EFFECT OF OVERLIMING ON ETHANOL PRODUCTION FROM CASSAVA GRATE WASTE USING ACID AND ENZYMATIC HYDROLYSIS

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Abstract
Cassava Grate Waste (CGW) is solid waste from tapioca industry process. The utilization of CGW is still limited to animal feed which has low economic value. In order to reduce the accumulation of CGW, it can be used for the raw material of bioethanol production.

The aim of this experiment was to define the influence of acid concentration toward reducing sugar resulted from hydrolysis process and the influence of overliming toward sugar losses, and toward ethanol resulted in fermentation process using *Saccharomyces cerevisiae*. Ethanol production consists of three stages. The first stage was to dry the CGW. The next stage was acid hydrolysis process using concentrated sulfuric acid (2M) and dilute sulfuric acid (0.2M). Then the hydrolysis result was separated. The solid unhydrolysate was hydrolyzed using alpha-amylase, glucoamylase, and cellulase, while the liquid hydrolysate was overlimed until the pH reach 9, 10, 11 and the results were mixed with the enzyme hydrolysate. The last stage, the mixture were fermented by *Saccharomyces cerevisiae*.

From the experiment resulted that the higher of the acid concentration used, the higher the reducing sugar obtained. The higher pH used to overlime, the higher sugar losses occurred and yield (g ethanol/g sugar consumed) obtained. By using sulfuric acid 2M, the amount reducing sugar obtained was 30.74 g/L which reduced to 20.55% after overliming. The highest selectivity of ethanol production obtained in sample which hydrolyzed using 0.2M of sulfuric acid and then overlimed until the pH 11 was 32%.

Keyword: Cassava Grate Waste, Overliming, Acid Hydrolysis, Ethanol, *Saccharomyces cerevisiae*
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