

Lactic Acid Production by Coimmobilized Cells of *Lactococcus lactis* TISTR 1401 and *Lactobacillus casei* TISTR 1341 Using Whey as Substrate

Sukjai Choojun¹ and Rutairat Suttisuwan^{2*}

¹*Department of Applied Biology, Faculty of Science, King Mongkut's Institute of Technology Ladkrabang, Thailand 10520*

²*Department of Biology, Faculty of Science and Technology, Rajamangala University of Technology Krungthep, Thailand 10120*

*Corresponding author, E-mail: rutairat.s@rmutk.ac.th

ABSTRACT

*Lactic acid production from whey by batch fermentation of coimmobilized cells of *Lactococcus lactis* TISTR 1401 and *Lactobacillus casei* TISTR 1341 was investigated in order to decrease the manufacturing cost of lactic acid. The fermentation was conducted in a two liters fermentor at 37°C and pH 6.5 with an agitation rate of 100 rpm. The maximum lactic acid concentration was obtained with a value of 29.89 g.l⁻¹ and the coimmobilized cells had consistent potential to recycle two rounds of fermentation by producing 17.38 and 12.51 g.l⁻¹ lactic acid in 24 h, for each batch of the first and the second cycle, respectively, while lactic acid produced by free cells in mixed cultures of the two species of the bacteria was 16.63 g.l⁻¹ in 48 h. These results suggested that coimmobilized cell cultures were more effective than free cell mixed cultures in improving lactic acid production.*

Key words: Whey, Lactic acid, Mixed cultures, Coimmobilized cell cultures

INTRODUCTION

Lactic acid is used as a biopreservative in food as lactic acid is effective in adding flavor and taste to food, controlling pH and inhibiting growth of microorganisms and germination of spores (Sachin et al., 2006). In addition, lactic acid is useful in biodegradable plastic production (Nabil et al., 2001). Lactic acid can be produced from chemical production or biological fermentation but the cost of chemical production is high and the product is difficult to be purified; therefore, biological fermentation by lactic acid bacteria (LAB) is made use of (Senthuram et al., 1999).

Synergistic effect of LAB has been reported recently regarding enhanced lactic acid production. KiBeom (2005) observed that mixed cultures of LAB might be more effective than single culture for improving lactic acid production. Moreover, immobilized cell technology can be established, leading to improved productivity (Sheng-Tsiung and Sheng-Tsiung, 1991).