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## **Cordyceps biodiversity and industrialization of *Cordyceps militaris***

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**Purpose:** Cordyceps sensu lato create tremendous economic value due to their medicinal and nutritional importance. The objective of this study is classification of Cordyceps s.l. and optimization of large-scale production conditions for *C. militaris* and cordycepin.

**Methods:** Molecular phylogeny and morphology.

**Results:** More than 120 species of Cordyceps s.l. have been identified from China, Thailand and Russia based on morphology and multi-gene phylogenetic analyses. Among them, 30 are new to the science. In the industrial application works, (1) Solid-state fermentation for fruiting-body and cordycepin production: the optimization strategies in solid medium culture lead to a fruit body yield increased 67.96% (about 1.73 g/bottle) and cordycepin yield in fruiting-body increased 55.36% (0.87%). Larger particle size of rice in the medium offers better fruit body growth, and the cordycepin production prefers smaller particle size. (2) Solid-state fermentation only for cordycepin production: medium components glucose, peptone, adenine and histidine have been examined. The levels of variables for CCD experiments were selected according to the above results of the One-factor-at-a-time method; maximum response of 18.92 mg/g cordycepin at levels of glucose 26.25 g/L, peptone 26.25 g/L, adenine 7.50 g/L, and histidine 4.50 g/L as optimized medium components. This is the first report for improving the cordycepin production by using additives in this method. Isolates from colony sector mutation could be used for screening high-yield strains in cordycepin production and colony colour is one of the markers to detect fruit body and cordycepin production.

**Conclusions:** This study enriches the biodiversity of Cordyceps s.l. This method provides an effective way for increasing the *C. militaris* fruit body and cordycepin production at a large scale in order to improve industrial applications.