

Original Research Article

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## Comparative Study on Growth and Yield Performance of Pink Oyster Mushroom on Different Substrates

Tarun K. Mandaviya\*, Ashok B. Brahmbhatt and Rameela I. Chaudhari

*Department of Plant Pathology, B. A. College of Agriculture, Anand Agricultural University,  
Anand-388110, Gujarat (India)*

*\*Corresponding author*

### ABSTRACT

#### Keywords

Pink oyster,  
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Five substrates *viz.*, wheat straw, paddy straw, sorghum straw, maize straw, sugarcane bagasse and banana pseudo stem were evaluated for production of pink oyster mushroom. Four parameter related to growth *viz.*, No. of fruiting body, diameter of cap, length and thickness of stipe was measured. The results revealed that the highest number of fruiting body was found in wheat straw (31.00) followed by paddy straw (27.00). The stipe length of mushroom on different substrates ranged from 2.34 to 3.08 cm. The highest stipe length was observed in wheat straw (3.08 cm) whereas the lowest was observed in sugarcane bagasse (2.34 cm). Diameter of cap was also varied within substrates. The highest diameter of cap was recorded in wheat straw (9.90 cm) which was at par with paddy straw (9.70 cm). The highest thickness of stipe was found in sugarcane bagasse (6.53 cm) which was at par with wheat straw (6.21 cm). Different types of substrates significantly influenced the yield of mushroom. The highest yield obtained from wheat straw (213.20 g/kg) was superior among all substrates.

### Introduction

India is the second largest populous country in the world. Increasing in population creates an alarming situation in food problem in India. Malnutrition in terms of protein deficiency is one of the major factors responsible for high mortality and morbidity in this country and other developing countries of the world. Due to population explosion the problem of protein hunger will become more and more acute. Animal protein is beyond the reach of low income group which forms a large proportion of our population. Mushrooms, yeasts and

algal foods are frequently mentioned as alternative sources of protein. Out of these, mushrooms are the most preferred. In the present circumstances, popularizing mushroom as part and parcel of everyday food is a need of an hour. Mushroom cultivation has developed into a profitable industry in many countries of the world. Mushrooms offer vast rural employment potential. Mushrooms cultivation involves various technologies. In the instances where limited capital is available, methods that require simple equipments can be used. Most of these low cost methods, suitable for rural projects, are

labour-intensive and can provide employment both in semi-urban and rural areas. India is blessed with varied agro climate, abundance of agricultural wastes and man-power making it most suitable for the cultivation of all the types of temperate, tropical and sub-tropical mushrooms. It is estimated that about 355 million tones of agricultural waste are left out for burning and incorporating in the soil in manure form. If 1% of it is utilized to produce mushrooms, India will be a major mushroom producing country.

Under such circumstances, the present investigation has been undertaken to find out best substrates for growth and yield of pink oyster mushroom. In the recent times, the cultivation of *Pleurotus sp.* had excelled next to *Agaricusbisporus* (Lange) Sing. throughout the world in terms of yield and production (Erkel, 1992; Chang *et al.*, 1991). These studies mainly concentrated on the cultivation on agricultural wastes. Almost, all the available, lignocellulosic substances are likely to be used as substrate for *Pleurotus sp.* Cultivation with slight variation in the range and combination of the substrates in different parts of world based on their availability in abundant and being cheaper in the respective region (Royse, 1985; Schmidt, 1986). Most of these studies focused on the higher yield and quality of fruiting bodies of *Pleurotus sp.* with respect to cultivation times. The present study deals with the cultivation of pink oyster on some common and abundantly available waste available for conversion in food which otherwise is left for natural degradation. The cultivation of edible mushrooms offers one of the most feasible and economic method for the bioconversion of agro-lignocellulosic wastes (Bano *et al.*, 1993; Cohen *et al.*, 2002). The technology can also limit air pollution associated with burning agriculture wastes as well as to decrease environmental pollution due to unutilized agricultural wastes. The results of the various experiments pertaining

to the present investigations are discussed in this paper.

## **Materials and Methods**

All the mushroom growing processes were carried out in the Department of Plant Pathology, B. A. College of Agriculture, Anand Agricultural University, Anand.

## **Culture and cultivation**

The pure culture of pink oyster mushroom was obtained from Indian Institute of Horticultural Research, Bengaluru (Karnataka) and the culture was maintained in PDA during the course of investigation.

## **Spawn preparation**

Different types of grains were used for preparation of spawn *viz.*, wheat, sorghum and maize grains. For the preparation of spawn, grains were boiled in water for 20 min. and allowed to remain soaked in the hot water for about 20 minutes. Water drained off over a wire netting. On the same day, gypsum @ 1.32 g/100g and lime @ 2.5 g/100g on dry weight basis of grains were added and thoroughly mixed in boiled grain after cooling.

The treated grains were filled into glass bottles and autoclaved. Bottles filled with treated grains were sterilized in autoclave at 121.1°C with 15 kg/cm<sup>2</sup> for 2 hrs. The sterilized bottles were immediately transferred to isolation chamber and allowed to cool down over night. Next day, the bottles were inoculated with pure culture of mushroom. The inoculated bottles were incubated at 27 ± 1°C temperatures. The mycelial growth was observed up to 15 to 20 days after inoculation. Mother spawn bottles were kept in BOD incubator at 27 ± 2°C for further use.

### **Collection of different substrates**

Different substrates *viz.*, paddy straw, wheat straw, maize straw, sugarcane bagasse and sorghum straw were collected from the various localities of Anand and campus of AAU.

### **Substrates pre-treatment**

The chopped substrates were soaked in water to the extent that it contained 68 to 70 per cent moisture. The soaked substrates were chemically treated with bavistin 50% WP @10 g/10 liters water and 40% of formaldehyde solution (13.50 ml/10 liters of water) for a period of 24 hours. Treated substrates were put on a sieve for one hour for the removal of excess solution.

### **Spawning**

After squeezing of substrates they were filled in layer in autoclavable polythene bags (5 bags, 60 x 30 cm, and 80 gauge). Layer spawning were done @ 2 per cent weight of substrates. Bags were tied with strings. Small holes were made in bags for gaseous exchange and better aeration and were incubated in BOD incubator at  $25 \pm 1^\circ\text{C}$  temperatures with 75 to 85 per cent relative humidity.

### **Harvesting and preservation of mushroom**

The mature fruits were harvested before its margin started to fold inwards. The yield of mushroom was observed on different substrates. The harvested mushrooms were dried directly in sunlight. The dried mushrooms were stored in air tight sealed polythene bags (60 x 30 cm, and 80 gauge.) in dry and cool place.

### **Results and Discussion**

In the present study, results reveal the yield, No. of fruiting body, diameter of cap, length

of stipe and thickness of stipe of the pink oyster mushroom cultivated on different substrates. The results presented in Table 1 indicated that among all substrates, wheat straw was found to be the most suitable substrate for pink oyster mushroom as compared to other substrates.

### **Number of fruiting body**

Number of fruiting body were found highest in wheat straw (31.00) followed by paddy (27.00). Number of fruiting body in maize straw (21.00) and sorghum straw (19.00) was statistically at par with each other. Lowest number of fruiting body was observed in sugarcane bagasse (11.00). This result was also confirmed with results of Mondal *et al.*, (2010) who reported that the number of effective fruiting body ranged from 8.5 to 37.25.

### **Stipe length**

The stipe length of mushroom on different substrates ranged from 2.34 to 3.08 cm. The highest stipe length was observed in wheat straw (3.08 cm) which was at par with paddy straw (3.00 cm). Lowest stipe length was observed in sugarcane bagasse (2.34 cm). Similar results were obtained by Kharadi (2007) who reported that the stipe length of milky mushroom on different substrates ranged from 2.17 to 3.20 cm. The highest stipe length was observed in wheat straw (3.20 cm) followed by paddy straw (2.20 cm) which was at par with maize stalk (2.17 cm). The results are similar to that of Lalani (2005) who reported that the stipe length of mushroom on different substrates ranged from 2.16 to 3.22 cm. The highest stipe length was observed in paddy straw (3.22cm) which was at par with cotton stalks (3.18cm) followed by sugarcane bagasse (2.38cm) which was at par with wheat straw (2.26cm) and maize straw (2.16cm).

### Diameter of cap

Diameter of cap also varied within substrates. The highest diameter of cap were recorded in wheat straw (9.90 cm) which was statistically at par with paddy straw (9.70 cm). Lowest diameter of cap was found in sugarcane bagasse (7.21 cm). The results are in agreement with report of Mondal *et al.*, (2010).

### Thickness of stipe

Thickness of stipe is also an important parameter with respect to yield. The highest thickness of stipe was found in sugarcane bagasse (6.53 cm) which was statistically at par with wheat straw (6.21 cm). Lowest

thickness of stipe was found in maize straw (5.04 cm). Our finding is supported by Khan and Ali (1982) who reported that oyster mushrooms could be grown on most of the agricultural wastes of which sugarcane bagasse proved the best substrate for sporophore production.

### Yield

Different types of substrates influenced the yield of mushroom significantly. The highest yield was obtained from wheat straw (213.20 g/kg) which was superior among all substrates. Paddy straw gave second highest yield (161 g/kg) which was at par with maize straw (141 g/kg). Lowest yield was obtained from sugarcane bagasse (101.60 g/kg).

**Table.1** Effects of different substrates on growth of mushroom

Sr. No.	Substrates	No. of fruiting body	Length of stipe (cm)	Diameter of cap (cm)	Thickness of stipe (cm)	Yield (g/kg substrates)
1.	Wheat straw	31	3.08	9.90	6.21	213.20
2.	Paddy straw	27	3.00	9.70	5.99	161.00
3.	Maize straw	21	2.83	9.04	5.04	141.00
4.	Sorghum straw	19	2.52	8.66	5.43	140.00
5.	Sugarcane bagasse	11	2.34	7.21	6.53	101.60
	S Em ±	1.03	0.05	0.13	0.08	7.55
	CD @ 5%	3.03	0.14	0.37	0.25	22.27
	CV %	10.44	3.39	3.15	3.23	11.15

The result of the present experiment are in agreement with the findings of Kumari and Achal (2008) who found that the highest yield of *Pleurotus ostreatus* was recorded on wheat straw followed by the combination of paddy and wheat straw. Similar results were also found by Patil and Jadhav (1991) who tested different fourteen substrates separately and in three combinations of selected substrates for productivity. Among fourteen substrates, cotton stalk produced significantly higher yield followed by wheat and paddy straw. Sugar cane trash recorded the lowest yield.

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