Effect of Oils and Surfactants in Medium on Mycelial Biomass,Polysaccharides Production by Grifola frondosa

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ABSTRACT

Grifola frondosa commonly known as Maitake or Hen-of- the-Woods, is considered one of the most popular choice edible mushrooms. In this study various surfactants and plant oils were added to culture medium to evaluate the cell growth and polysaccharides product by Grifola frondosa in submerged culture fermentation. When 2 % glucose as carbon source both surfactants addition and plant oils addition increased cell concentration, but not increased polysaccharide production. On the other hand, 4 % glucose as carbon source, the addition of surfactants and plant oils in different time of cell cultivation which were at the initial cultivation(Day 0), at the beginning of exponential growth phase(day 5), the middle of exponential growth phase(Day 7) and the beginning of stationary growth phase(Day 9). The maximum cell concentration was found with soybean oil addition at day 0 and the cell concentration reached 8.551 g/L. On intracellular polysaccharide production the addition of olive oil at the initial culture has the highest polysaccharide concentration of 0.029 g/g-cell which was twice of without oil addition. With Span 20 addition at day 9 the highest extracellular polysaccharide production was reached to 1.381 g/L. The effect oxygen concentration of aeration was evaluated for the fungus growth and polysaccharide product in a 5-L fermentor. High concentration of oxygen aeration (40 %) was found to have the inhibition of cell growth and resulted in better cell growth with 21 % oxygen aeration. However, 40 % oxygen with 1 % olive oil addition a significantly cell concentration increase was found and cell concentration was reached to 16.853 g/L. Finally, utilizes the scanning electron microscope to observe the morphology of mycelia treated by the addition of surfactants and plant oils. Both with plant oils addition and with Tween 20 addition the mycelia become thicker and polysaccharide like objects was covered on the hypha surface. Different morphology of mycelia was found in media with Span, Tween series, and without additive. Significant shorter mycelia were found with Span surfactant addition.

Keywords : Grifola frondosa, polysaccharides, surfactants, plant oils

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