PRODUCTION OF THE SHIITAKE MUSHROOM, *LENTINULA EDODES* UNDER A CONTROLLED ENVIRONMENT

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Introduction

The cultivation of the *shiitake* mushroom on artificial logs consisting of agricultural and agro-industrial wastes instead of traditional woodlogs has resulted in considerable economic benefits in terms of yield increase, lower substrate cost and shorter gestation period. *Shiitake* is a fastidious mushroom whose yield is very dependent on the environment. Our aim was to investigate multifarious factors such as strains, substrates, and environmental and conditions to establish an optimum regime for the cost-effective production of the mushroom.

Materials and Methods

17 commercial strains of *shiitake* bred and collected from all parts of the world were monitored during anamorphic (mycelial) and teliomorphic (fruiting) development. Rate and density of growth on agar plates and spawn-run polypropylene bags under different temperatures and illuminated conditions were measured. A chitin assay (Ride and Drysdale, 1972) was employed for estimation of mycelial biomass. Production bags filled either with supplemented sawdust, palm pressed fibres or grass were prepared and inoculated according to Tan and Chang (1989), incubated for 3-4 months of spawn-run at 25°C in the dark, and tested in an environmentally-controlled room installed with temperature, light, humidity and aeration controls. Fruiting parameters measured included gestation period, successful maturity of primordia (pinheads) and biological efficiency (yield).

Results and Discussion

Among the 17 strains tested viz. L2, 9, 12, 13, 14, 17, 22, 31, 32, 34, 38, 200, 272, 300, 2161, M 3, and L ina, the fastest growers were L2, 13, 200, 272, 2161, M3 while the densest were L2, 22, 38, 272, 300, 2161. The best temperature for mycelial growth was 25°C in the dark. There was a correlation between radial/linear measurement of growth and that of actual biomass determined from glucosamine with the chitin assay among some strains though absent in others. In the fruiting trials, some strains responded well to lower fluctuating temperature regimes, while a few can fruit under a constant, low temperature. The best strains with respect to yield on supplemented sawdust, under light intensity of 20-40 lux, aeration speed of 1.3 - 2.5 m/s were L2161 and L272, with L2161 performing well under both temperature regimes of fluctuating 25°C (day)/ 20°C (night), and 20°C/15°C , while L272 fruited well at 20°C/15°C. The other high-yielding strains were L2, 13, 38, 200, 300 and M3. Gestation period (time for pinhead initiation after inoculation) ranged from 90-150 days, with maturity time for pinheads between 5-8 days. The biological efficiency for the first two flushes for L2161 and L272 were 25-30 % and 20-25 % respectively. In some strains, particularly L272, L2161 and M3, there was positive correlation between mycelial biomass and mushroom yield as found by other workers (Tokimoto et al. 1984; Tan and Chang, 1989). Palm pressed fibres were also a suitable substrate for mushroom production though yields were lower and contamination higher. Grass (cellulosic) was found unsuitable although reported otherwise (Lin, 1997).

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