completed within 72 hours. The analysis of the ethanol sample concentration was done for every 12 hours by using Potassium di-chromate test. The highest concentration of ethanol obtained is 11.81 % for run 7 after 60 hours fermentation time. ANOVA analysis has shown that the aeration is the most significant factor with given “Prob>F” value of 0.032 (“Prob>F”< 0.05). Critical values were obtained at 0.08 vvm and 75 rpm for aeration and agitation, respectively. The findings of this project can be applied in production of bioethanol and biofuel research in large scale.