

Pretreatment of Palmyrah Coir Dust and Bioethanol Production

E.J.S.B.A. Christy¹, G. Chandrasena¹, S. Mahilrajan², P. Silva¹, R. Kabilan³, S. Sri Vijeindran²

¹*Department of Export Agriculture, Uva Wellassa University, Badulla 90000, Sri Lanka*

²*Palmyrah Research Institute, Kandy Road, Jaffna, Sri Lanka*

³*University of Jaffna, Jaffna, Sri Lanka*

Ethanol is most important renewable fuel in terms of market value. Nowadays it is produced from sugar and starch based materials such as sugarcane and corn. However, second generation of ethanol production also derived from lignocellulosic materials is now being tested in some plants. In this study palmyrah waste material such as molasses, expired pulp and coir dust were selected. Among them molasses and expired pulp were used for primary alcohol production and coir dust was used for secondary alcohol production. Pretreatment of coir dust was carried out with different alkaline and acid solution at 121 °C for 15 min and H₂SO₄ was selected as the best hydrolysis agent based on the reducing sugar content then used for ethanol production. For H₂SO₄ pretreatment two factors, as concentration (3, 5 and 7%), times (15, 30 and 45 min) were optimized. Among nine treatments 3% of concentration and 45 min were selected as optimum condition for hydrolysis. Coir dust hydrolyzed solution; molasses and expired palmyrah (°15 initial brix) were used for fermentation. Fermentation was carried out with bakers yeast in peptone yeast extract nutrient medium at room temperature and pH 5.0. The highest significant alcohol production was observed for coir dust H₂SO₄ hydrolyzed medium (0.4%), molasses (8.6%) and pulp (5.5%) at 4, 6 and 4th day of fermentation respectively. During fermentation there were significant different in acidity, pH, reducing sugar and total sugar between the tested days. This acidity and sugar content was determined by titration and spectrophotometry method correspondingly. Total sugar content was significantly decreased during fermentation for all waste materials. Bioethanol production could be enhanced by developing enzymatic pretreatment technologies for coir dust and optimization of fermentation medium.

Keywords: Bioethanol, Fermentation, Palmyrah, Acid hydrolysis