

Investigating the Potential of Bioethanol Production using Different Palmyrah Products

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Fossil fuel is widely used as energy source in various fields. The Day today life of human being become difficult due to scarcity, fast depletion and increasing price of fossil fuel, Biofuel can be an alternative to reduce the dependency on fossil fuel. Palmyrah (*Borassus flabellifer*) is an economically beneficial plant which is mainly found in tropical regions. Palmyrah products such as tuber flour, boiled tuber flour, Sweet sap, Treacle, Jaggery are rich in starch, sugars and some nutrients needed for fermentation. Yeast (*Saccharomyces cerevisiae*) is the common microbes employed in ethanol production due to its high ethanol productivity, high ethanol tolerance and ability of fermenting wide range of sugars compared to other microorganisms. Further, yeast can grow under wide range of pH (2.8 - 8.0). Therefore, this study was undertaken to investigate the potential of bioethanol production using various palmyrah products as medium. Five fermentation mediums were prepared using palmyrah products such as tuber flour, boiled tuber flour, sweet sap, treacle and jaggery. Glucose solution (50 gL⁻¹) was used as the control. This experiment was laid as a Complete Randomized Design with two replicates. The starter culture was prepared by inoculating 5 g of yeast into 100 mL of sterile sucrose solution (50 gL⁻¹) and incubated in a rotary shaker. Each fermentation medium (250 ml) was inoculated with 20 ml of starter culture incubated at room temperature (30 ± 2 °C) in an orbital shaker (100 rpm). Fermentation time was changed while keeping other factors constant. Samples were taken at different time intervals (24 h, 48 h, 72 h, 96 h and 120 h) and after measuring their pH and Brix values they were centrifuged at 10000 × g for 10 min. Supernatants were collected and their ethanol contents were measured using an Ebulliometer. Alcohol concentration (% v/v) was calculated from the Ebulliometer degree table. Data were subjected to Analysis of Variance. Glucose medium resulted highest ethanol yield (3.09% v/v) after 72 hours. Among palmyrah products, after 48 hours, jaggery resulted the highest ethanol yield (2.5% v/v) whereas boiled tuber flour and raw tuber flour resulted 0.75% and 0.87% (v/v) of ethanol yield respectively. Therefore, this study suggested that the palmyrah products can serve as a raw material in bioethanol production.

Keywords: Bioethanol, Palmyrah Tuber Flour, Yeast, Jaggery, Treacle