

## Preliminary studies on *Saccharomyces cerevisiae* cell mass production

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This paper describes the preliminary studies on factors that affect the growth of *Saccharomyces cerevisiae* strain from Fermipan. The fermentation medium and inoculum medium were the same and contained ( $\text{gl}^{-1}$ ); yeast extract, 2.5; bacterial peptone, 1.15;  $(\text{NH}_4)_2\text{HPO}_4$ , 0.25 and  $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ , 0.025. The fermentation was carried out at  $30^\circ\text{C}$  and pH 5.0, while shaking at 100rpm. The growth was monitored as dry weight. In the fermentation medium containing 50, 100 and  $150\text{gl}^{-1}$  glucose, dry weight of yeast obtained was 4.7, 9.5 and  $9.8\text{gl}^{-1}$  respectively and the residual glucose present at 24h of fermentation was 0, 12.2 and  $48.4\text{gl}^{-1}$  respectively. As the residual sugar in  $150\text{gl}^{-1}$  glucose containing medium was  $48.4\text{gl}^{-1}$  it was decided to do further studies in medium containing 50 and  $100\text{gl}^{-1}$  glucose. The impact of addition of different amounts of inorganic nitrogen source on production of biomass and alcohol was studied. The medium containing glucose  $50\text{gl}^{-1}$  with 0.25 and  $0.50\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  along with other nutrients the dry weight of yeast obtained was 4.4 and 4.7 and the alcohol produced was 12.5 and  $10.8\text{gl}^{-1}$  respectively. While with  $100\text{gl}^{-1}$  glucose medium with 0.25 and  $0.50\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  along with other nutrients, the dry weight of biomass was 9.4 and  $9.9\text{gl}^{-1}$  and alcohol produced was 20.5 and  $18.5\text{gl}^{-1}$  respectively. Complete glucose utilization was obtained in  $50\text{gl}^{-1}$  glucose with 0.25 and  $0.5\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  containing medium. Residual sugar present in the  $100\text{gl}^{-1}$  glucose and 0.25 and  $0.5\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  containing media were 6.7 and  $1.3\text{gl}^{-1}$  respectively. The glucose concentration of  $100\text{gl}^{-1}$  was selected for further studies as the glucose in the medium containing 0.5g of  $(\text{NH}_4)_2\text{HPO}_4$  was almost completely utilized by cells. In the next set of experiment, the medium contained  $100\text{gl}^{-1}$  glucose, along with 0.25, 0.50 or  $0.75\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  and other nutrients. The dry weight obtained and alcohols produced were 7.3, 8.1 and  $7.5\text{gl}^{-1}$  and 28.8, 25.3 and  $23.0\text{gl}^{-1}$  respectively. Hence the growth medium containing glucose,  $100\text{gl}^{-1}$  and  $(\text{NH}_4)_2\text{HPO}_4$ ,  $0.5\text{gl}^{-1}$  along with other nutrient was selected for further studies. The effect of yeast extract on growth and alcohol fermentation was studied. In the medium containing  $100\text{gl}^{-1}$  glucose and  $0.5\text{gl}^{-1}$   $(\text{NH}_4)_2\text{HPO}_4$  supplemented with 2.5, 3.5 and  $4.5\text{gl}^{-1}$  yeast extract, the cell mass of 7.7, 9.1 and  $10.7\text{gl}^{-1}$  and alcohol of 24, 22.5 and  $20.5\text{gl}^{-1}$  were produced respectively. As yeast extract addition was economically not feasible it was decided to keep the yeast extract at  $2.5\text{gl}^{-1}$  level and increase the  $(\text{NH}_4)_2\text{HPO}_4$  to 0.5g. With increase in  $(\text{NH}_4)_2\text{HPO}_4$ , the pH of the medium decreased from 5.0 to 3.0 during fermentation. Hence the effect of pH on growth of the *S.cerevisiae* was studied. The initial pH was adjusted to 5.0, 6.0 and 6.5 and the pH was adjusted 4 hourly using 4N sterile NaOH. The dry weight obtained was 6.0, 7.0 and  $6.7\text{gl}^{-1}$  respectively. The alcohol produced was 30, 28 and  $25\text{gl}^{-1}$  respectively. Hence the pH was maintained around 6.0 during the fermentation.