

## UTILIZATION OF DISTILLERY SPENT WASH AS NITROGEN SOURCE FOR ALCOHOL PRODUCTION AT 40°C

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During toddy distillation waste effluent from the still is known as distillery spent wash or stillage. Since distilleries produce large volumes of spent wash with high pollution potential, uncontrolled disposal of the spent wash is environmentally detrimental. Hence the feasibility of using spent wash for the production of alcohol was evaluated. The alcohol production with different concentrations (100, 150 and 200 g l<sup>-1</sup>) of glucose was studied in spent wash and pre defined peptone Yeast Extract Nutrient (PYN) medium (g l<sup>-1</sup> peptone, 3.5; yeast extract, 3.0; KH<sub>2</sub>PO<sub>4</sub>, 2; (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, 1.0 and MgSO<sub>4</sub>.7H<sub>2</sub>O, 1.0). In all the experiments the inoculum was prepared in PYN medium at pH 4.5 containing 100 g l<sup>-1</sup> glucose in an orbital shaker (100 rpm) at 37°C and 18h old 10% (v/v) inoculum was pitched into the fresh media. Prior to sterilization, the pH of all the fermentation media was adjusted to 4.5. The fermentation was carried out at 40°C using the novel thermotolerent yeast developed in this laboratory. Complete utilization of glucose and 90% alcohol production efficiency were observed in 100 g l<sup>-1</sup> glucose supplemented spent wash and PYN media at 24 h. PYN medium with 150 g l<sup>-1</sup> glucose yielded 90% alcohol production efficiency with no residual sugar. Where as in 200 g l<sup>-1</sup> glucose supplemented PYN medium incomplete glucose utilization (2.0 g l<sup>-1</sup> residual sugar) with 78 g l<sup>-1</sup> alcohol production (production efficiency 78%) at 48 h was observed. In 150 and 200 g l<sup>-1</sup> glucose supplemented spent wash 23 and 60 g l<sup>-1</sup> residual glucose was found with 55 and 62 g l<sup>-1</sup> alcohol production respectively. When the composition of PYN medium was doubled, complete utilization of glucose and 90 g l<sup>-1</sup> alcohol production was observed. In order to make complete utilization of 200 g l<sup>-1</sup> glucose in spent wash medium, pre-treated spent was or spent was supplemented with different nitrogen sources were considered. Different amounts of yeast extracts (g l<sup>-1</sup>, 5.0, 10.0, 15.0 and 20.0) were added to spent wash. Complete utilization of glucose was observed with minimum of 10 g l<sup>-1</sup> yeast extract supplemented spent wash. The alcohol production efficiency was 90%. Then it was decided to use other nitrogen sources such as peptone, soy powder and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> having elemental nitrogen equivalence to 10.0 g l<sup>-1</sup> yeast extract. At the same time Neutrased (150,000 AU per 1000 ml spent wash, at pH 6.5, 45°C, 100 rpm for 6 h) spent wash also used with 200 g l<sup>-1</sup> glucose. After 48 h, peptone and (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub> supplemented spent wash and Neutrased treated spent wash showed 90% alcohol production efficiency. Untreated and soy powder supplemented spent wash produced 65 and 72 g l<sup>-1</sup> alcohol respectively (and alcohol producing efficiency was 65 and 72% respectively) with 60 and 30 g l<sup>-1</sup> residual sugar.