

ABSTRACT

Hydrolysis/Fermentation of Selected Tropical Crops

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Large quantities of biological materials are available in the Caribbean and could be used as an energy mechanism. The potential of utilising root crops and a fruit as fuel or supplementary feedstock is investigated experimentally. The root crops selected for study were sweet potato (Ipomoea batatas) and eddoes (Colocasia antiquorum esculenta var. globulifera). The fruit chosen was pomme-au-rac (Eugenia malaccensis).

The root crops were first hydrolysed using the enzymes contained in malt. The method adopted in this study is similar to that used for the production of beer and hence eliminates the need to isolate the enzymes. A theoretical analysis of the enzyme kinetics involved during the hydrolysis was studied.

The starch hydrolysates were fermented with the yeast Saccharomyces cerevisiae, strain No. 37. The yield based on the percentage conversion of starch to ethanol is 92% for eddoes and 90% for sweet potato. This corresponds to yields of 88 l/tonne and 101 l/tonne for the eddoes and sweet potato respectively.

The fruit was fermented with the yeast S. cerevisiae, strains No. 37 and 33. The percentage conversion obtained using both strains was approximately 97-98%. The ethanol yield obtained was between 80 to 90 %/tonne. The results obtained using the two strains of yeast were almost identical.

A gas-lift fermenter was designed, built and tested. The effect of aeration rate on ethanol production was investigated using a 10.0% (w/v) glucose solution as substrate, and the yeast strain, No. 37. The optimal ethanol production was obtained for an airflow rate of 0.123 vvm.

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