

PRODUCTION OF ETHANOL USING STARCH IN CORN AND RICE FLOUR

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Starch (112g) in corn flour (160g l^{-1}) was hydrolysed by the synergistic action of α -amylase and glucoamylase at pH 5.0 and 70°C . The extract of the corn flour hydrolysate contained 98g l^{-1} reducing sugar, 116g l^{-1} total sugar and 76.6% dextrose equivalent (DE). When the sugar in the extract was fermented by a commercial yeast preparation (B. S. Fermipan), 9.2g l^{-1} ethanol (yield 15.9%) was obtained. Since the yield of ethanol was low, a locally isolated yeast strain (BT¹) was compared with Fermipan for ethanol production. The B. S. Fermipan, and BT¹ yeast produced 9.2g l^{-1} (yield 15.9%) and 20.7g l^{-1} (yield 35.7%) ethanol from an extract containing 116g l^{-1} total sugar. From these results, it was decided to use the locally isolated strain in the subsequent experiments as it gave an ethanol yield of 35.7%. To increase the ethanol yield, the effect of initial yeast cell number in the medium was studied. When the cell number was 10^6 , 10^7 and 10^8 / ml medium, the ethanol yield was 55.5, 60.0 and 73.6% respectively. From the results, it was decided to use an initial cell density of 10^8 / ml medium. Due to the present crisis corn is not freely available in the local market. Hence the carbon source was switched on from corn flour to rice flour. Hydrolysis of 160g l^{-1} and 320g l^{-1} of corn and rice flour was compared. The reducing sugar and the DE obtained were almost same for corn and rice at their respective concentrations. Therefore the fermentation experiments were continued with the substitution of corn flour extract with rice flour extract. Fermentation of 120g l^{-1} of total sugar in rice flour extract at 48h produced 31g l^{-1} ethanol. This is comparable to the ethanol obtained (27g l^{-1}) with the fermentation of corn flour extract having a total sugar of 116g l^{-1} . The effect of total sugar concentration on the efficiency of ethanol production was studied. When the sugar concentrations were 130, 200 and 220g l^{-1} , the ethanol yield was 47.7%, 28% and 28% respectively. The results show that the ethanol yield was not improved by increasing the initial sugar concentration in the fermentation medium. Deficiency of nitrogen source in the medium could be a cause for the reduced ethanol production. When the medium containing 130g l^{-1} sugar was supplemented with triammonium orthophosphate (1.0g l^{-1}) the ethanol yield was reduced from 47.7% to 21.1%. Thus addition of inorganic nitrogen did not help to improve the ethanol yield. Further studies are in progress to improve the ethanol yield.