Production of Mycelium and Polysaccharide from the Edible and Medicinal Fungus Grifola frondosa by Submerged Fermentatio

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ABSTRACT

ABSTRACT Grifola frondosa in Japan as maitake （dancing mushroom）, in China as gray tree flower, it is a Basidiomycete fungus belonging to the order Aphyllopherales, and family Polyporaceae, as a white-rot and acreobe fungus. It is polysaccharides have been reported in many research articles include antitumor, immunological enhanc- ement, antidiabetic and anti-HIV, etc. A β-(1-3)-linked glucan with branches of β-(1-6)-D-glucose showing the main of pharma- cological activity has been isolated from fruit bodies and mycelium. By synthetic-log cultivation, when the young mycelium grown to fruit body need of three months.according to the related studies, employing mycelium of the submerged culture to grow the fungus has the advantages of the shorter growth time, better product quality, and lower cost. This study investigates the process of the growth of Grifola frondosa in terms of the following issues：（1）to screen different strains producing polysaccharides and analysis of free amino acid、total amino acid、main element (C、N及O)、enzyme activity；（2）studies biomass、extracellular polysaccharide and intracellular polysaccharide under shaking and static bottles；（3）to compare of the free amino acid and polysaccharides by the chemical and semi-chemical medium；（4） effect of submerged fermentation in shaking bottles, and to expand of 5 and 20L fermentor. The study shows that, in PDA culture, the CCRC 36434 have the best growing speed of the colony, in PDB and base medium culture, the CCRC 36355 have best yields of intracellular poly- saccharides, CCRC 36357 which yields the highest content of extracellular polysaccharide；in content of free amino acid, shows the higher of CCRC 36355；in content of total amino acid by mycelium, the higher of CCRC 36434；in api-ZYM system, intracellular enzyme have higher activity；in shaking culture by chemical medium , the highest intracellular polysaccharides is achieved under the condition of 4％glucose, 0.1％ammonium oxalate, 0.15％potassium phosphate, the highest the free amino acid is achieved under the condition of 3％sucrose, 0.2％ammonium oxalate, 0.45％potassium phosphate；in shaking culture by semi- chemical medium , the highest intracellular polysaccharides is achieved under the condition of 0.2％peptone, the highest extra- cellular polysaccharides is 0.4％yeast extract, the highest the mycelium biomass is 0.8％tryptone；in static culture, the highest intracellular polysaccharides is achieved under the condition of 3％fructose, 0.2％ammonium nitrate, the highest the free amino acid is achieved under the condition of 4％mannose, 0.4％ammonium oxalate ；studies submerged fermentation, the higher extracellular polysaccharides on day 11 by shaking culture and 5、20L fermentor on day 5；in 5L fermentor, free amino acid have best yield on day 2, the free amino acid follow time to decreased. extracellular polysaccharides and intracellular polysaccharides contain acidic glucan by ion exchange chromatography and intracellular polysaccharides contain less basic glucan.

Keywords : medicine fungus ; Grifola frondosa ; polysaccharides ; mycelium ; liquid culture ; medium ; chromatography

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