Production of Bio Ethanol from Sri Lankan Overripe Fruits Using Batch Fermentation and Optimization of Ethanol Yield

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Bio ethanol produced by bio materials are used in many countries around the world as an alternative to gasoline mainly due to better emission characteristics. Since Sri Lanka imports its whole transportation fuel requirement and also committed to reduce greenhouse gas emission, there is a necessity of searching for alternative freely available and low-cost bio resources to produce bio ethanol. The aim of this research was to study the possibility to produce ethanol from Sri Lankan overripe fruits using batch fermentation and then optimization ethanol yield by kinetic modelling. In this research, ethanol production was carried out by fermentation of three different freely available Sri Lankan overripe fruits. Fermentation was carried out by varying fermentation parameters such as type of fruits (banana, papaya, jackfruit), type of inoculums (*Saccharomyces Cerevisiae (yeast)* and a novel microorganism: *Pseudomonas Mendocina* (PM)), concentration of the substrate (1:1, 1:1.5, 1:2 w/w ratio of fruit and water), pH (4.3, 5.0, 5.7), and temperature (27, 32, 35 ^{o}C). Kinetic modelling was carried out using Monod and modified Gompertz equations. Optimization was carried out by fitting experimental data to the theoretical curves using MATLAB software and then selecting the fermentation process with highest correlation between the theoretical and the experimental curve. The highest correlation was obtained by fermentation banana fruit (embul variety) with PM microorganism, 1:1 w/w concentration at pH value 5 and 35 ^{o}C temperature. The concentration of the produced ethanol was 13% V/V. Monod and modified Gompertz equations were well fitted to the experimental data showing higher regression coefficients respectively 99.81% and 99.37%. Compared to the literature a considerable higher ethanol concentration was obtained by fermentation of banana (embul variety) with the novel microorganism: PM than with *Saccharomyces Cerevisiae.*

Keywords: Bio-ethanol, Fruits, Fermentation, Kinetic modelling, Optimization

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