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Spawned Casing vs Simple Casing

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Authors' contributions

This work was carried out in collaboration between both authors. Author Siddhant designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors Siddhant and OPU managed the analyses of the study. Author OPU managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Effect of spawned and simple casing on the biological efficiency of pink oyster mushroom *Pleurotus eous* was observed. The results exhibit that spawned casing not only takes lesser time for case run but also produces early primordial development. A positive response on mushroom biomass is also noticed in this technique.

Keywords: Simple casing; spawned casing; Pleurotus eous; yield; biological efficiency.

1. INTRODUCTION

The word 'casing' means covering of top of mushroom beds with a layer of soil [1]. Though the exact origin of this step in mushroom culture is not known, yet its use seems to have been more than two hundred year old. French were first to find it essential to cover compost with a casing layer, so as to stimulate vegetative mycelium phase to encourage fruit [2]. It regulates temperature and prevents quick drying of spawned compost. It also gives mechanical support to the mushroom sporophore. The spawned casing technique was developed in

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Ireland during 1960's and reported for the first time by [3] in which small quantity of fully run spawn/compost are added to casing medium before spreading it over the mushroom beds. This result in early pin head formation and increase the yield [4]. This practice is widely used for the cultivation of button mushroom where pin is developed due to nutritional stress provided by casing soil. However, it is not necessary for oyster mushroom cultivation where primordia develop and economic optimum yield can be obtained without using casing application. Present investigation is an attempt to determine the effect of spawned and simple casing on the biological efficiency of pink oyster mushroom *Pleurotus eous*.

2. MATERIALS AND METHODS

2.1 Mushroom Culture

The pure culture of *Pleurotus eous* was obtained from the Mushroom Section of Plant Pathology Department, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur (U.P.) India. It was maintained on Potato Dextrose Agar medium (peeled, sliced and boiled potato, 200 g; dextrose, 20 g; agar, 20 g l^{-1}) by using serial subculture method [5].

2.2 Spawn Strategy

2.2.1 Spawn substrate

Wheat grain (*Triticum aestivum*) was used as a spawn substrate which was purchased from the seed market of Faizabad. The spawn was prepared by the conventional method [5].

2.2.2 Spawn dose

Inoculation of substrate was made with spawn of *P. eous* @ 15% w/w on dry weight basis under aseptic conditions.

2.3 Substrate Preparation

The wheat straw substrate was collected during threshing of harvested wheat crop by avoiding pieces of leaf and leaf sheath [6]. It was soaked in fresh water. When excess water was drained off, it was then pasteurized in the solution of Formaldehyde (500 ppm) and Bavistin (75 ppm) for 18 hours as suggested by [7].

2.4 Method of Cultivation

Plastic bag technology was employed in this experiment. The beds were prepared from pasteurized substrate by multilayered (3) spawning following the procedure adopted by [8]. In this method, the wheat straw was placed at the bottom of polythene bag. Later, a layer of mushroom spawn was sprinkled. In the same way, four layers of straw and three layer of spawn were kept in the polythene bag. The mouth of bags was then tightened with fibre thread. The treatments were replicated thrice. These bags were incubated in cultivation room at 22-30℃ temperature for spawn run. Completely colonized substrate was cased with casing material. Watering was done at regular interval to maintain moisture.

2.5 Casing Practise

2.5.1 Casing soil preparation

Farm yard manure and loam soil (1:1) were used as casing materials, which were collected from the village Madarahiya. These were properly mixed to a uniform texture. The pH of mixture was adjusted at 7.0-7.5 by addition of $CaCO_3$. It was then treated with 2% formaldehyde solution and covered with the polythene sheet for next 72 hours. After this period, the mixture was uncovered to remove the extra trace of formaldehyde. It was then spread, collected and store for use.

2.5.2 Casing application

Casing was applied on fully spawned run substrate. It was achieved by following ways.

(1) **Simple casing:** In this method, the mouth of bag was opened after completion of spawn run which was then covered with 1-1.25" thick layer of sterilized casing material.
(2) **Spawned casing:** This was done by the method suggested by [3]. In this method, spawn was mixed to the casing soil @ 0.1% (w/w) at the time of casing.

2.6 Concerning Data

2.6.1 Data regarding mushroom development and yield parameters

It included time lapsed in spawn and case run, fruit body initiation and maturation, number of flushes, total yield, biological efficiency and

percent increase over control. The biological efficiency of mushroom was worked out as percentage yield of fresh mushroom in relation to dry weight of the substrate as suggested by [9].

2.6.2 Statistical analysis

Completely Randomized Design (CRD) was followed for the experiment. The data were statistically analysed by using the analysis of veriance (ANOVA) at p= 5%. The critical difference (CD) was worked out at five per cent probability level.

3. RESULTS

3.1 Mushroom Development

All the sets took equal time (16 Days) for substrate colonization from the date of spawning. Once beds were fully covered with mushroom mycelium, casing was applied. Spawned casing seems to be significant in terms of early case run. It took least time (20 Days) as compare to simple casing (22 Days). Visual observations regarding mycelia characters also indicated that there was a compact mycelia growth with dense strand in case of spawned casing. Results also indicated that spawned casing produced early sporophore production in comparison to simple casing (Table 1).

3.2 Mushroom Yield

The crop of mushroom was harvested in three flushes where yield and biological efficiency ranged 344-354 gm, 68.8-70.8% in both the casing techniques. Among them, spawned casing gave higher yield and biological efficiency (354 gm; 70.8%) over simple casing (344 gm; 68.8%), although, statistically both the casing techniques were at par to each other, but if choice is to be made between these, the spawned casing was preferred over simple casing due to early case run and primordial development along with positive response on mushroom biomass. The percent increase in yield was also noticed in spawned cased beds (Table 1).

Table 1. Effect of simple and spawned casing on various parameters of mushroom production

Casing	Spawn run (days)	Case run (days)	Fruit body initiation (days)	First harvest (days)	Total yield from three flushes (gm/500 gm dry substrate)	Biological efficiency (%)	% increase over control
Spawned casing	16	20	22	25	354	70.8	+2.90
Simple casing	16	22	25	28	344	68.8	0.0
SE	-	0.52	-	-	4.86	0.97	-
CD (P=0.05)	-	1.46	-	-	13.51	2.70	-

Average of three replications

A) Spawned casing **B) Simple casing**

Plate 1. Effect of casing techniques on cropping of *Pleurotus eous*

4. DISCUSSION

In our investigation, spawned casing produced early sporophore production in comparison to simple casing. It was due to evenly distributed inoculums in casing which equalized the mycelial growth thorough out the casing [10] and ensured all the mycelium on the bed surface at the same stage of development and had equal access to nutrients in the substrate [11] resulted early case run and pin head formation in spawned casing [4]. [12] suggested that specific bacterial populations in the casing layer play an important role in the formation of primordia and the development of basidiome in *P. ostreatus*. It is well established that casing in mushroom cultivation has been principally associated with aiding the change from the vegetative phase (mycelium) to a reproductive one e.g. fruiting [13]. In present investigation, spawned casing produced higher mushroom biomass. Similar observation has been made by [14,15,16] and [17] who reported higher yield of oyster mushroom from cased substrate.

5. CONCLUSION

Pleurotus eous is one of the edible mushrooms that can be cultivated throughout the seasons in different climatic zones of India except arid and semi-arid regions. Simple cultivation technology, low capital input, attractive fruit-bodies and long shelf life are some of the qualities which makes it a better choice for mushroom growers and also consumers. The spawned casing results early commencement of this mushroom which simplifies the management of pre-fruiting period. This technique has also a potential of increasing the biological efficiency of mushroom and to get early crop over simple casing.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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