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EFFECTS OF GUM ARABIC ON THE GROWTH OF *LACTOBACILLUS PLANTARUM* L9 BY USING STATISTICAL APPROACH

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TABLE OF CONTENT

ABSTRACT

Optimization of biomass production between the interaction of different concentrations of *Lactobacilus plantarum* L9 and gum Arabic was carried out using response surface methodology. A three square (3^2) full factorial design followed by statistical response and analysis of variance (ANOVA) was employed for experimental design and analysis of results and process of optimization. Nine inoculums were randomly performed to optimize the biomass growth of *L. plantarum* L9 in de Man Rogosa and Sharpe (MRS) carbohydrate-free medium supplemented with three different concentrations of gum Arabic as prebiotics (1 %, 3 % and 5 % , w/v) and three different concentrations of *L. plantarum* L9 (5 %, 10 % and 15 %, w/v). The optimal process parameters obtained from achieving the maximum yield of biomass L9 were temperature at 37 ˚C, anaerobically for up to 24 h incubation in the shake flask. Biomass production was analysed by using three different responses including maximum colony forming unit (CFU), specific growth rate and mean doubling time. The maximum value for maximum CFU was 4.07E8, specific growth rate was 1.19 h^{-1} and shortest mean doubling time was 0.58 h. The response surface graph predicted the optimal concentration of gum Arabic was 3.0 % and L9 concentration 15.0 %. ANOVA result showed that only *L. plantarum* L9 could give significance difference to the biomass production. So, it is suggested that further study could reduce the concentration range either for L9 or gum Arabic, thus experiment data would be more precise and reliable for future references and researches.

CHAPTER 1

INTRODUCTION

1.1 Background of study

According to the statistic of World Health Organization (WHO), in 2008 the global prevalence of raised total cholesterol among adults more than 5.0 mmol per adult was 39.0%. As the level of cholesterol increases, the risks of heart disease and stroke also rise worldwide (WHO, 2008). New Straits Times on 8th Sept 2012 reported that Malaysian suffering from hypercholesterolemia rose from 20.7% in 2006 to 35.1% for 2011 which are also proven by the 2011 National Health and Morbidity Survey (NHMS). Liong and Shah (2005) mentioned that risks of coronary heart disease of 2.0 - 3.0 % reduction when there is 1.0 % serum cholesterol reduce.

Fermented dairy products have been studied which have hypocholesterolemic ability such as yogurt, cheese and milk are common carriers for lactobacilli strain (Guzel-Seydim et al., 2011). This characteristic is proven by the various study indicates that lactobacilli could reduce low-density lipoprotein (LDL) cholesterol and total plasma cholesterol (Sanders, 2000).