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Ethanol production from cassava starch using palm wine yeasts immobilized on wheat-gluten

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Thirty one yeasts isolated from palm wine obtained from different locations in Abeokuta South West Nigeria, were screened for fermentative abilities. Further screening was carried out in cassava starch liquefied with commercial alpha amylase at 4% (w/v) (pH 6.0, 80 ºC) and saccharified with glucoamylase at 4% (w/v) (pH 4.5, 60 °C). Analyses of volumetric ethanol productivity (Q), carbon dioxide productivity (QCO_2) and ethanol tolerance of selected isolates were carried out using standard chemical methods. Yeast isolate with the most desirable traits was selected for further studies and immobilized on gluten beads (1.0 cm and 1.5 cm) prepared from wheat flour. Yeast isolate designate T01 was selected based on its ethanol tolerance, rate of fermentation and ethanol productivity. Kinetic studies of fermentation of hydrolysed starch by isolate designate T01, showed that residual sugar concentration was directly proportional to viable cell count but inversely related to concentration of ethanol produced. There was no significant difference in ethanol production using yeasts immobilized on 1.0 cm bead sizes and free cells. However, yeasts cells of designate, T01 immobilized on gluten pellets of 1.5 cm gave a 30% increase in fermentation efficiency and improved ethanol production over free cells. When isolate designate, T01 immobilized on gluten bead (1.5 cm) were used in three repeated batch fermentation of cassava starch hydrolysate, there were no significant differences (p>0.05) in all fermentation parameters measured. Results from this study presents shows that cheap agricultural materials such as wheat-gluten is a re-usable and efficient support for immobilization yeast cells in fermenting cassava starch for ethanol production.

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