International Journal of Current Science Research
www.drbgrpublications.in

IP Indexing - Impact factor – 3.5

Volume: 3; Issue: 11; November-2017; pp 1452-1457. ISSN: 2454-5422

# Effect of waste tea leaf and slake lime in casing mixture on yield of white button mushroom [*Agaricus bisporus* (Lange) Imbach]

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## Abstract

Three casing formulation i.e. GLS + FYM (2:1), GLS + FYM + waste tea leaves (2:1:1) and GLS + FYM + slake lime (2:1:1) based materials were used for evaluating the effect of different casing mixture on number of days required for complete mycelium colonisation, fresh weight, number of fruiting body per bag, biological efficiency and cost benefit ratio of *Agaricus bisporus*. According to results, casing mixture combination GLS + FYM + waste tea leaves steadily found best in all the parameters the minimum number of days required for complete colonisation recorded 17.62, fresh weight 0.94 kg per bag, number of fruiting body per bag 83.25, biological efficiency 18.21 and cost benefit ratio 1:2.08 respectively. The best mushroom yield and maximum number of time fresh flesh of mushroom were harvested from casing mixture consist with waste tea leaves as casing material.

**Keywords**: *Agaricus bisporus*, waste tea leaves, slake lime and yield.

## Introduction

Fungi are eukaryotic, achlorophyllous, nucleated, shade loving, gametophytic, haploid, heterotrophic, nonvascular, spore producing, cryptogrammic, thallophytic plant which are surrounded by cell wall containing chitin. They do not use carbon - dioxide as their carbon source and hence depend on external sources for organic carbon (Adejumo and Awosanya, 2005). Fungi range from simple form like thread to complex forms like

mushrooms. The cultivation of white button mushroom was first introduced into Paris (France) around 700A.D. by an unknown French Horticulturist in open. Towards the end of the 17th century, some workers evolved a method of treating house manure and planting it with the spawn of wild mushroom. However, Tournefort, a Frenchman, gave the first method of cultivation. This method of cultivation is more or less similar to the one in practice in some countries (Kapoor, 2004). Mushroom cultivation mainly depends on the agriculture crop residues. These crop resides are abundantly available in our country. Out of 2000 edible fleshy fungi (mushroom) known worldwide, about 300 species belonging to 70 genera have been reported from India. Five genera of mushroom viz; *Agaricus* sp., *Lentinula* sp., *Calocybe*sp., *Pleurotus* sp., and *Auricularia* sp. contribute about 85% of the total world production during 2012 (Anonymous, 2013). However, button mushroom (*Agaricus bisporus*) is the most popular mushroom commercially cultivated all over the world.

Compost for the production of white button mushroom (*A. bisporus)* is prepared from wheat straw, straw- bedded horse manure, chicken manure and gypsum. It is prepared from a mixture of organic materials subjected to a composting process for making it selective for growth of *A. bisporus.* Casing soil plays an important role in the cultivation of *A. bisporus.* Although many different materials may adequately function as a casinglayer, peat is generally used and recommended as a good casing medium. This is because of its unique waterholding and structural properties makes it widely accepted as ideal for the purposes of casing (Cloak *et al.*, 2007). In the commercial cultivation of mushrooms, compost colonized with mushroom mycelium is covered with a 3-5 cm thick casing layer to initiate the development of sporophores. The main function of casing layer is the production of mushrooms in quantity. Casing layer, which is nutritionally deficient medium brings about important morphological changes from transition of vegetative growth to fruiting stage. Casing is generally done to make a surface where uniform fruitification can take place and to provide anchorage and essential reserves for developing sporophores of mushrooms (Shandilya, 2002).

Mushroom cultivation can be one of the important live hood options for rural masses, unemployed youths, landless farmers and women. The mushroom cultivation uses agro-waste efficiently and converts it into quality food, imparts environmental sustainability and helps in socio-economic upliftment of the common people (Anonymous, 2013). The aim of this

study was to evaluate the effect of two different urban waste material in association with casing materials on yield, number of fresh harvested fruiting bodies of white button mushroom.

## Materials and Methods

The process of compost preparation is called composting. It is defined as indefinite microbial degradation of organic waste. During composting, distinct changes occur in the physical, chemical and biological characteristics of the straw, all of which influence the productivity of *A. bisporus* subsequently. Compost was prepared by long method which took approximately 28-30 days (Mantel *et al.*, 1972). We used wheat straw for preparation of compost. Chemical composition of wheat straw Nitrogen 0.43%, Phosphorus 0.17% Ash 0.19% and water holding capacity is 100% (Binit *et al*., 2017).

## Sterilization of Mushroom Crop Room

Crop room was properly washed with water and coated with calcium carbonate ($CaCO_3$). After coating 2% concentration of fungicide (Bavistin) and insecticide (Carbofuran) were sprayed, and left the crop room for 2 hours. It was thensterilized by spray of 2% formalin and crop room was left for 2 days (Aneja, 2004).

The effect of casing materials on the growth and yield of *A. bisporus* was studied with three treatments including control which were replicated eight times and crop was placed in mushroom crop room according to Completely Randomised Designs (CRD). Bags were filled with 7 kg of compost. Following treatments combination of casing materials Garden loam soil (GLS) + Farm yard manure (FYM) (2:1), GLS + FYM + Waste tea leaves (2:1:1), GLS + FYM + Slake lime (2:1:1) were tested for yield and fresh bodies of *A. bisporus*.

**Table 1.1 Treatment combinations**

| | |
|---|---|
| $T_0$ | Garden loam soil (GLS) + Farm yard manure (FYM) (2:1) |
| $T_1$ | GLS + FYM + Waste tea leaves (2:1:1) |
| $T_2$ | GLS + FYM + Slake lime (2:1:1) |

## Care after casing

Temperature of mushroom room was monitored at $20\pm2^0$C for a week until the mushroom mycelium run was completed in the casing layer. Mushroom bags were covered with

sterilized newspaper, and light sprinkling of water was given 2-3 times in a day for wetting casing layer (Y. Mami *et al.*, 2013).

**Fig 1: Mycelium runs**

## Harvesting

Harvesting of mushroom started after 40-45 days of spawning. The fruiting bodies were harvested before gill opened and cap expanded. It was done by twisting the mushroom cap gently between thumb and finger, so that it was pulled without leaving any stub and disturbingother fruit bodies. The baseof stipe found within the straw, was removed by cutting off with sharp knife or sharp blade. The mushrooms were harvested after every 3-4 days from each treatment and yield data was recorded. The harvested mushrooms were stored in cool place (refrigerator) at 10-12$^0$Cfor 48 hours.

## Results and Discussion

**Table 1.2 : Effect of different casing materials on number of days required for mycelium run and initiation of pin head on casing layer**

| S. No. | Treatment combinations | AD | FW | NFB | BE | B:C |
|---|---|---|---|---|---|---|
| $T_0$ | Control (Garden loam soil + Farm yard manures) (2:1) water spray | 25.00 | 0.30 | 14.50 | 5.86 | 1:1.62 |
| $T_1$ | Garden loam soil (GLS) + Farm Yard Manures (FYM) + Vermi-compost (VC) (2:1:1) | **17.62** | **0.94** | **83.25** | **18.21** | **1:2.08** |
| $T_2$ | Garden loam soil (GLS)+ Farm Yard Manures (FYM) + slake lime (2:1:1) | 22.25 | 0.61 | 45.87 | 11.87 | 1:2.07 |

**AD: Avg Days, FW: Fresh Weight, NFB: Number of Fruiting body per bag, BE: Biological efficiency, B: C: Cost Benefit ratio.**

Mushroom bags were completely colonized by mushroom mycelium within (20 days) and then covered by different casing soil for following observation of growth stages. Data pertaining to the initiation of pin heads presented inTable.1.2 revealed that time taken for initiation of pin heads. The casing mixture of GLS + FYM was taken maximum time (i.e. 25 days) for initiation of pin heads and GLS + FYM + VC taken minimum time period (i.e. 17.62 days) for initiation of pin heads. These casing mixtures deferred non-significantly among themselves. The casing mixture GLS + FYM + VC was taken minimum time (i.e. 35.67 days) for harvesting of first flush and maximum time (i.e. 44.67 days) by application of GLS + FYM. The performance of casing GLS + FYM +VC was better than other casingmixture. The crop period was observed maximum (i.e. 85.66 days) with application of GLS + FYM + VC and GLS + FYM where it took (95.66 days) whereas, the crop period was minimum (i.e. 90.33 days) with application of GLS + FYM + Slake lime casing mixture. It is evident from the Table 1.2 that the highest yield of first flush obtained from the casing mixture of GLS + FYM + VC (i.e. 0.94g) followed by GLS + FYM + Slake Lime and GLS + FYM (i.e. 0.61and 0.30g) respectively. The casing mixture GLS + FYM, GLS + FYM +VC and GLS + FYM+ Slake lime showed the significant difference.This finding confirm with the result of Dhār (2006) were used eight commonly available casing materials in India, FYM, VC, and slake lime to identify the suitable casing materials for use in button mushroom cultivation. Result as early pinning and significantly higher number of fruit bodies and total yield. This result also conforms to the findings of Pardo 2004 and Singh (2000) evaluated different casing materials for the cultivation of button mushroom. Jarial and Shandilya (2005) also proved that municipal waste based vermi compost (HWBV) in combination with other casing materials was evaluated as a casing substrate for, In view of the summarized experimental findings, it may be concluded that, all the casing materials were evaluated for their effect on grown parameters and yield.

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