JOURNAL OF PURE AND APPLIED MICROBIOLOGY, October 2008. Vol. **2**(2), p. 543-546

# Evaluation of Saw Dusts as Alternate Substrates for Cultivation of Oyster Mushroom (*Pleurotus citrinopileatus)*

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(Received: 02 June 2008; accepted: 20 August 2008)

**Studies were conducted to find out the suitability of saw dusts as potential substrates for cultivation of *P.citrinopileatus* at Gandhigram Rural Universiy,Gandhigram, Tamilnadu, India. Performance of five saw dusts namely padak,silver oak,pine ,coconut were evaluated by using of them in combination with paddy straw in 1:1 ratio.The study revealed that mushroom species namely *P.citrinopileatus* could be successfully grown on the silver oak during presummer season.Though faster rate of spawn run,pinhead intiation and harvesting periods were recorded in paddy straw ,maximum yield of mushroom was obtained on silver oak.The results indicate that silver oak saw dust which is cheaper and available in plenty in saw mills,can be utilized successfully as promosing substrate for the commercial cultivation of oyster mushrooms.**

**Key words:** Oyster mushroom, *Pleurotus citrinopileatus,* silver oak, saw dusts, paddy straw.

Mushroom is one of the most profitable and environmental friendly enterprises among different horticultural crops in India. It is mainly cultivated indoors in cropping rooms where fluctuation in climate conditions have little impact on its production. Oyster mushroom *(Pleurotus spp*) is the third largest cultivated mushroom in the world and contributes 16.3% to the total world mushroom production. Generally lignocellulosic materials like paddy straw,wheat straw, millets straw are used as substrates for the commercial production of oyster mushrooms. Studies reveal the potentials of lignocellulosic wastes like cotton stalk (Lavie, 1988), waste cotton (Leong, 1980), pods and leaves of Cassia (Miller, 1987) cocoa shell (Graham & Pettiphzer, 1988) waste paper, sugarcane baggase and maize cobs (Sivaprakasam & Kandasamy, 1981) and logs saw dust of soft woods (Chakravarthy & Sankar, 1984; Block *et al.,* 1959) as substrate for commercial production of oyster mushroom.. Straw is commercially used as cattle feed in developing countries. This led to less availability of suitable substrate and call for a search of certain alternate lignocellulosic materials which should be available in sufficient quantity throughout the year

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at relatively cheaper price. Saw dust the residue left after timbering, is the cheaper plant resource available in bulk. They are widely used as fuel. With a view to utilize different saw dusts, the present study was conducted on cultivation of oyster mushroom (*Pleurotus citrinopileatus)* by using them as alternate substrates, during presummer seasons.

## MATERIAL AND METHODS

The pure cultures of *P.citrinopileatus* were obtained from Tamil Nadu Agriculture University, Madurai, Tamil Nadu. The sorghum grain spawn was prepared in autoclavable polythene bags following the standard methods (Sivaprakasam, 1980). Different saw dusts such as Padak(*PterocarpusDalbergiodes)*($T_1$), Silver Oak(*Gravillea robusta)* ($T_2$),Kumul (*Gmelina arborea)* ($T_3$), Pine (*Pinus ellioti)* ($T_4$) and Coconut (*Coccus nucifera)* ($T_5$) were collected, dried in the sun for 2-3 days. Paddy straw (C) was used as control.The paddy straw was dried, chopped into pieces of 3-5 cm size.. All the selected substrates were dried and washed thoroughly in freshwater and thereafter chemically treated by soaking in a solution of bavistin (75ppm) and formalin (500ppm) for 18 to 24 hrs (Vijay & Sohi, 1987). Transparent polythene bags of 60X30 cm in size perforated with two holes of 1 cm diameter on the two sides were filled separately each with 1:1 ratio of saw dust, straw. 10 replicates were maintained. Multilayered spawning on moistened substrate was done to inoculate them. The spawn substrate ratio was 1:10.Immediately after spawning the bags were incubated in the dark at the temperature of 26-28°C in a separate room inside the mushroom house with the humidity of 80%. After the complete colonization of mushrooms mycelium over the substrate, these bags were cut open and the beds were transmitted to the cropping room with diffused light. When the pinheads appear in the bed, they were allowed to bloom in 3-4 days. The fully bloomed mushrooms were harvested in three different flushes. Maximum and minimum temperature inside the mushroom house was recorded during the cultivation period. Optimum temperature and relative humidity were maintained throughout the study. The data on the spawn running, cropping, total yield (fresh weight basis), bioefficiency, maximum size, weight of single mushrooms were recorded.

## RESULTS

The data on the growth and yield performance of *P. citrinopileatus* is given in (Table 1). Growth of *P. citrinopileatus* on the selected substrates except Silver Oak treatment ($T_2$) was slow during spawn running, pinhead initiation and harvesting stages. However, faster rate of spawn run, pinhead initiation and harvesting periods were recorded in paddy straw (C).

While comparing the period taken for these growth stages in paddy straw (C)and silver oak treatment ($T_2$), $T_2$ performed earlier growth of spawn run, bud initiation and first two harvesting stages. Among the different substrates tried, yield of silver oak saw dust treatment ($T_2$)

**Table 1.** Growth performance of oyster mushroom on selected woody Biomass

| S. No. | Symbols for substrates | Spawn Running 50% | Spawn Running 100% | Budding | Total Crop period |
|---|---|---|---|---|---|
| 1. | C | 13.2±0.8366 | 19.8±0.8366 | 23.4±0.5477 | 44.4±0.5477 |
| 2. | $T_1$ | 18.4±0.5477 | 27.4±0.5477 | 31.4±0.5477 | 48.8±0.4472 |
| 3. | $T_2$ | 12.4±0.5477 | 18.4±0.5477 | 22.4±0.5477 | 45.2±0.4472 |
| 4. | $T_3$ | 16.8± 0.8366 | 28.6±0.5477 | 32.4±0.5477 | 49.2±0.4472 |
| 5. | $T_4$ | 12.4±0.5477 | 20.4±0.5477 | 23.4±0.5477 | 46.2±0.5477 |
| 6. | $T_5$ | 14.4±0.5477 | 25.4±0.5477 | 28.4±0.5477 | 47.4±0.5477 |

**Table 2.** Yield performance of oyster mushroom selected woody Biomass

| S. No | Symbols for substrate | Total yield (g) | Bioefficiency (%) | Max.Wt.of Single Mushroom(g) | Max.siz.of Single Mushroom (cm) |
|---|---|---|---|---|---|
| 1. | C | 1150±0.1931 | 76.67% | 26±2.2360 | 11.6±0.8944 |
| 2. | $T_1$ | 955±0.1006 | 63.67% | 24±2.2360 | 12.6±0.5477 |
| 3. | $T_2$ | 1210±0.1596 | 80.67% | 35±3.5355 | 14.7±0.4472 |
| 4. | $T_3$ | 875±0.2795 | 58.33% | 19±2.2360 | 11.4±0.8944 |
| 5. | $T_4$ | 1155±0.1537 | 77.05% | 33±2.7386 | 13.5±0.5 |
| 6. | $T_5$ | 970±0.0670 | 64.67% | 22±2.7386 | 11.5±1.3228 |

was significantly higher than all other substrates and also in control (Table 2). It was found that the first flush of fruit bodies in all the substrates was much higher than the second ,third flushes. The yield in first flush was around 50% of the total yield. Decrease in yield in subsequent flushes was observed. The lowest yield was recorded in the third flush. In this study silver oak saw dust mixed with paddy straw recorded maximum yield of 1210/1500 g dry substrate and its bioefficiency was 80.67%, while the total yield and bioefficiency in paddy straw (C) was observed as 1150/1500g and its bioefficiency was 76.67% with the maximum size of 14.7cm, maximum weight of 35g of were harvested from the silver oak saw dust ($T_1$). (Table 2).

## DISCUSSION

Various agro based industrial byproducts and forest wastes are available in plenty and have very little or no use; hence could be recycled through oyster mushroom production in a profitable manner (Upadhyay & Verma, 2000). In the present study silveroak saw dust treatment which recorded better growth performance among other treatments, resulted in high total yield, bioefficiency and producing maximum size mushroom with maximum weight. Higher biological efficiency in bags with silveroak saw dust mixed with paddy straw could be due to better aeration and water absorption in the bags than paddy straw alone. Cultivation of *P. sajorcaju* was tried on 15 logs of woods. It was recorded that mango logs yielded maximum fresh sporocarp (Suharban & Nair, 1991). Chakaravarthy & Sarkar (1982) also reported best results on logs of *Mangifera indica* and *Artocarpus* sp. Dhar (1976) found that in Kashmir valley, non resinous woods like poplar, acacia and willow have been suitable for grow *P. ostreatus*.

In terms of production and bioefficiency silveroak saw dust mixed with paddy straw in 1:1 ratio could be used as a potential substrate for growing *P. citrinopileatus*. This would help to recycle this saw dust in a beneficial way.

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