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# MANGO TREE AND PADDY STRAW USED AS SUBSTRATES FOR PRODUCTION OF OYSTER MUSHROOM CULTIVATION (*Pleurotus florida*)

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## ABSTRACT

**Mango (*Mangifera indica* L. ) three substrates viz. wood saw dust, tip branch and leaf fall were used individual and in combination with paddy straw for cultivation of oyster mushroom (*Pleurotus florida*) under glass house condition at Varanasi. Observation with spawn run period, days taken for initiation of fruit bodies, harvesting of 1st flush and total yield were recorded. The average yield of mushroom was considerably higher 450 g/bag on paddy straw followed by combination with saw dust 400 g/bag. The performance of tip branch and leaf fall combination with paddy straw was also good from comparison to individual used substrates.**

**KEYWORDS :** Mango stiff, Paddy and *Pleurotus florida*

Huge quantities of agricultural residues and other organic wastes are generated annually through the activities of agricultural, forest and food processing industries. These agricultural wastes are primarily used as cattle feed but huge part burnt and spread in the field after harvesting. These are very poor management practices for agricultural wastes because they are increasing environmental pollution and cause health hazards. If even one percent of these agricultural wastes are used to produce mushroom, India will become a major mushroom producing country in the world. In this context, scientists are suggesting to farmers for better utilization of agricultural residues for mushroom production. Natural plant wastes are basic substrates for cultivation of edible fungi . Cultivation of oyster mushroom (Pleurotus spp.) was started on tree stumps and logs at the beginning of 20th century (Falck 1917). During 1958 Block and his co-workers wrote an extensive account on the requirement of this mushroom for saw dust cultivation (Block et. al. 1958).Oyster mushroom has been recognized as a highly potential converter of cheap cellulose in to valuable protein at the very nominal cost.

Recently, cultivation of Pleurotus spp. is gaining popularly as an income generating enterprise. Normally wheat straw and paddy straw are used as substrates for cultivation of oyster mushroom. Very often availability of these substrates becomes a limiting factor as the main cattle feed in this region.

Hence, utilization of alternative locally available mango tree parts substrates combination with paddy straw and individual for successful cultivation was to be investigated. Therefore, present investigation was based on the comparison of different substrates for growth behaviour and yield potential of Pleurotus florida. So that, maximum yield can be obtained by the farmers, by using these locally available agricultural wastes.

## MATERIALS AND METHODS

### Mushroom Culture

Pure culture of oyster mushroom: *Pleurotus florida* (Mont.) Singer was prepared by the tissue culture technique. The fruiting body of mushroom obtained was from the Mushroom House, Department of Mycology and Plant Pathology, Institute of Agricultural Sciences, B.H.U., Varanasi (U.P.). The mushroom culture was maintained and sub-cultured on PDA medium at $26^0$C temperature in B.O.D. incubator for further investigations.

### Preparation of Mushroom Spawn

The boiled and sterilized wheat grains were used for spawn preparation as described method (Patrabansh and Madan 1995). Well cleaned and healthy wheat grains were boiled for 30 minutes until they become soft. Excess water was drained off after boiling and the grains were cooled in wooden tray. These cooled grains were mixed with 2% calcium carbonate and 2% calcium sulphate on dry weight basis of grains to avoid clumping of grains. Boiled cereal

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grains were filled (500g/ bag) in polypropylene bags and plugged with non-absorbent cotton plugs. These bags were sterilized in autoclave at 15 lb pressure (121˚C) for one hr. and then allowed to cool at room temperature. These sterilized bags were aseptically inoculated with mycelium bits of 10 days old mushroom culture of Pleurotus florida. These inoculated bags were incubated at 26˚C in B.O.D. incubator for colonization and shaken at 4 days interval to allow proper spread of the mycelium between the grains. These bags were then completely colonized by mushroom mycelium in two weeks.

**Collection of Substrates**

Oyster mushroom can be cultivated on a large number of agro-wastes having cellulose, hemicellulose and lignin. For the cultivation of oyster mushroom these locally available substrates were collected from Agriculture Farm, BHU.

**Preparation of Substrate**

These substrates were prepared individually and in combination with paddy straw in ratio 1:1.These substrates were soaked in water for 18-24 hours. Excess water was drained off from straw by spreading it on wire mesh frame and then autoclaved. In autoclaving, the moist substrates were steamed under pressure inside the autoclave for 20 minutes at 15 lb pressure. After sterilization substrates were taken out of the autoclave and allowed to cool down at room temperature.

**Spawning**

Spawning is the process of mixing of spawn (mushroom seed) in the well prepared substrate/compost. Freshly prepared (20-30 days old) grain spawn was used for spawning. The sterilized straw was thoroughly mixed with 2% spawn and filled in cylindrical polythene bags (45×40cm). Then mouth of each bag was bind with rubber band and 8-10 small holes (2mm) were made at 10cm apart from each other. These spawned bags were placed in a neat and clean growth room furnished with iron racks , desert cooler, exhaust fan and lights, where average temperature ranged between 24-28˚C and humidity ranged between 70-85% recorded. Bags were incubated for completion of spawn run, the polythene wrapper terminated for cropping (Chandrasekhar and Savalgi 2002)

**Fruiting**

The polythene bags were tore off and the polythene sheets were removed without disturbing the compact mushroom beds. These mushroom beds were kept on wooden racks for the formation of fruiting bodies.

**Water Spraying**

Mushroom beds were sprayed regularly with water to keep the adequate moisture. Water was sprayed with the help of the sprayer.

## OBSERVATION AND MEASUREMENT

Harvesting was done by grasping the stalk and gently pulling and twisting the mushroom from the substrate level. Three mushroom flushes were harvested during total cropping period.

The growth behaviour and yield potential of Pleurotus florida was studied in terms of following parameters-

**Observations**

- Spawn run period in day.
- Initiation of pinheads in day.
- Harvesting of first flush in day.
- Total yield in gram
- Biological efficiency

## RESULTS AND DISCUSSION

The average value of observation with spawn run period , initiation of fruit bodies , harvesting of 1st flush and total yield were recorded. The result (Table-1) show that the wood saw dust recorded early spawn run (15-16 days) followed by other substrates (Kothandaraman at al. 1991). However, no difference was observed in spawn run, initiation of fruit bodies and harvesting of 1st flush between paddy straw and combination of saw dust+ paddy straw. Another individual substrates viz. leaf fall , tip branch and combination like leaf fall + paddy straw , tip branch + paddy straw showed different period ( in days )for same case (spawn run , initiation of fruit bodies , harvesting of 1st flush). The average yield of mushroom was considerably higher 450 g/bag on paddy straw followed by combination with saw dust 400 g/bag. The performance of tip branch and leaf fall combination with paddy straw was also good from

**Table 1: Growth Period and Yield of *Pleurotus Florida* on Different Substrates**

| Substrates | Growth period in days | | | Total yield in gm/bag | Biological efficiency (%) |
|---|---|---|---|---|---|
| | Spawn run | Initiation of fruit bodies | Harvesting of 1st flush | | |
| S.D. | 15-16 | 22 | 28 | 340 | 68 |
| L.F. | 20-21 | 26 | 32 | 300 | 60 |
| T.B. | 21-22 | 27 | 34 | 320 | 64 |
| SD:PS | 16-17 | 21 | 26 | 400 | 80 |
| LF:PS | 18-19 | 22 | 28 | 375 | 75 |
| TB:PS | 19-20 | 23 | 29 | 380 | 76 |
| P.S. | 16-17 | 21 | 26 | 450 | 90 |
| C.D.(5%) | | | | 7.01 | |
| Sed | | | | 3,14 | |

S.D. = Saw dust, L.F. = Leaf fall, T.B. = Tip branch, P.S. = Paddy straw

$$\text{Biological efficiency} = \frac{\text{Total yield of mushroom/bag}}{\text{Dry weight of substrate`}} \times 100$$

comparison to individual used substrates. Pleurotus spp. have been tested by workers to be cultivated on mango wood , logs , saw dust and combination with agricultural residues ( Chakraverthy and Sarkar 1982, Jain and Vyas 2002, Kaul and Janardhanan 1970, Suhabran and Nair 1991). The performance of present investigation suggests that Pleurotus florida can be grown on mango tree substrates individual and combination with good yield.

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