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## Process optimization of bio-ethanol production from cassava peels using different microbial inoculants

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Cassava peel is one of the major biomass wastes in Nigeria, obtained from processing of cassava tuber for human consumption, starch production and industrial uses. A few reports are available of its potential in bio-ethanol production which is a promising alternative energy source for crude oil. In this study, an attempt was made to optimize the production of bio-ethanol using different microbial inoculum for the simultaneous saccharification and fermentation of cassava peels in three cassava varieties at an optimal pH of 5.0 and a temperature of 28°C in 21 days. The cultures were distilled on the 7<sup>th</sup>, 14<sup>th</sup> and 21<sup>st</sup> days. The combinations of inoculum used were: A=*Rhizopus nigricans*+*Saccharomyces cerevisiae*; B=*Aspergillus niger*+*Saccharomyces cerevisiae*; C=*Rhizopus nigricans*+*Aspergillus niger*+*Saccharomyces cerevisiae*; D=*Rhizopus nigricans*+*Spirogyra africana*+*Saccharomyces cerevisiae*; E=*Aspergillus niger*+*Spirogyra africana*+*Saccharomyces cerevisiae* and Control=*Saccharomyces cerevisiae*. Results obtained showed significant differences ( $P < 0.05$ ) in the amount and concentration of ethanol produced among the five inoculants but no significant difference ( $P > 0.05$ ) among the three cassava varieties. Cassava peels from variety TME 4779 gave the highest amount of ethanol with a yield of 19.72 g/cm<sup>3</sup> when pH of the culture was optimized using *Rhizopus nigricans*+*Spirogyra africana*+*Saccharomyces cerevisiae* on the 7<sup>th</sup> day. It gave ethanol yield of 18 g/cm<sup>3</sup> when pH of the culture was optimized on the 21<sup>st</sup> day but gave 13.33 g/cm<sup>3</sup> when the pH of the culture conditions was left in its natural state. The lowest amount of ethanol yield obtained were 4.17 g/cm<sup>3</sup>, 5.28 g/cm<sup>3</sup> and 6.66 g/cm<sup>3</sup> from the cassava peels of TME 419, TME 0505 and TME 4779 respectively in an optimized condition using *Saccharomyces cerevisiae* alone. The implications of these findings in optimizing production of bio-ethanol from cassava peels and the prospects for the petroleum industry are highlighted.

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