



CULTIVATION OF MILKY MUSHROOM (*CALOCYBE INDICA*) ON WOOD SHAVINGS

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ABSTRACT *Calocybe indica* is robust, fleshy, milky white in colour and umbrella like mushroom. This mushroom is suitable for the humid climate and can be cultivated indoor in high temperature and humidity areas. Wood Shaving was selected for the cultivation of milky mushroom in 5% spawn run rate. A temperature range of 30 - 32 °C, relative humidity of 85% and photo period of 8 h were maintained in the cropping room. The mycelial invasion of the whole substrate was seen within 13 days. The first harvest took place after 10 days of spawning with the piles of 5.4cm width and stipe length of 8.9cm. The bioconversion efficiency (BE) on wood shaving was found to be 62.5%. It is found that wood shavings have sufficient nutrients which support the growth of this mushroom.

KEYWORDS : *Calocybe indica*, wood shaving, bioconversion efficiency

Introduction

Milky mushroom (*Calocybe indica*) is a tropical edible fungus and ranked third among commercially grown mushrooms in India after button and oyster. It has been cultivated in Karnataka, Tamilnadu and Andhra Pradesh on a large scale (Krishnamoorthy A.S., 2003). In recent times, it has gained a great demand due to robust, fleshy and milky white sporophore. It provides the people with an additional vegetable option enriched with high quality proteins, minerals, lipids, dietary fibre, carbohydrate are abundant essential amino acids and vitamins which can be of direct benefit to the human health and fitness (Alam *et al.*, 2008).

The *Calocybe indica* APK 2 variety are grown and cultivated in subtropical and high altitude zones of South Asian countries like India. It grows well at room temperature (30°C- 32°C) and can be cultivated even on unfermented materials (Mary Josephine and B.Sahana, 2014). The cultivation process of Milky Mushroom resembles oyster mushrooms but includes an additional process of casing. The mushroom can be harvested within 30-34 days after spawning. The advantages of this mushroom over other mushrooms are easy method of cultivation, less investment, very attractive fruiting body, pleasing milk white colour, long shelf life, more nutritious and less time to grow (Bokaria *et al.*, 2014). Uncomposed substrates like paddy straw, wheat straw, soy bean straw, sugarcane baggase, cotton waste and coconut coir pith are the commonly used for the cultivation of Mushroom (Doshi *et al.*, 1989). The present research deals with the yield and rate of biological efficiency with suitable wood shavings as substrates and the appropriate thickness of casing materials for the cultivation of *Calocybe indica*.

Materials and Methods

Substrate Preparation

Wood shavings are used as the substrate for the cultivation of Milky Mushroom. The substrates are soaked in fresh water for 24 h. Excess water was drained and subsequently the wet substrate was filled in Polypropylene bags for autoclaving.

Mushroom Bed Preparation

Polypropylene bags of 29 × 17.5 cm size and 100 gauge thicknesses are used for filling 200 g (dry weight basis) of wood shave substrate. Layer method of spawning was carried out at the rate of 5%. Filled bags were incubated at 30 to 32°C and relative humidity 85% under dark condition in cropping room for spawn run.

Preparation of Casing Soil

Casing process was carried out after 10 – 12 days when the substrates were fully colonized. Red soil was used for this purpose. The soil was collected, sieves and pH adjusted to 7.5 – 8.0 by using calcium carbonate. The moisture content of the soil was adjusted to 40% by gravimetric method followed by autoclaving at 121 °C for 30 min. Casing was done by the addition of sterilized red soil (about 2 cm

height) uniformly on the top of the spawn run bags. Cased bags were kept in cropping / growth room for incubation. The temperatures of 30 - 32°C with relative humidity of 85% were maintained under light with photo period of 8 h cycle.

Yield and Biological Efficiency

The fruiting bodies harvested from polypropylene bags were recorded as total yield of mushroom. The biological efficiency (B.E) was calculated by the formula given by Chang *et al.*, (1999). Biological Efficiency is ratio of fresh milky mushroom harvested (g) per dry substrate (g) and expressed as percentage.

$$B.E = \frac{\text{Fresh Weight of the Mushroom}}{\text{Dry Weight of the substrate}} \times 100$$

Data Analysis

Results were analysed by calculating the mean days require for each spawn run events obtained from three replications consisting of triplicates. The experiment was carried out twice to get consistent observations.

Results and Discussion

Mycelial Growth and Casing on Wood Shavings

Spread of mycelia invasion was observed within 3 days (60 h) of spawning on the substrate. Complete mycelial spread in the substrate was noticed within 13 days. After sufficient spawn run, casing was done with red soil. The casing soil was free from pre – decomposed vegetative matter and the pH adjusted from neutral to alkaline with high water holding capacity, enough pore space, stable structure, low in soluble salts and electrical conductivity for better production. Bokaria *et al.*, (2014) reported that, cylindrical polythene bag beds of 15 × 30 cm size were found useful for commercial cultivation of milky mushroom. Clay loam soil (pH 8.4) was found to be the best casing soil which recorded 388.0 g for mushrooms per bed. Incubating the beds after casing in a partially sunken 3 feet deep polythene chamber lined with high density sky blue coloured polythene sheet as roofing material was found to be effective.

Milky Mushroom fruiting bodies maturation

The experimental bag took 6 – 10 days from primordial formation to mushroom fruit body after spawning (Fig – 1). The first harvest was done after 10 days of spawning which have the piles breadth of 5.4 cm and stipe length of 8.9 cm (Table – 1 & Fig - 2). The joint of stalk and pileus of milky mushroom induced significantly higher yield (711.3 g, 71.1 % BE), within 15 days, highest number of fruiting bodies (6) , quickest primordial initiation (30 days) and higher pileus : stipe ratio (Pani, 2016). Josephine and Sahana (2014) reported that in paddy straw substrates, milky mushroom took 14days for spawn run, 7days for pin head formation, 7days for first harvest and harvested 500gms yield/1500gm substrate. Bokaria *et al.*, (2014) reported that commercial production techniques for Milky mushroom, *Calocybe*

indica recorded yield of 356.5 to 375.0 g of mushrooms per 250 g of paddy straw (dry weight) which accounts to 142.6 to 150.0% bioefficiency.

Bioconversion Efficiency of Milky Mushroom

The bioconversion efficiency of Milky Mushroom on wood shavings was found to be 62.5% (Table – 2). The maximum biological efficiency of *Calocybe indica* was found in the cow dung & loamy soil (3cm thick) and the rice straw was the best substrate for the commercial cultivation of milky mushroom (Mary Josephine and Sahana, 2014). Commercial production techniques for milky mushroom *Calocybe indica* yielded 350.5 to 375.0g of mushrooms per 250 g of paddy straw (dry weight) accounting to 142.6 to 150.0% bioefficiency. Substrates like maize stalks, sorghum stalks, vetiver grass and straw were also found to be suitable for growing *Calocybe indica* (Bokaria *et al.*,2014). Pani (2016) found the maximum production of milky mushroom (703.3 g) with biological efficiency of 70.3 % from the spawn raised from the fruiting body consisting of stipe with a well differentiated pileus followed by matured stage (672.6 g, 67.2 % BE). Young fruiting body having stipe with small pileus sustained significantly lower yield of mushroom (414.6 g, 41.4 % BE). The biological efficiency of different substrates ranged from 51.57 – 146.3%. The highest biological efficiency (146.3%) was observed on wheat straw followed by paddy straw (132.4%). Soybean straw, coconut coir pith and cotton waste were found to be having 126.1%, 108.7% and 92.07% BE respectively.

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Table – 1 Growth of Milky Mushroom fruiting bodies

S. No	Substrate	Days for Spawn run 100%	Days for Pin Head Formation	Days for 1 st Harvest	Pileus width (cm)	Stipe length (cm)
1	Wood Shavings	13.5	7	10	5.4	8.9

Table – 2 Total yield and Bio conversion efficiency of Milky Mushroom and Wood chips

Flushes (grams)			Total	B.E. in %
1 st	2 nd	3 rd		
55	40	30	125	62.5 %

Figure – 1 Pin Head formation of *Calocybe indica* on wood shavings after casing



Figure – 2 Milky Mushroom (*Calocybe indica*) fruiting body maturation



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