

## Original Research Article

# Evaluation of Different Substrate for Growth Performance, Yield and Nutritional Value of Oyster Mushroom (*Pleurotus sojar-caju*)

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## ABSTRACT

Mushroom is increasingly becoming an important human diet. In concern to doubling income of farmers, farmers should use available crop waste to grow them. The research was carried out at Holy Cross Krishi Vigyan Kendra, Hazaribag, Jharkhand to evaluate the efficacy of different locally available substrate for the growth performance and yield of oyster mushroom to find out the best alternative substrate for the growth of oyster mushroom, to produce maximum yield with highest biological efficiency and nutritional contents. The results regarding the time required for mycelial running, Pin- head initiation and maturation of fruiting bodies on different substrate showed that in all the three cases, its appeared earlier on Mustard straw (15.33, 21.66 & 26.00 days respectively) followed by Paddy straw and the maximum yield also obtained from mustard straw (913.33 g/bag) followed by paddy straw (883.33 g/ bag). Maximum protein content observed in mustard straw (30.33 %) followed by paddy straw (32.96 %). Maximum Nitrogen content (5.09%), Phosphorous content (1.30%), Zinc content (166.75 ppm), & Copper content (24.16%) were recorded in Paddy straw whereas maximum Potassium content (3.26%), Manganese content (27.83%), Sulphur content (4395.83 ppm) & Iron content (283.56 ppm) were recorded in Mustard straw.

### Keywords

Oyster Mushroom,  
Nutritional  
composition,  
Different substrate

## Introduction

Oyster mushroom (*Pleurotus sojar-caju*) is an edible mushroom having an excellent taste and flavour. They also contain appreciable amounts of potassium, phosphorous, copper and iron but have low levels of calcium. Mushrooms are a good source of protein, vitamins and minerals (Kimenju *et al*; 2009), mushroom protein is intermediate between that of animals & vegetable. Major medicinal properties attributed to oyster mushroom include anticancer, antibiotic, anti-inflammatory

antiviral activities, immune-modulator effect and lipid lowering effects (Lavi *et al*; 2010) In India Oyster mushroom have become the most popular for commercial production. The growth of oyster mushroom requires high humidity (80-90%) and high temperature (25- 30°C) for the vegetative growth called spawn running and lower temperature (18-25°C) for fruiting body formation. Mushroom has been recognized as important food item and their usage is being increased day by day for their

significant role in human health, nutritional and medicinal properties (Mshandete, 2011).

### **Materials and Methods**

The research was conducted at Holy cross Krishi Vigyan Kendra, Hazaribag in their mushroom production unit during 2016-17.

#### **Preparation of different substrate:**

For cultivation of mushroom, various substrate viz; Sugarcane bagasse, Mustard straw, Paddy husk, Paddy straw + Paddy husk (1:1), Paddy straw + Mustard straw (1:1), Paddy straw + Sugarcane bagasse (1:1) and Paddy straw were taken. 10 kg of straw chopped into small pieces of 3-4 cm, after that all substrate soaked in 100 lit of water for 12- 14 hr which is supplemented with 7.5g of bavistin and 125 g formaldehyde for complete sterilization of substrate, then spread over clean, slightly inclined surface in thin layers for cooling and draining of excessive water, moisture content were maintained around 65%. The bags are filled with substrates and weighed. Spawning was made with *Pleurotus sajor-caju* (150-200 g) per bag on dry weight basis under the aseptic conditions. These inoculated bags were placed in growth room with 70-80% humidity and between 25- 30<sup>o</sup>c temperature for proper growth of mycelium. Growth of mushroom was recorded daily for all the treatments. When bags become full of growth and pin- heads started appearing, the bags were mouth opened to facilitate the development of fruiting bodies. The yield parameters were recorded, days required for complete mycelial growth, days required for initiation of pin-head, days required for maturity of fruiting bodies, weight of each bags, yield of fresh mushroom per bags on each substrate and also estimated nutritional value of mushroom from each substrate. The evaluated minerals included nitrogen,

calcium, magnesium, potassium, phosphorus, copper, zinc, manganese, and iron. Values for N were determined using the micro Kjeldahl apparatus; P values were calculated by a spectrophotometer; Ca, Mg, Cu, Mn, Fe, and Zn values were obtained using an atomic absorption spectrophotometer; and K values were determined by a flame photometer after standardizing against respective elements (Cuniff, 1995).

### **Results and Discussion**

Seven different substrates were studied to determine the best substrates for growth of mycelial to get maximum yield. The mycelial growth ranged from 15.33 to 21.00 days. The appreciable days to complete mycelium running of oyster mushroom on different substrates might be vary due to their chemical composition and C: N ratio as reported by Bhatti et al. (1987). The fastest mycelial growth observed in mustard straw (15.33 days) followed by paddy straw (16.66 days). Mandeel *et al* (2005) reported that spawn run of *P. sajor-caju* was different when grown in various substrates, varying from 2 to 4 weeks. The slowest mycelial growth observed in paddy husk (21.00 days). The presence of right proportion of cellulose, hemi-cellulose and lignin was the reason for fastest growth of mycelium. The outstanding growth of mycelium is a vital factor in mushroom cultivation. (Pokhrel *et al* 2009). Similarly Pin-head initiation on various substrates was also observed in between 21.66 to 33.33 days of incubation. Buah et al., (2010) reported pinhead formation of *P. ostreatus* on different substrates after 21-23 days. The total days for the first harvest of mushroom took between 26.00 to 39.66 days depending on substrate used. The first mycelial growth period (15.33 days), pinhead initiation period (21.66 days) and 1<sup>st</sup> harvest period

(26.00 days) observed in mustard straw, which is followed by paddy straw. Weight of each bag differs on the basis of substrate weight. The study revealed that the yield of mushroom from mustard straw (913.33g/bag) was significantly highest among all substrate, even though weight of bag is less (3.70 kg/bag). The lowest yield obtained paddy husk (506.66 g/bag), even though weight of bag is highest (6.33 kg/bag). Taurachand (2004) reported that sugarcane bagasse contains cellulose and sucrose which is easily degraded by oyster mushroom. It is also rich in nitrogen content. Even though it is rich in cellulose, sucrose and nitrogen, its yield was found low in our experiment in comparison to other substrates. The study revealed that the

fruiting bodies are quite rich in protein ranged from 26.28 to 34.76 per cent on dry weight basis. The protein content in fruiting body depends on nature of substrate (Wang *et al.* 2001). Mushroom provides a reasonable amount of minerals in comparison with vegetables (Guillamon *et al.*, 2010). Highest Nitrogen content (5.09%), Phosphorus content (1.30%), Zinc content (166.7ppm) and copper content (24.16%) were recorded in paddy straw whereas highest Potassium content (3.26%), Manganese content (27.83%), Sulphur content (4395.83ppm) and Iron content (283.56ppm) were recorded in Mustard straw. These results are in accordance with Chang *et al.* (1981) and Alam *et al.* (2007).

**Table.1** Comparative studied of mycelial growth, pin-head initiation, harvesting time, weight of different bags and yield from different substrates

S.No.	Substrates	Avg. no. of days required for mycelial growth	Avg. no. of days required for Pin-head initiation	Avg. no. of days required for Primordial stage to harvesting stage	Weight of each bag in kg	Yield of each bag (g/ bag)
T <sub>1</sub>	Sugarcane Bagasse	19.33	27.66	31.66	4.40	721.66
T <sub>2</sub>	Mustard Straw	15.33	21.66	26.00	3.70	913.33
T <sub>3</sub>	Paddy Husk	21.00	33.33	39.66	6.33	506.66
T <sub>4</sub>	Paddy Straw + Paddy Husk	20.33	30.33	35.66	5.63	646.66
T <sub>5</sub>	Paddy Straw + Mustard Straw	17.00	26.00	32.33	4.13	875.00
T <sub>6</sub>	Paddy Straw + Sugarcane Bagasse	18.66	32.33	37.66	4.95	696.66
T <sub>7</sub>	Paddy Straw (Control)	16.66	23.66	27.00	4.80	883.33
	CD	2.80	3.59	3.51	0.77	113.89
	SE(d)	1.29	1.66	1.62	0.35	51.70
	CV	8.66	7.30	6.05	8.92	8.45

**Table.2** Nutritional value of oyster mushroom (*Pleurotus sajor-caju*) on different substrates

S.No	Substrates	N (%)	P (%)	K (%)	Zn (ppm)	Fe (ppm)	S (ppm)	Cu (%)	Mn (%)	Protein (%)
T <sub>1</sub>	Sugarcane Bagasse	4.84	1.12	2.41	150.53	253.56	4021.56	16.96	23.32	31.97
T <sub>2</sub>	Mustard Straw	3.94	0.95	3.26	154.80	283.56	4395.83	16.58	27.83	34.76
T <sub>3</sub>	Paddy Husk	5.09	1.17	2.16	136.10	225.23	3661.73	22.90	25.91	26.28
T <sub>4</sub>	Paddy Straw + Paddy Husk	4.31	1.16	2.07	140.00	244.33	3851.06	19.23	21.67	30.19
T <sub>5</sub>	Paddy Straw + Mustard Straw	4.58	1.05	2.37	139.84	211.28	3749.56	14.50	21.50	28.65
T <sub>6</sub>	Paddy Straw + Sugarcane Bagasse	4.40	1.22	2.92	146.25	237.98	3509.13	20.83	19.31	27.89
T <sub>7</sub>	Paddy Straw (Control)	4.17	1.30	2.64	166.75	239.75	4199.08	24.16	17.40	32.96
	CD	0.49	0.30	0.62	14.05	29.56	426.83	2.76	3.84	4.98
	SE(d)	0.22	0.13	0.28	6.49	13.41	193.75	1.25	1.74	2.26
	CV	6.16	8.42	10.24	5.37	6.78	6.06	7.96	9.53	9.11

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