

Studies on cultivation environment and antibacterial effects of *Ophiocordyceps sinensis* and *Cordyceps militaris*

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(冬虫夏草類の栽培環境と抗菌性効果に関する研究)

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Thesis Summary

The entire lives on the Earth live under different pressure levels which are generated by atmospheric air molecules. The *Paecilomyces hepiali* is a true anamorph of the wild *O. sinensis* which expose low pressure environment. Low pressure has been positively affected on proteins and enzymes by enhancing favorable mycelia growth. This study showed some growth influences, which have been done by pressure. Specially, -150 mmHg treated samples have acquired highest growth in liquid media. Meanwhile, -100 mmHg treated samples showed significantly highest mycelial growth of semi solid and solid media. The fundamental interaction of electric field with materials is that electric field exerts force on the charges in the materials. All plants and animals on earth live under an electric field because there is an electric field between clouds and the Earth. *O. sinensis* strain inoculated rice and adzuki bean were exposed to different electric fields. The highest mycelial growth was obtained rice media in -0.1 kV/cm of electric field followed by adzuki bean media in -0.1 kV/cm of electric field. However, on day 25 colony diameter value for rice media in -0.1 kV/cm of electric field was significantly higher than control followed by, adzuki bean substrates in -0.1 kV/cm of electric field had significantly higher colony diameter values than control. The moisture contents of the aggregated grown mycelia were comparatively exceeded in -0.1 kV/cm of electric field treated sample in both types of media. This study shows that inverse electric field has significant effect on enhancement of the mycelial growth of *O. sinensis*. A study find out comparative effect of hot water extract of particular fungal material on growth of six species of gastrointestinal bacteria belong to both aerobic and anaerobic and, consist with harmful and commensal categories. The pure mycelial extract of *P. hepiali* with 2×10^{-3} g/ml of concentration has significant effect on depleting the growth of *E. coli*, *E. faecalis*, *S. aureus*, *L.gasseri* and *B. ovatus* bacteria. *B. longum* has no significant affect by particular extract. Same type of extract of *C. militaris* has significantly reduced the growth of every bacteria used in this study. Hot water extract of *C. militaris* cultivated on soy bean has significant growth retardation toward *E. coli*, *E. faecalis*, *S. aureus* and *L.gasseri*. It has stimulated the growth of *B. ovatus* and *B. longum* which are considered as beneficial bacteria for human gut. This study shows that extract of both mycelia include antimicrobial substances like cordycepin and ergosterol which can be used as food supplements to enhance human gut health.