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Production of Mycelial Biomass, Exopolysaccharide, and Enzyme during Solid-State Fermentation of Plant Raw Materials by Medicinal Mushrooms

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Abstract : The main objectives of this proposal are to develop low-cost, innovative, and competitive technologies for the production of mycelial biomass of medicinal mushrooms as a natural food supplement for poultry. To fulfill this task, industrial strains of Lentinus edodes, Ganoderma lucidum, and Pleurotus ostreatus were used in this study. The solid-state fermentation (SSF) of wheat grains, wheat bran, and soy flour was performed in flasks and bags. Among nine mushroom strains, P. ostreatus 2191 appeared to be the most productive in protein biomass accumulation in the SSF of wheat bran. All mushrooms produced exopolysaccharide with the highest yield of 5-8 mg/mL depending on fungal strain and growth substrate. Supplementation of medium with 1% glycerol and 2-4% peptone favored mushroom growth and protein accumulation. Among inorganic nitrogen sources, KNO_3 also provided high biomass and protein production. The SSF of all growth substrates was accompanied by the secretion of cellulase and xylanase activities. The highest CMCase activity (12-13 U/g) was revealed in the cultivation of P. ostreatus 2191 using wheat bran as a growth substrate and ammonium sulfate or yeast extract as a nitrogen source, whereas the highest xylanase activity was detected in the fermentation of soy flour supplemented with peptone. Acknowledgments: This work was supported by the Shota Rustaveli National Science Foundation of Georgia (Grant number STEM-22-2077).

Keywords : mushrooms, plant raw materials, fermentation, biomass protein, cellulase
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