Effects of Cultural Environment on the Relationships of Pellets Morphology and Bioactive Ingredients by Cordyceps milita

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ABSTRACT

The effects of inoculum age, temperature, initial pH of the medium, inoculum size, carbon and nitrogen source and C/N ratio on mycelial morphology, mycelial biomass and bioactive ingredients by Cordyceps militaris was investigated. The mycelial morphology was quantified and characterized by means of image analysis, which included average diameter, roughness, circularity and core area ratio of the pellets. It indicated spores from grown on YMA medium for 2 weeks, 20℃, initial pH 6.0, 5×104 spores/mL and glucose as carbon source were best suited for mycelial biomass and bioactive ingredients biosynthesis. The majority of the mycelial morphology were fluffy and large pellets in initial pH 5.5~6.5 of medium. It showed that increasing inoculum size caused the pellets to increase in number per unit volume and roughness but to decrease in size and circularity. When glucose was used, the maximum number and roughness of pellets was obtained. The majority of the mycelial morphology was pellets in malt extract or yeast extract powder medium. The majority of the mycelial morphology was free mycelia in peptone, NH4NO3, or （NH4）2SO4 medium. When yeast extract powder was used, bioactive ingredients content were the highest among those teats. The maximum mycelial biomass, production of cordycepin in broth and content of IPS, adenosine and cordycepin in mycelia in C/N ratio as 2 of medium was 12.94 g/L, 172.60 mg/L, 58.3, 0.75 and 1.48 mg/g, respectively. While the fermentation proceeded, the pellets became fluffy and compact. In shake flask cultures, the cordycepin production in broth reached a maximum level of 225.89 mg/L on day 9；the maximum content of IPS, adenosine and cordycepin in mycelia was obtained on day 7. It was found that the fluffy and compact pellet was favorable for bioactive ingredients biosynthesis of C. militaris.

Keywords : Cordyceps militaris, polysaccharides, cordycepin, pellet, morphology, image analysis

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