Optimization of oleaginous yeast production by central composite design

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Abstract: Rhodosporidium toruloides is one of the high potential oleaginous yeasts for the application in food additive pharmaceutical and feed ingredients. The effect of growth parameters to biomass and lipid production of R.toruloides TISTR 5149 in molasses media was studied and optimized by response surface methodology via Central Composite Design. Fermentation parameters affecting the lipid production using 40, 50 and 60 g/L molasses as carbon source, pH 5, 6 and 7, temperatures at 28, 30 and 32 °C and shaking speeds at 200, 250 and 300 rpm were investigated for biomass and lipid production. Results found that biomass and lipid production can be represented as the quadratic models. Results also revealed that biomass yielded 15.47 g/L under 50 g/L molasses, 200 rpm, 32 °C, pH 5.0 while pH and shaking speed were significantly effect to lipid production (p-value = 0.0015 and 0.0006). The highest lipid production was 10.40 g/L. The models were validated and showed a good agreement to predict biomass but not lipid production. This mathematical relationship of biomass production can be applied to scale up the biomass production in pilot scale.

Keywords: Rhodosporidium toruloides; Oleaginous Yeast; Molasses; Biomass