Evaluation of Substrate Colonization Efficacy of Mushroom-Forming Fungal Isolates for Developing Mycelium-Based Biomaterials

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Mycelium-based materials (MBM) have become a greener alternative to conventional synthetic material and a solution in waste management. MBMs are produced by growing the mushroom-forming fungi on different organic substrates. The present study evaluated the colonization efficacy of several local basidiomycete fungal isolates *in vitro* as well as on selected agricultural and industrial waste material to select best performing fungal isolates for biomaterial production. Basidiocarps of 14 mushroom-forming fungal isolates grown on decaying trees were collected from Uda Peradeniya, Sri Lanka. By culturing on PDA medium supplemented with Streptomycin (40 mg/L), pure cultures of only seven isolates (1, 7, 8, 10, 12, 13 and 14) were obtained and four isolates were morphologically identified. Colony growth on PDA significantly differed among the isolates ($P<0.0001$) and isolates 12 (*Polyporaceae betulinus*) (⌀8.5cm/day) and 7 (unidentified) (⌀8.3cm/day) demonstrated the highest growth rate followed by isolates 8 (*Lentinus giganteus* Berk.) (⌀5.2cm/day), 10 (*Polyporaceae (Hirtus) betulinus*) (⌀3.2cm/day) and 1 (unidentified) (⌀3.0cm/day). Five isolates showing a higher *in vitro* growth rate were evaluated for their surface colonization efficacy on four different ratio combinations of substrates (i.e. saw dust, rice husk and an industrial material). Area of colonization on a given substrate was recorded and data were analyzed by ANOVA and Duncan grouping. Interaction effect of substrate and fungal isolate was highly significant on surface colonization ($P<0.001$). Industrial waste: saw dust at 1: 3 ratio was selected as the most suitable substrate to colonize the tested five fungal isolates. The highest surface colonization was given by isolate 12 (*Polyporaceae betulinus*) 37cm^2/day, 27 cm^2/day, 38 cm^2/day, 12.75 cm^2/day on all substrate combinations. All five fungal isolates showed the highest colonization on 1:3 ratio of the industrial waste and saw dust. The findings are useful for the development of MBMs using the tested substrates and the fungal isolates.

Key words: Saw Dust, Rice Husk, Cellulosic Absorbent Material, *Polyporaceae Betulinus*