DOI: 10.36036/MR.31.1.2022.326303
Mushroom Research 31 (1) : 103-107, 2022

Short Note

Cultivation of oyster mushroom (*Pleurotus florida*) on sawdust

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ABSTRACT

The study was conducted at Department of Rural Technology, HNB Garhwal University Srinagar Garhwal, Uttarakhand during 2018-2019 for cultivation of *Pleurotus* species (*Pleurotus florida*) on three different treatments of sawdust i.e. T_1 (sawdust), T_2 (sawdust 70%+Rice bran 30%) and T_3 (sawdust, 80% + 20% rice bran). Mango and *Toona sinensis* sawdust was used in the study. Different treatments were evaluated for spawn running, pinhead formation, fruit body development and total yield. Among all the treatments T_2 (Sawdust 70% + Rice bran 30%) was found most favourable for oyster mushroom (*Pleurotus florida*) cultivation.

Keywords: Cultivation, oyster mushroom, sawdust, yield

Mushrooms are fleshy, spore-bearing reproductive structures of fungi grown on organic substrates and have an important role as a human food due to its nutritional and medicinal properties (Etich, *et al.* 2003*)*. Mushrooms are a good source of protein, vitamins and minerals and are known to have a broad range of uses both as food and medicine. A high nutritional value of oyster mushrooms has been reported with protein (25-50%), fat (2-5%), sugars (17-47%), mycocellulose (7-38%) and minerals (potassium, phosphorus, calcium, sodium) of about 8-12% (Salami, *et al.,* 2016; Sawiñska and Kalbarczyk, 2011). Edible mushrooms are also rich in vitamins such as riboflavin, vitamin D and C (Syed, *et al.,* 2009; Dundar *et al.,* 2008)

Currently, high biofuel prices have caused an increase in food prices and food scarcity in many countries. Some pertinent issues of the time are population increase, hunger, malnutrition and rising food prices in the world, mushrooms cultivation can be reliable and appropriate option. Oyster mushroom (*Pleurotus* spp.*)* cultivation has picked up throughout the world during the last few decades due to its simple cultivation technology, flavour and nutritional values (Chang, 1999; Quimio, 1978b: Alananbeh, *et al.,* 2013). Also this vocation can play an important role in degrading organic wastes whose disposal has become a problem now a days (Das and Mukherjee, 2007; Ananbeh, 2003). *Pleurotus* spp. has a potential to grow on wide range of lignocellulose material like straw, sawdust, rice hull, etc.

Presently sawdust is widely used medium for cultivation of mushroom on a commercial scale. Pathmashini*, et al.* (2008), reported successful cultivation of oyster mushroom on sawdust of different woods (mango, simbal and kail) with good yields. Hami (1990) reported that the softwood sawdust like mango and cashew are more suitable than hardwood sawdust. The present work was carried out with objectives to evaluate the cultivation and production of oyster mushroom (*Pleurotus florida*) on sawdust with different amendments.

Recieved on 28-05-2019; Accepted on 24-06-2022

The study was conducted at Department of Rural Technology, HNB Garhwal University Srinagar Garhwal, Uttarakhand during 2018-2019 for evaluation of oyster mushroom (*Pleurotus florida*) on three different treatments i.e. T_1 (Sawdust), T_2 (Sawdust 70%+rice bran 30%) and T_3 (Sawdust,80% + 20% rice bran). Mango and *Toona sinensis* sawdust was used for the cultivation. Spawn was collected from the ICAR-Directorate of Mushroom Research, Solan (Himachal Pradesh).

Substrate preparation and sterilization

Soaked substrates for 15 to 18 hrs were spread on floor for evaporation of excess moisture to maintain it to approximately 70%. Around 1 kg wet substrate was filled in each polypropylene bag (6×8 inches) and the bags were sealed using a rubber band around the neck. The bags were autoclaved at 121°C at 15 psi pressure for an hour and allowed to cool overnight (Fig 1a).

Cropping

During spawn run period, the temperature and relative humidity in growth room was maintained between 22-26°C and 80-90%, respectively by sprinkling water on the floor. After the completion of spawn run, temperature was reduced to 17-20 °C for fructification. The humidity of the growing room was maintained between 80-90% by sprinkling water on floor and moisture requirements of the bags was accomplished by sprinkling water on them thrice a day using plastic adjustable hand sprinkler (Fig 1b&c).

Fig. 1a. Substrate preparation

Fig. 1b. Mushroom at maturity

Fig. 1c. Mushroom fruiting bodies sprouting from the substrate

Yield parameter

The data was collected and with respect to number of days taken for the completion of mycelium growth, pin head formation, total number of fruit bodies, total number of flushes and yield of each bag. Total yield (g) of the mushroom was calculated after the completion of cropping period.

Statistical analysis

Data obtained was analysed using Analysis of variance (ANOVA) techniques to test the overall significance of data while the least significance difference (LSD) test was used to compare the differences among.

Spawn run

Time taken in various phases of cultivation of oyster mushroom (*Plurotus florida*) is given in Table 1. The result showed that the fastest spawn running took 17.64±0.59 days in T2 treatment (Sawdust 70%+Rice bran 30%), followed by T3 (Sawdust 80% + 20% rice bran) in 18.33±0.77 days while 19.57±0.44 days in only sawdust. The findings are in concurrence with the finding of Pokhrel *et al.,* (2009), Shah *et al*., (2004), Ponmurugan *et al.* (2007) and Sharma *et al.,* (2013).

Pin head formation and harvesting

Pin head formation in the T2 treatment (Sawdust 70% +Rice bran 30%) was observed within 4.66±0.57 days after spawn run followed by T3 (Sawdust, 80% + 20% rice bran) and first crop was obtained in 25.4, 27 and 30.4 days after spawning, respectively. The number of fruit bodies was also observed to be the maximum in T2 (Sawdust 70% +Rice bran 30%) i.e. 4.43±0.42 followed by T3 (3.82±0.24) and T1 (3.46±0.6) (Table 1). Similar results are also reported by some workers (Shah *et al*., 2004; Liaqat *et al.,* 2014, Khan *et al.,* 2001 and Obaidi *et al.*, 2003). In the present investigation, we observed that increasing the amount of rice bran in the substrate mixture accelerated spawn run, pin head and fruit body formation which was reported by earlier workers also (Ponmurugan *et al.,*2007; Liaqat *et al.,*2014; Khan *et al.,* 2001 and Obaidi *et al.*, 2003).

Yield

Different treatments showed significant difference in terms of yield in the first flush. T2 treatment yielded maximum (22.40±0.62g) in 1st flush followed by treatment T3 (20.39±0.76 g). Statistically T2 and T3 gave at par yield while T1 gave 18.79±1.26 g yield in 1st flush. In 2nd flush also T2 gave maximum yield 15.86±0.68 g while T3 and T1 gave at par yield with each other by producing 9.96±0.35g and 9.39±0.49 g, respectively in 2nd flush. In second flush, T2 treatment showed significantly higher yield over T1 and T3 treatment. In 3rd flush, T2 treatment again gave maximum yield 8.42±0.66g while T_3 and T_1 gave significantly lower yield by producing 4.89±0.44g and 4.49±0.37g, respectively in 3rd flush.

In terms of total yield, a significantly higher yield could be observed in T2 treatment (Sawdust 70% +Rice bran 30%), i.e. 44.26±12 g followed by T_3 and T_1 with a total yield of 37.62±2.34 g and 34.69±2.24g,

Table 1. Time of spawn run, pin head formation and number of fruit bodies

Treatments	(Mean ± SD)		
	Spawn Running(Days)	Pin head formation(Days)	No of Fruit bodies
T_1 (Sawdust)	19.57±0.44 B	3.51±0.43A	3.46±0.6A
T_2 (Sawdust 70% +Rice bran 30%)	17.64±0.59A	4.76±0.57A	4.43±0.42A
T_3 (Sawdust, 80% + 20% rice bran	18.33±0.77 A	4.11.63A	3.82±0.24A

Values followed by different letters in a row differ significantly at p=0.05

Table2: The mushroom yield, on sawdust substrate

Treatments	(Mean ± SD)			
	1st flush (g)	2nd flush (g)	3rd flush (g)	Total yield (g)
T_1 (Sawdust)	18.79±1.26A	9.39±0.49A	4.49±0.37A	34.69±2.24A
T_2 (Sawdust 70% +Rice bran 30%)	22.40±0.62B	15.86±0.68B	8.42±0.66B	44.26±12 C
T_3 (Sawdust, 80% + 20% rice bran	20.39±0.76A	9.96±0.35B	4.89±0.44B	37.62±2.34B

Values followed by different letters in a row differ significantly at p=0.05

respectively (Table 2). Similar result was also reported by Kumari and Achal (2008), Liaqat *et al.,* (2014), Das and Mukherjee (2007) and Pathmashini *et al.,* (2008).

The study was conducted for cultivation of oyster mushroom (*Pleurotus florida)* on sawdust substrates with three treatmenti.e.T_1 (Sawdust), T_2 (Sawdust 70% +Rice bran 30%) and T_3 (Sawdust, 80% + 20% rice bran). Among all the treatments T_2 (Sawdust 70% +Rice bran 30%) was found most favourable for oyster mushroom (*Pleurotus florida*) cultivation.

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