

Growth enhancement of probiotic *pediococcus acidilactici* by extractive fermentation of lactic acid exploiting anion-exchange resin

ABSTRACT

Fermentation employing lactic acid bacteria (LAB) often suffers end-product inhibition which reduces the cell growth rate and the production of metabolite. The utility of adsorbent resins for in situ lactic acid removal to enhance the cultivation performance of probiotic, *Pediococcus acidilactici* was studied. Weak base anion-exchange resin, Amberlite IRA 67 gave the highest maximum uptake capacity of lactic acid based on Langmuir adsorption isotherm (0.996 g lactic acid/g wet resin) compared to the other tested anion-exchange resins (Amberlite IRA 410, Amberlite IRA 400, Duolite A7 and Bowex MSA). The application of Amberlite IRA 67 improved the growth of *P. acidilactici* about 67 times compared to the control fermentation without resin addition. Nevertheless, the in situ addition of dispersed resin in the culture created shear stress by resins collision and caused direct shear force to the cells. The growth of *P. acidilactici* in the integrated bioreactor-internal column system containing anion-exchange resin was further improved by 1.4 times over that obtained in the bioreactor containing dispersed resin. The improvement of the *P. acidilactici* growth indicated that extractive fermentation using solid phase is an effective approach for reducing by-product inhibition and increasing product tite

Keyword: Amberlite IRA 67; Anion exchange resin; End-product inhibition; Extractive fermentation; Lactic acid; Probiotic