

## Processing and Economic Analysis of Rain Tree (*Samanea saman*) Pods for Village Level Hydrous Bioethanol Production

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**Abstract :** Biofuel is one of the renewable energy sources adapted by the Philippine government in order to lessen the dependency on foreign fuel and to reduce carbon dioxide emissions. Rain tree pods were seen to be a promising source of bioethanol since it contains significant amount of fermentable sugars. The study was conducted to establish the complete procedure in processing rain tree pods for village level hydrous bioethanol production. Production processes were done for village level hydrous bioethanol production from collection, drying, storage, shredding, dilution, extraction, fermentation, and distillation. The feedstock was sundried, and moisture content was determined at a range of 20% to 26% prior to storage. Dilution ratio was 1:1.25 (1 kg of pods = 1.25 L of water) and after extraction process yielded a sugar concentration of 22 <sup>0</sup>Bx to 24 <sup>0</sup>Bx. The dilution period was three hours. After three hours of diluting the samples, the juice was extracted using extractor with a capacity of 64.10 L/hour. 150 L of rain tree pods juice was extracted and subjected to fermentation process using a village level anaerobic bioreactor. Fermentation with yeast (*Saccharomyces cerevisiae*) can fasten up the process, thus producing more ethanol at a shorter period of time; however, without yeast fermentation, it also produces ethanol at lower volume with slower fermentation process. Distillation of 150 L of fermented broth was done for six hours at 85 °C to 95 °C temperature (feedstock) and 74 °C to 95 °C temperature of the column head (vapor state of ethanol). The highest volume of ethanol recovered was established at with yeast fermentation at five-day duration with a value of 14.89 L and lowest actual ethanol content was found at without yeast fermentation at three-day duration having a value of 11.63 L. In general, the results suggested that rain tree pods had a very good potential as feedstock for bioethanol production. Fermentation of rain tree pods juice can be done with yeast and without yeast.

**Keywords :** fermentation, hydrous bioethanol, fermentation, rain tree pods, village level

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