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Effect of nitrogen on production of bioethanol from waste coconut water

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The major environmental problem related to the desiccated coconut industry is water pollution caused by its effluents. These effluents have a high biological oxygen demand (BOD) and chemical oxygen demand (COD) due to sugars present in the waste water of coconut. These sugars have the potential to be converted into ethanol by a fermentation process. The production of ethanol in this manner can be advantageous in two ways; it eliminates a source of water pollution and can also be used as a biofuel. The main objective of this study was to determine the feasibility of generating bioethanol from waste coconut water. Further, the effect of nitrogen concentration in the medium upon the concentration of ethanol was studied. Coconut water used for this experiment was taken from coconuts that are consumed for cooking purposes by assuming waste coconut water from DC mills is similar to the typical coconut water. Commercial yeast (*Saccharomyces cerevisiae)* was used as the fermentation organism and the fermentation process was carried out under nitrogen concentrations ranging from 1.5 g/l to 2.5 g/l. Yeast inoculums were prepared using yeast stock culture which was obtained from Industrial Technological Institute (ITI), Colombo 07. Sample size was 150 ml of coconut water. Duplicates of the fermentation process were performed for each nitrogen concentration. All the other fermentation parameters were kept constant and at the the biomass growth of the yeast organism, the reducing sugar concentration and the ethanol concentration were analyzed using standard methods and results were graphically analyzed using statistical software "STATISTICA". Results showed that coconut water can indeed be used to produce bioethanol and further indicated that increasing the nitrogen concentration could increase the ethanol concentration produced. The highest ethanol yield obtained from this study at the highest nitrogen concentration (2.5 g/l) was 5.576 mg/ml. Moreover, the values of reducing sugar decreased with increasing nitrogen concentrations and the minimum value of reducing sugar of 0.308 mg/ml was obtained at the end of the fermentation when nitrogen concentration of the medium was at its highest. Finally, it could be stated that this method can be adopted in DC mills to produce bioethanol from waste coconut water.

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