

# Bioconversion of Oil Palm Empty Fruit Bunches to Fermentable Sugars for Bioethanol Production

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## Abstract

As the Malaysian palm oil industry is increasing, concomitant wastes of empty fruit bunches are also increasing. The utilization of EFB as a renewable biomass and low cost raw material for the production of bioethanol as a petrol additive/substitute is expected. In order to produce high sugar for bioethanol production, the degradation characteristic and enzymatic saccharification of EFB were studied experimentally. The effectiveness of sterilization in an ordinary oil palm mill operation on EFB hydrolysis was investigated without any pretreatment process before enzymatic saccharification process. As a result, EFB with 250  $\mu\text{m}$  in size was achieved up to 10.75% conversion of cellulose - to - glucose with yield of glucose,  $Y_{p/x}$  is 25.01g/g. In contrast, FFB with the same mesh size gave only 7.07% conversion and the glucose production,  $Y_{p/x}$  was 17.36g/g. It was shown that mill sterilization was increased the yield of fermentable sugar production of glucose (g/g cellulose) up to 44.43% compared to fresh fruit bunches (FFB) as a control. The hydrolysate from the saccharification process was used as a carbon source for yeast fermentation for bioethanol production. The bioethanol produced was achieved up to ( $Y_{p/x}$ ) 0.92 g/g with the productivity of 0.690 g/L/h.

Sterilization process of oil palm fruits in the mill operation can be satisfactorily used as a degradation method in production of value-added products from EFB. It is considered as a zero cost pre-treatment for the efficient utilization of EFB which is necessary for the sustainable development of the biomass resources.

**Keywords:** Empty fruit bunch, Sterilization, Enzymatic saccharification, Bioethanol.

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