

Ganoderma P. Karst. Culture Collection for Biodiversity Prospecting and Health Food Development in Taiwan

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The Culture Collection and Research Center (CCRC) of the Food Industry Research and Development Institute has accumulated and preserved more than 10,000 microbial cultures to eventually be applied to industry and agriculture. Among the 10,000 cultures, 2000 have been collected through the project "Collection, authentication, and application of important agricultural microorganisms" appointed by the Council of Agriculture (COA), Taiwan. Mushroom cultures, containing polysaccharides and other physiologically active materials, are widely believed to be quite nutritious. Species of *Ganoderma* P. Karst. have been considered an effective folk medicine for hundreds of years in China. Two hundred and nine isolates of 25 *Ganoderma* species are well characterized and preserved by appropriate methods for further applications. Recent research has shown that some *Ganoderma* species possess certain bioactive components that are beneficial to human health. However, the biological activities vary widely depending on the specific isolate of *G. lucidum* (Curt.: Fr.) P. Karst. Since the physical appearance of the basidiocarp is greatly influenced by environmental factors, the use of the traditional taxonomic method has failed to establish a stable classification system

for the *Ganoderma* complex. In the first part of this study, we used AFLP (amplified fragment length polymorphic DNA) analysis to clarify the phylogenetic relationship of the *Ganoderma* complex and also constructed a genetic database for authenticating and identifying *Ganoderma* isolates. Based on AFLP, sequencing, and cultural study data, *G. lucidum*, *G. tropicum* (Jungh.) Bres., *G. tsugae* Murr., and *G. applanatum* (Pers.) Pat. can be well distinguished and grouped. However, each isolate has its own unique banding pattern. AFLP was shown to be a sensitive and efficient method for distinguishing *Ganoderma* isolates. In the second part, cell lines of gastric cancer cells (AGS), cervical carcinoma (Hela), and breast cancer (MCF-7), as well as macrophage cell (RAW 264.7) were used to screen the potentially functional *G. lucidum* isolates. *Ganoderma lucidum* GL4 and GL8 were then selected for investigating liquid cultural conditions. The results indicate that the optimal condition of GL8 culture in the 250-liter fermentor is 4% glucose, 3% corn steep liquor, initial pH 4.2, temperature 30°C, rotating speed 150 rpm, and aeration rate 0.5 vvm. The dry weight of mycelium is 10.986 g/liter, and the crude polysaccharide concentration is 0.93 mg/ml at the 120th hour.