

**PERFORMANCE OF PALMYRAH TODDY MIXED  
CULTURE ON ALCOHOL PRODUCTION  
USING DISTILLERY SPENT WASH AND PALMYRAH  
BASED CARBON SOURCES**

**S. Balakumar, Vasanthy Arasaratnam and K. Balasubramaniam.**

**Department of Biochemistry, Faculty of Medicine  
University of Jaffna, Sri Lanka.**

Palmyrah toddy mixed culture has been used for the alcohol production from palmyrah fruit pulp and bakers yeast was used a control. This work was carried out as a preliminary research with the view of spent wash (a waste produced during distillation of toddy in distilleries) utilization, replacing bakers yeast by toddy mixed culture and the possibility of palmyrah fruit pulp as a carbon source in industrial scale production of alcohol. Palmyrah toddy (10h old) was kept in a reciprocal shaker water bath (150rpm) at 36°C after the addition of penicillin antibiotic (0.1gl<sup>-1</sup>). Cells were separated by centrifugation after 24h and used for inoculation. Bakers yeast (Fermipan) 0.5g was grown in PYN medium which consisted of (gl<sup>-1</sup>) peptone, 3.5; yeast extract, 3.0; KH<sub>2</sub>PO<sub>4</sub>, 2.0; (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 1.0; MgSO<sub>4</sub>·7H<sub>2</sub>O, 1.0 and glucose, 100 for 18h. Under all conditions palmyrah toddy mixed culture or bakers yeast was used as the inoculum (cell number 2x10<sup>7</sup> cells ml<sup>-1</sup>) and the incubation was carried out at 36°C in a reciprocal shaker (150rpm). Palmyrah fruit pulp (PFP, 50ml) was diluted to 100ml with either distilled water or spent wash; spent wash (50ml), PFP (50ml) & sucrose (5g); spent wash (50ml) & sucrose (10g) and depectinized PFP (DPFP, 50ml) & sucrose (6g, to make up the total sugar equivalent to that of PFP 50ml and sucrose 5g) were taken and the final volume of all media were made upto 100ml with distilled water. Molasses fermentation was carried out using molasses (60 Brix) diluted with spent wash to make the sugar concentration to 100gl<sup>-1</sup>. Spent wash supplemented with sucrose (100gl<sup>-1</sup>) gave maximum ethanol production of 43 and 38gl<sup>-1</sup> with palmyrah toddy mixed culture and bakers yeast respectively. When approximately half of the sucrose (50gl<sup>-1</sup>) was replaced with PFP, a slight drop in alcohol production (38gl<sup>-1</sup>) was observed. When the PFP was replaced

## Section B

with DPF, ethanol production efficiencies were almost same 75 and 66.5% with palmyrah toddy mixed culture and bakers yeast respectively. Palmyrah toddy mixed culture and bakers yeast showed 75.0 and 69.0% ethanol production efficiency (Amount of ethanol that could be produced / Theoretical amount of ethanol that could be produced from the added amount of glucose x 100) with molasses diluted with spent wash medium. The results indicated that the toddy culture was superior to bakers yeast and among the media considered for the studies, spent wash supplemented with sucrose ( $100\text{g l}^{-1}$ ) was the best. Hence the wasted spent wash can be enriched and used for ethanol production. Further addition of palmyrah fruit pulp to spent wash is a good substitute for commercial sucrose as it gave 78.4 and 65.9% ethanol production efficiency with palmyrah toddy mixed culture and bakers yeast respectively.