

Genetic Resources and Mycelial Characteristics of Several Medicinal Polypore Mushrooms (Polyporales, Basidiomycetes)

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ABSTRACT: Mycelial characteristics of dikaryotic collections of 6 medicinal polypore mushrooms (*Fomes fomentarius*, *Fomitopsis pinicola*, *Ganoderma adspersum*, *G. applanatum*, *G. lucidum*, and *G. resinaceum*) with different geographical origins (Armenia, China, France, Iran, Italy, and Russia) were screened. A total of 42 polypore collections were molecularly identified by sequencing the internal transcribed spacer region of the ribosomal RNA genes' cluster, and a phylogenetic tree was constructed. Morphological characteristics of 37 cultures were observed on agar media (malt extract agar, potato dextrose agar) at different temperatures (25, 30, 35, and 38°C) at a pH of 6.0. Colony morphology, pigmentation of mycelium and agar, mycelial growth rate, *in vitro* teleomorph formation, and other macromorphological characteristics were thoroughly described and illustrated. Micromorphological features of mycelia, such as different hyphal structures, clamp cells, presence and type of asexual sporulation, chlamydo-spores, and others were observed. The taxonomic significance of the mycelial characteristics revealed was estimated. The obtained results will assist further biotechnological cultivation of medicinal polypore mushrooms to develop novel health care biotechnological products.

KEYWORDS: genetic resources, Basidiomycetes, medicinal mushrooms, molecular identification, morphological characteristics, temperature relationships

ABBREVIATIONS: GR_{avr}, average growth rate; ITS, internal transcribed spacer; MEA, malt extract agar; PDA, potato dextrose agar; R, growth rate; rDNA, ribosomal DNA.

I. INTRODUCTION

Polypores are wood-inhabiting bracket mushrooms and fungi (order Polyporales, phylum Basidiomycota) of economic and medicinal importance. Based on the Index Fungorum database, they include about 2300 species from 13 families and 405 genera worldwide. Nowadays, there are many gaps to be filled in the current knowledge on the taxonomy, phylogeny, and biology of polypores. Taxonomically and phylogenetically valuable DNA-based characteristics (internal transcribed spacer [ITS] and large subunit of ribosomal DNA [rDNA], mitochondrial ribosomal small subunit, RNA polymerase II sequence analysis), together with morphological and ecological characteristics of fruiting bodies and mycelia (e.g., thermophily, mycelial microstructures and growth

rate, formation of asexual mitospores, chlamydo-spores and teleomorphs *in vitro*), should be used for their correct identification.^{1–10} Currently, much taxonomic confusion has been associated with polypore mushrooms, particularly those from *Ganoderma*, *Polyporus*, and allied genera. Many were recognized as polyphyletic.^{5,11,12}

As biodestructors, polypores have powerful lignocellulose-degrading activity, which makes their usage promising in biotechnology and bioremediation.^{13–16} Among polypores are white-rot (e.g., *Fomes fomentarius*, *Ganoderma lucidum*, *G. applanatum*, *G. adspersum*, *Trametes versicolor*) and brown-rot species (e.g., *Fomitopsis pinicola*, *Piptoporus betulinus*, *Laetiporus sulphureus*).¹⁷ Polypores are widely appreciated for their medicinal properties, as well. Ethnomycological and modern scientific data