

Spore Germination and Breeding Pattern in *Grifola frondosa* (Dicks.:Fr.) S.F. Gray

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Grifola frondosa (Meripiliaceae, Polyporales), commonly called Maitake, grows on hardwood trees in the northern temperate forests of the eastern United States, Canada, Europe, and Asia. It produces sporophores that are edible with high organoleptic properties. In addition to Maitake's use as food, it is known to exhibit medicinal properties and is thus a fungus of high economic importance today.

The attempt to develop commercial strains from isolates of *G. frondosa* distributed in the US revealed the difficulties encountered at spore germination. Therefore, it became necessary to investigate various physicochemical factors that can affect spore germination of *G. frondosa*. Plant hormones, gibberellic acid (GA) and indole-3-acetic acid (IAA), temperature, pH, sonication, mushroom extract, and soil extract were tested in laboratory experiments. Temperature and pH showed significantly higher spore germination values compared to the control (2.8 spores per plate). In 30°C temperature pretreatment, an average of 28.6 spores germinated at pH 7 resulted in an average germination of 32.2 spores per plate. Some of the concentrations of plant hormones showed germination values that were significantly higher than the control. The concentrations of plant hormones that were not significantly higher than the control were 1.0 mg/L GA, 0.01 mg/L IAA, and 0.05 mg/L IAA. The effect of sonication on spore

germination was also significantly higher than the control in all the time periods tested. Soil extract treatment had a negative effect on spore germination as the values were significantly lower than the control. It was therefore concluded that pH and heat pretreatments were the most appropriate factors to stimulate spore germination in *G. frondosa*.

A preliminary study to determine the breeding pattern in *G. frondosa* was also conducted. Single spore isolates (ssi) were selected and examined for clamp connections, and 10 clamp free ssi were selected for use in the mating experiment. Cross mating was conducted by co-cultivating pairs of single spore isolates on 2% PDA plates and incubating for 14 days. All ssi were crossed in all possible combinations. Examination to determine formation or absence of clamp connection under ×100 and ×400 magnification conducted on all crosses was conducted, and the results analyzed for the breeding pattern. The results indicated that *G. frondosa* exhibits a tetrapolar breeding pattern. Among the 10 isolates used, the distribution of mating alleles were 2 ssi A1B1, 2 ssi A2B2, 3 ssi A1B2, and 3 ssi A2B1. It was observed that clamp connection formation in *G. frondosa* is more than 70% and 50% less than what we normally observe in dikaryotic cultures of commercially cultivated species of *Pleurotus* and *Lentinus*.