

## **ABSTRAK**

### **THE EFFECT OF CONCENTRATION AND INCUBATION LENGTH FOR CELLULASE ENZYME IN HYDROLYZE CELLULOSE AND HEMICELLULOSE FROM PALM EMPTY FRUIT BUNCHES (PEFB)**

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Palm Empty Fruit Bunches (PEFB) is a by-product of palm oil mill which is very abundant. PEFB is containing lignocellulose which can not be directly fermented into bioethanol. PEFB is containing cellulose (42,3%), hemicellulose (28,56%) and lignin (22,42%). PEFB need to be given pre-treatment prior to degrade lignin, then cellulose and hemicellulose will be hydrolyzed using cellulase enzymes to be reduction sugar before it is fermented into bioethanol reduction. The effective (easy and fast) and efficient (cheaper) pretreatment technique for agro-industry waste biomass enzymatically PEFB have not been found and need to be investigated.

The aim of this research is to find the best concentration and incubation length of enzyme to produce an optimal reduction sugar. The treatment in this study consisted of 2 factors and 3 replications. The first factor is the concentration of enzyme that consists of 4 levels, there are 0 FPU, 5 FPU, 10 and 15 FPU. The second factor is the incubation length that consists of 5 levels, there are 0, 6, 12, 18, and 24 hours with a speed of 100 rpm at 50°C and pH 4.8. Data was calculated to get the average of it, then presented into tables and bar charts and discussed descriptively.

To achieve the goal of this research, PEFB was dried using an oven at a temperature of 105°C until it has constant weight then was reduced its size (40 mesh) then lignin of PEFB was degraded using NaOH. After the degradation of lignin, the sample was analyzed again and the result was PEFB lignin content (1,49%), hemicellulose (27,76%) and cellulose (62,9%). After that, cellulose and hemicellulose PEFB was hydrolyzed by cellulase enzyme. The optimum result of reduction sugar was obtained on hydrolysis PEFB using cellulase concentration of 10 FPU and 18 hours of incubation length, and it produced 1516,56 mg/100mL of reduction sugar.

*Keywords: Palm Empty Fruit Bunches, reduction sugar, lignocellulosic, cellulase enzyme*