

Evaluation of casing materials on productivity of milky mushroom (*Calocybe indica* P&C)

Niranjan Chinara* and Shyam Sundar Mahapatra

¹Department of Plant Pathology, OUAT, Bhubaneswar-751 003, Odisha, India

*Corresponding author, Email: niranjanchinara@gmail.com

ABSTRACT

Milky mushroom (*Calocybe indica* P&C) is one of the important edible mushrooms cultivated in India. Its robust, fleshy, attractive colour with excellent keeping quality has made it popular among the edible mushrooms in recent times. Hot and humid climate in coastal regions of India favours its large-scale cultivation. However, this mushroom has not yet been cultivated commercially in the state of Odisha. Different lignocellulosic materials are being used for production of milky mushroom but casing materials is used to induce the initiation of fruiting bodies, provide physical support and moisture to the mushroom. Therefore, eight different combination of casing materials were evaluated for productivity of milky mushroom in the Centre of Tropical Mushroom Research and Training, Odisha University of Agriculture and Technology, Bhubaneswar during the year 2018-19. From the result, maximum yield per bag 1146.7g with a biological efficiency of 76.5% was observed using loam soil+FYM (1:1) as casing material followed by vermin compost (1123.3g/bag). But, the bags with coir pith resulted lowest production (646.7g) against control without casing materials (873.3g).

Key words: Milky mushroom, *Calocybe indica*, casing soil

The world population is increasing at a phenomenal rate and as per United Nations estimates it is expected that by 2050, this may reach 9.8 billion and during 2100 it could be 11.2 billion. This will lead for requirement of sufficient extra food along with nutritionally rich food supplement to feed the population and taking care of human health issues. As a result of continuously increasing population, extra pressure is going to mount on natural resources such as arable land, potable water and environment. Converting lignocellulosic residues into protein-rich mushrooms is economically viable and sustainable processes to meet world food demand, especially protein demand. Edible mushrooms are in the human diet since time immemorial. India has subtropical to tropical climate in most of its part and growing

temperate mushroom such as button mushroom requires high energy inputs.

Milky mushroom (*Calocybe indica* P&C) is one of the important tropical edible mushrooms occurs in nature on humus rich soil during rainy season in tropical regions. It is popular among all the edible mushrooms because of attractive colour, ability to grow on a wide range of agricultural wastes, high conversion rate as well as good keeping quality. Besides, paddy straw, it can be grown in different agro-wastes such as wheat straw, niger stick, sugarcane bagasse and maize stalk etc. It grows well in higher range of temperature (30-35°C) with more than 85% humidity. The cultivation process has similarity with oyster mushroom with additional

EVALUATION OF CASING MATERIALS ON PRODUCTIVITY OF MILKY MUSHROOM

application of casing material, which provides physical support to hold mushroom vertically straight on the substrate along with supply of required water for fruiting and exchange of gases from the substrate. However, casing materials also induce initiation of fruiting bodies on the substrates. Although, milky mushroom can also fruit in absence of casing material but the biological efficiency is reduced without casing. Therefore, an attempt was taken to evaluate the combination of different casing materials on the productivity of milky mushroom.

MATERIALS AND METHODS

The experiment was carried out in Centre of Tropical Mushroom Research and Training, Odisha University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha. The locally collected milky mushroom strain (OCI 04) was used as test fungus during the whole period of investigation. The mother spawn of milky mushroom was prepared from pure culture of the strain using wheat grains as substrate. The 15 days old mother spawn was used for the cultivation of milky mushroom. For preparation of milky mushroom bags more than 3 months old, dry paddy straw were chopped into 2-4cm size, soaked in clean water for six hours and excess water was drained. The soaked substrate was pasteurised by means of hot water and dried under shade to maintain substrate moisture about 50-55 %. About 1.5 kg wet substrate was filled in a polythene bag with 10 % spawn applied in layer method on dry weight basis. About 10-20 small holes were made in all sides of the bag for exchange of gases. The prepared bags were then incubated in dark room at a temperature of 30-35°C for spawn run. Later the colonised bags were transferred to cropping room for application of casing soil. To observe the effect of casing materials on milky mushroom seven different combination of materials viz. FYM, vermin-compost, coir pith, sand, loam soil and FYM were evaluated. The combinations were (i) Loam + sand (3:1); (ii) FYM; (iii) Vermin compost; (iv) Coir pith; (v) Loam + FYM (1:1); (vi)

Sand; (vii) Loam soil. The milky mushroom bags without any casing material treated as control. All the above casing materials were sterilised in autoclave at 15 psi for one hour before application. The sterilised casing materials were applied to the depth of 2-3 cm on the fully colonised substrates. The observation on days to pin head formation, number of mushrooms, yield per bag and biological efficiency were recorded and analysed in Randomized Block Design. Biological efficiency of mushroom was calculated using following formula.

$$\text{Biological efficiency (\%)} = \frac{\text{Yield of fresh mushroom (g)}}{\text{Total weight of dry substrate (g)}} \times 100$$

RESULTS AND DISCUSSION

Data presented in Table 1 indicated early pin head formation (29.6 d) in the bags applied with Loam soil + FYM (1:1) as casing material being at par with that of vermin compost and Loam + sand (3:1). Similar trend was also observed in case of days to first harvest. Maximum yield per bag was 1146.7 g was observed in case of Loam + FYM (1:1), which was at par with vermin compost, FYM and loam + sand (3:1). The bags applied with coir pith produced lowest yield (646.7g/bag) even below the bags without application of casing material (873.3 g). Highest number of mushroom fruit bodies (10.3) was observed in the bags applied with Loam + FYM (1:1) and vermin compost. Lowest number of mushrooms per bag (5.9) was recorded from bags applied with coir pith being at par with that of loam soil (6.7).

Application of casing materials not only helps physical support to the milky mushroom in the bags but also induces the sporophore formation. The production of milky mushroom from the treatment of loam + FYM (1:1) in present study corroborate with the result of Tandon and Sharma (2006) and Amin (2010). Smerdon (1983) advocated that casing material should have high water holding capacity with

Table 1. Evaluation of casing materials on productivity of milky mushroom (*Calocybe indica*)

Casing materials	Days to pin head initiation	Days to 1 st harvest	BE (%)	Average numbers of fruit bodies / bag	Yield (g) / 1.5 kg dry straw
Loam: sand (3:1)	30.5	41.1	73.3	10.1	1100.0
FYM	31.0	42.2	70.2	9.7	1053.3
Vermicompost	30.2	40.3	74.9	10.3	1123.3
Coir pith	35.5	46.3	43.1	5.9	646.7
Loam: FYM (1:1)	29.6	40.2	76.5	10.3	1146.7
Sand	33.8	44.3	62.4	8.5	936.7
Loam soil	36.3	47.2	49.6	6.7	743.3
No casing	34.2	44.7	58.2	7.9	873.3
SE(m) \pm	0.4	0.3	2.2	0.3	32.8
CD (0.05)	1.0	1.0	6.2	0.9	93.5

facilitation for gas exchange and should have neutral pH. Similarly, Krishnamoorthy and Venkatesh (2015) evaluated partially steamed clay loam soil with pH of 8.4 maximised the yield than peat soil, sand, biogas slurry, FYM and coir pith. Moreover, sandy soil and FYM delayed the pinhead formation, which supports the present result. Chinara and Mahapatra (2020) observed poor growth of *Calocybe indica* mycelium in coir pith as compared to other substrates and for that reason the same may have influenced the production of mushroom in present study. From this study, it may be concluded that fresh coir pith delays the growth of *Calocybe indica*. Pani (2012) observed gradual reduction of number of fruiting bodies and productivity by delaying of casing soil application. Sassine *et al.* (2005) reported that the casing materials should be loose to facilitate the penetration of primordia from the bottom to the top of the casing layer. Tandon and Sharma (2006) reported loam soil as casing material delayed the pin head formation, which was also reflected in the recent experiment.

Fine particles of casing materials do not allow exchange of gas and reduce the formation of fruiting bodies in *Calocybe indica*. In same manner mushrooms appear in the radial / peripheral region of bags with application of fine and compact soil texture.

Therefore, the casing materials should have ideal water holding capacity and porous with neutral pH.

ACKNOWLEDGEMENT

The support rendered by the Department of Plant Pathology, OUAT, Bhubaneswar-751 003 during the research period is highly acknowledged.

REFERENCES

1. Amin, R., A. Khair, N. Alam, and T.S. Lee. 2010. Effect of different substrates and casing materials on the growth and yield of *Calocybe indica*. *Mycobiology* **38** (2): 97-101.
2. Chinara, N and S.S. Mahapatra.2020. Evaluation of Different Substrates for Production of Milky Mushroom (*Calocybe indica* P&C) in Odisha. *International Journal of Current Microbiology and Applied Science* **9**(6): 3195-3200.
3. Krishnamoorthy, A. S and B. Venkatesh. 2015. A comprehensive review of tropical milky mushroom (*Calocybe indica* P&C). *Mycobiology* **43**(3):184-194.
4. Pani, B.K. 2012.Sporophore production of Milky mushroom (*Calocybe indica*) as

EVALUATION OF CASING MATERIALS ON PRODUCTIVITY OF MILKY MUSHROOM

- influenced by depth and time of casing. *International Journal of Advanced Biological Research* **2(1)**:168-170.
5. Sassine, Y.N., Ghora, Y., Kharrat, M., Bohme, M., Abdel-Mawgoud, A.M.R. 2005. Waste paper as an alternative for casing soil in mushroom (*Agaricus bisporus*) production. *Journal of Applied Science and Research* **1**:277-284.
 6. Smerdon M. 1983. Thoughts on casing. *Mushroom Journal* **12(4)**:193-194.
 7. Tandon G and V.P. Sharma. 2006. Yield performance of *Calocybe indica* on various substrates and supplements, *Mushroom Research* **15**: 33-35.