ETHANOL FROM STARCH IN RICE FLOUR

Vasanthy Arasaratnam, N.Nithianantharajah
and
K.Balasubramaniam.
(Department of Biochemistry, Faculty of Medicine.
University of Jaffna.)

Rice flour of different concentrations(160, 200, 280 and 300 g l^{-1}) was suspended in tap water and hydrolysed either by one step (simultaneous) or two steps liquefaction and saccharification using α-amylase (2.5 KNU g^{-1} DS) and glucoamylase (2.3 AGU g^{-1} DS) for 4h. At all rice flour concentrations studied, the recovery of total reducing sugars and the dextrose equivalent (DE) were higher when the hydrolysis was performed in two steps. With increase in rice flour concentration from 160 g l^{-1} to 300 g l^{-1} the recovery in one step process decreased from 85.4% to 55%, while that in the two step procedure decreased from 99.4% to87.9%. When the hydrolysate (DE 74.6%) obtained by the hydrolysis of 280 g l^{-1} rice flour was inoculated with a commercially available yeat prepartion(Fermipan), at 48h, 25.3 g l^{-1} ethanol was obtained and no further increase in the ethanol production was observed. Addition of glucoamylase (0.53 AGU ml^{-1}) had increased the ethanol production from 25.3 g l^{-1} to 68 g l^{-1}. Therefore the rice flour was liquefied and the liquefied preparation was subjected to simultaneous saccharification and fermentation. By this process at 48h, 53g l^{-1} and at 72h, 68.4 g l^{-1} ethanol was obtained. A study was performed to recycle the yeast cells for ethanol production. When rice flour hydrolysate of DE 100 having 250 g l^{-1} total sugar was used as medium, in the first and 2nd cycles at 120h, 45 g l^{-1} and 73.6 g l^{-1} ethanol was obtained respectively. In the 3rd and 4th cycles at 92h, 60 g l^{-1} and 62 g l^{-1} ethanol was respectively obtained. From these experiments it can be concluded that the starch in rice flour can be liquefied and could be subjected to simultaneous saccharification and fermentation. Furthermore recycling of the cells can decrease the time required for the ethanol production.

KNU - Kilo Novo Unit; AGU - Amylo Glucosidase Unit;
DS - Dry Substance