Paecilomyces hepiali: Mycelial Growth in Various Agar Media, Yield of Fruit Bodies in Rice Based Media

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ABSTRACT

Paecilomyces hepiali is one of the most popular fungi isolated from natural *Ophiocordyceps sinensis*. Since the 1980s 22 species in 13 genera have been isolated and reported as anamorphs of *O. sinensis*. These have resulted in the commercialization of several mycelial products that are used to supplement the limited availability of wild *O. sinensis*. For instance, JinShuiBao capsule, the commercial product of Cs-4 (*Paecilomyces hepiali*) has been used in clinics throughout China. Other strains which have been reported as anamorphs of *O. sinensis* include *Synnematum sinensis, Cephalosporum sinensis, Gliocladium roseum, Mortierella hepialid, Hirsutella* s*inensis, Chrysosporium sinensis, Tolypocladium sinensis, Scytalidium hepiali, and Paecilomyces sinensis*. Most of the recent studies are reporting *Hirsutella* s*inensis* as a generally accepted anamorph of *O. sinensis*. *Ophiocordyceps sinensis* (Berk.) G.H. Sung, J.M. Sung, Hywel-Jones & Spatafora is one of the most popular and highly valued medicinal fungi. In 2007 it was transferred to a new family Ophiocordycipitaceae and genus Ophiocordyceps from the previous family Clavicipitaceae and genus Cordyceps as described in the phylogenetic study conducted by Sung *et al*. Its fruit body extends from the mummified carcass of an insect larvae, usually that of the Himalayan moth, *Thitarodes armoricanus* (*Hepialis armoricanus*). In nature, it is found only at alpine pastures in north–west and central Himalayan region. This fungus is called "Dong Chong Xia Cao" (Winter-Worm-Summer-Grass) in Chinese and ''Tochukaso'' in Japanese. In Nepal, Bhutan, and India, it is popularly known as "Yartsagumba", "Yartsa Goenbub", and "Keera Jhar", respectively. The mycelial powder of *P. hepiali* has been intensively studied and developed into functional food in China for many years. Polysaccharides, adenosine and cordycepin in the mycelial powder of *P. hepiali* are considered as the major functional compositions for the health effects. Studies have shown that *P. hepiali* can inhibit tumor proliferation, invasion, metastasis, and neovascularisation, induce apoptosis, reverse drug resistance, enhance immunity, and protect hepatic function.

This study looked at the growth of *Paecilomyces hepiali* in various agar media and yield of fruit bodies in rice based media. The best growth in agar media was obtained at 25^{o}C (61.86 mm colony diameter in 14 days). The initial agar media pH range of 6 to 8 was found to be most favourable for mycelial growth. This study found that agars made with powders of cereal grains (lye, wheat, millet, white sorghum, brown rice and oats) alone do not support good mycelial growth of *P. hepiali*. Addition of peptone to cereal grain agars improved mycelial growth significantly. The most favourable carbon sources were found to be Mannose, Fructose and Glucose. Organic nitrogen sources were most preferred. Peptone, Beef Extract and Yeast Extract were the most favourable nitrogen sources. The results demonstrated that brown rice is better than polished rice in yield of fruit bodies. Addition of peptone was found to be quite significant in enhancing yield of fruit bodies. Peptone, as a supplement, gave a better yield than addition of egg yolk, albumen and a mixture of the two. The medium with 40 g brown rice, 0.325 g glucose, 0.65 g sucrose, 2 g peptone and 65 ml corn steep liquor was found to be most favourable and it yielded 19.3 g of fresh fruit bodies.