CHEMICAL PRETREATMENT METHOD FOR BIOETHANOL PRODUCTION FROM CASSAVA ROOT PEEL (*Manihot esculenta*) USING DIFFERENT SULFURIC ACID CONCENTRATION

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An Undergraduate Thesis Submitted to the Faculty of the Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Muñoz, Nueva Ecija, Philippines
in Partial Fulfillment of the Requirements
for the Degree of

BACHELOR OF SCIENCE IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING
(AB Process Engineering)

JUNE 2023

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ABSTRACT

BARRIENTO, JOYLEEN MAE GALLANO AND LADDARAN, JUVIETH CABIGAT, Department of Agricultural and Biosystems Engineering, College of Engineering, Central Luzon State University, Science City of Munoz, Nueva Ecija, **June 2023, CHEMICAL PRETREATMENT METHOD FOR BIOETHANOL PRODUCTION FROM CASSAVA ROOT PEEL (*Manihot esculenta*) USING DIFFERENT SULFURIC ACID CONCENTRATION**

Adviser: ELMAR M. VILLOTA, Ph.D

A considerable amount of cassava root peel wastes is produced after processing of cassava roots. These wastes are a good source of cellulose and lignin which are important components for bioethanol production. Hence, this study was conducted to evaluate the usability of cassava root peel waste as raw material for bioethanol production using various chemical pretreatment acid concentrations. Specifically, it aimed to produce hydrolyzed cassava root peel and evaluate its properties in terms of percentage sugar content yield, and potential alcohol by volume percentage using different chemical acid concentration pre-treatment. A simple cost analysis was also performed.

In this study, the cassava root peels were treated with different sulfuric acid concentrations – 5%, 10%, 15% – and distilled water which served as the controlled treatment, totaling to four different treatments. The same ratio of dried cassava root peel and water, 1:10 (5 g:50 mL), was used for each treatment. The treatments were analyzed by their potential alcohol by volume, specific gravity, sugar content, and reducing sugar. The results of the measurements were then statistically analyzed using Completely Randomized Design Analysis of Variance (ANOVA) and verified using Tukey's HSD analysis.

The potential alcohol by volume was computed using brix calculator. The results showed that the highest alcohol content with a value of 7.6% was obtained from the cassava root peel treated with 10% sulfuric acid. For the Specific Gravity of Filtrate, it was determined using the Brix Table. The findings showed that the highest specific gravity having a value of 1.057 was also attained at 10% sulfuric acid concentration. The maximum percentage concentration of sulfuric acid was 10% as the specific gravity increased, confirming the result that was present in the potential alcohol content of the filtrate. Furthermore, the percentage sugar content was determined using the brix refractometer from the different acid hydrolysate treatments. It was found that the highest percentage of sugar is 14% observed at 10% sulfuric acid concentration. Last but not least, the highest reducing sugar percentage, 42.15%, was achieved by the treatment with 10% sulfuric acid. To conclude, the treatment with 10% sulfuric acid concentration is the optimum mixing ratio for bioethanol production using cassava root peel wastes. Statistically, results revealed that there is significant difference between the cassava root peel treatments as affected by different sulfuric acid concentrations.

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