



Yield Performance of Different Strains of Milky Mushroom (*Calocybe indica*)

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ABSTRACT

The present investigation was conducted to study the yield performance different strains of milky mushroom at the Department of Plant Pathology, Agricultural College and Research Institute Madurai. The strains of *Calocybe indica* viz. CI-1, CI-2, CI-3 and CI-4 were isolated from the dead woods of *Cocos nucifera*, *Borassus flabellifer* and *Tamarindus indicus* from different places of Tamil Nadu and *Calocybe indica* (var. APK-2) were obtained from TNAU, Madurai. Five strains viz. CI-1, CI-2, CI-3, CI-4 and (var. APK-2) were tested for the yield performance under Madurai conditions. Among these strain CI-3 recorded the minimum days for completion of spawn run 13 days, maximum diameter (13.6 cm) of pileus, highest stipe length (16.25 cm) and the maximum yield of 675.15 g/bed followed by APK-2. The lowest yield related parameter was observed in the strain CI-4.

Key words: *Calocybe indica*, Yield, Performance, Strains, Bio-efficiency

Mushroom have been treated as a special food item. Greeks believed mushroom as a providing strength for warriors the pharaohs prized them a delicacy and the romans called them food for god. The Chinese named as Elixir of life. Mushrooms were initially collected from the wild habitat. But now it's being cultivated under controlled environmental condition (Kaur *et al.* 2011). Presently button and oyster mushrooms were commercially attractive, cultivated in the tropical and sub-tropical regions of India. The oyster mushrooms can be easily grown under natural condition whereas button mushrooms require controlled conditions. Huge inputs are required to provide ideal condition for cultivation such as cool condition to button mushrooms. Therefore, button mushroom cultivation is beyond the reach of ordinary farmers. The milky mushrooms require 25 - 35°C temperature. In subtropical region of India, ample quantity of agricultural wastes are available and temperature of 28 - 35°C is prevalent for about

4 - 5 months. It serves as means of generating employment, particularly for rural women and youths in order to raise their social status. Hence this present investigation was carried out to know the yield efficiency of different strains of milky mushroom under Madurai condition.

MATERIALS AND METHODS

Four strains of *Calocybe indica* were collected from different geographical locations of Tamil Nadu. Milky mushroom cultures viz. *Calocybe indica* (var. APK-2) were obtained from Agricultural College and Research Institute (TNAU), Madurai for the present study.

Isolation and purification

Different strains of milky mushroom fungi were isolated by making a cut at the junction of pileus and stipe from the freshly harvested sporophore. The tissue bits were collected and surface sterilized with 95 percent ethyl alcohol

for two min and subsequently washed thrice in the sterile distilled water. The tissue bits were placed at the center of the Petridish containing potato dextrose agar medium (PDA). The plates were incubated at room temperature for seven days. After incubation, the mycelial mat radiating from the tissue bit was taken at its end and transferred to PDA slants. Then these cultures were purified by single hyphal tip method as described by Rangaswamy *et al.* (1975). The PDA slants containing pure culture were maintained as stock cultures at 4°C with periodic transfer throughout the period of study. Four strains of milky mushroom designated as CI-1, CI-2, CI-3 and CI-4. The pure culture of *Calocybe indica* were represented as APK-2 for experimental work.

Preparation of mother spawn

Sorghum grain spawn was prepared using the isolated cultures of different strains of milky mushroom viz. CI-1, CI-2, CI-3, CI-4 and var. APK-2 by adopting the method described by Sivaprakasam (1980). Paddy chaffy grains were partially cooked with water for 40 mins. After cooking, drain the excess water, the grains were mixed with calcium carbonate at two per cent (to prevent adhesion of grains and for optimizing pH for the spawn running of the mushroom); filled up to third- fourth volume of poly propylene bags (30 × 12 cm: 200 gauge thickness) and tightly plugged with non-absorbent cotton wool, wrapped the mouth and sterilized at 1.5 Kg/cm² for two h. The poly propylene bags with sorghum grains were inoculated with pure cultures of nine mm mycelial disc of the strains of milky mushroom and incubated at room temperature (30±2°C) for 21 days. The nature of growth and the time taken for complete colonization in the spawn bags were recorded. Three replications were maintained for each strains of milky mushroom.

Preparation of bed spawn

Sorghum grains were partially cooked with water for 40 mins. After draining the excess water, the grains were mixed with calcium carbonate at two per cent (to prevent adhesion of grain and for optimizing pH for the spawn running of the mushroom); filled up to third-fourth volume of heat resistant polypropylene bags (30 × 12 cm; 200gauge thickness) and tightly plugged with non-absorbent cotton wool, wrapped the mouth and sterilized at 1.5 Kg/cm² for two hrs. From the mother spawn bottle, 10 g of fully grown mushroom mycelia was transferred to sterilized polypropylene bags under aseptic conditions. Inoculated spawn bottles were incubated for 15 days at room temperature. Thirty bed spawn bottles were prepared from one mother spawn of different strains of milky mushroom viz. CI-1, CI-2, CI-3, CI-4 and var. APK-2 separately and used for cultivation.

Cultivation of milky mushroom

The beds were prepared by adopting the polybag method described by Baskaran *et al.* (1978). Paddy straws were cut into bits of three to five cm long and soaked in water for four hrs. The excess water was drained and then

the paddy straw bits were boiled for 1 hr., excess water was drained and then shade dried to obtain 60% moisture level. Poly bags of 100 gauge thickness and 60 × 30 cm size were used to prepare the beds. Two holes of one cm diameter were made at the center to promote air circulation. For each bed, 500 g of the straw and 150g of spawn were used. Straw bits were placed at the bottom of the bag to a height of five cm and the spawn was spread to a thin layer. This forms the first layer. A second layer of straw bits to a height of 10-15 cm was placed over the first layer and spawned. Likewise, four layers were formed, the final layer (fifth) was formed by placing to a height of five cm and tied to form a compact bed. The bags were kept for spawn run production under high humid atmosphere. After complete mycelium spreading, the beds were taken from the mushroom shed and cut into the two equal halves and substrate is pressed on its top for the liberation of gases. The sterilized casing soil was applied on the top of the beds to a height of 1.5 cm and placed inside the mushroom shed. Spraying of water was done on the casing soil and the temperature of 30 - 35°C, 80 – 85% relative humidity and 1600 lux light intensity were maintained in the mushroom shed (Krishnamoorthy 2003). Mushroom beds were prepared for these strains viz. CI-1, CI-2, CI-3, CI-4 and var. APK-2 and each strains replicated four times. The observations on complete spawn run, initial appearance of the pin head, number of harvests / bed and total yield/ bed were recorded.

Yield performance of different strains of milky mushroom

Spawns of different strains of milky mushroom viz. CI-1, CI-2, CI-3, CI-4 and var. APK-2 were prepared from paddy chaffy grains and used for cultivation. Mushroom beds for each strains of milky mushroom were prepared by using paddy straw as a substrate and cultivated in the milky mushroom shed.

Observations on days taken for spawn run, pin head initiation, number of harvests / bed, number of harvest and yield / bed were recorded.

The results were statistically analyzed by using completely randomized design (single factor experiment) (Rangasamy 1995). The experimental data from each test was subjected to analysis of variance to determine the least significant difference among the treatment means.

RESULTS AND DISCUSSION

Yield performance of different strains of milky mushrooms

Among the six strains tested, strain CI-3 was recorded as the minimum days for completion of spawn run 13 days, followed by var. APK-2, CI-1 and CI-2 (13.25, 13.75, 14 days). CI-4 took maximum number of days (19 days) for spawn run. Pin head appearance after casing was minimum (7.25 days) in CI-3 and it was followed by var. APK-2, CI-1 and CI-2 with 7.75, 8, and 8.75 days respectively.

Pileus diameter of different strains of milky mushroom differed significantly with each other maximum diameter (13.6 cm) of pileus was recorded in CI-3 followed by var. APK-2, CI-1 and CI-2 (10.70 cm, 10.25 cm and 10.00 cm respectively). Minimum length of diameter (9.90 cm) was

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observed in strain CI-5. The highest stipe length (16.25 cm) was observed in CI-3 followed by var. APK-2, CI-1, and CI-2 (12.25 cm, 11.90 cm and 11.25 cm respectively). Minimum stipe length (9.50 cm) was recorded in strain CI-4. The maximum number of harvests (4.00 nos.) was

recorded in CI-3 while in other strains were ranged from 3.75 to 2.75 numbers. The maximum yield of 675.15 g/bed was obtained in CI-3 followed by var. APK-2 (601.43 g/bed), CI-1(580.17 g/bed) and CI-2 (423.40 g/bed) while it was minimum in 398.82 g/bed in CI-4.(Table 1, Plate 1).



1. CI- 1



2. CI-2



3. CI- 3



4. CI- 4



5. APK-2

Plate 1 Sporophore production of different strains of milky mushroom

Table 1. Yield performance of different strains of milky mushroom

Strains	Days taken for completion of spawn run	Pin head initiation (Days)*	Pileus diameter (cm)*	Stipe length (cm)*	Number of harvest / bed	Yield (g/bed)*	Bio efficiency (%)
<i>C. indica</i> - CI-1	13.75	8.00	10.25	11.90	3.25	580.17	102.23
<i>C. indica</i> - CI-2	14.00	8.75	10.00	11.25	3.00	423.40	84.68
<i>C. indica</i> - CI-3	13.00	7.25	13.6	16.25	4.00	675.15	135.03
<i>C. indica</i> - CI-4	16.00	9.25	9.90	9.50	2.75	398.82	79.76
<i>C. indica</i> -var.APK-2	13.25	7.75	10.70	12.25	3.75	601.43	120.29
CD (P= 0.05)	0.31	0.4	0.1	0.5	0.24	18.35	-

Different strains of milky mushroom were studied for pin head initiation, pileus diameter, stalk length, spawn run number of harvest and yield. Among the six strains tested,

strain CI-3 recorded minimum days for completion of spawn run (13 days) followed by APK-2 (13.25 days). Maximum diameter (13.6 cm) of pileus was recorded in CI-3 followed

by APK-2 (10.70 cm). Minimum length of diameter (9.90cm) was observed in strain CI-5. The highest stipe length (16.25 cm) was observed in CI-3 followed by APK-2 (12.25 cm). The maximum number of harvests (4.00 nos.) was recorded in CI-3 while in other strains were ranged from 3.75 to 2.75 numbers. The maximum yield of 675.15 g/bed was obtained by CI-3 followed by APK-2 (601.43 g/bed). From this result the strain CI-3 was superior than other strains of milky mushroom with regard to yield and growth character. Similarly Varshney (2007) reported the strain CI-4 and CI-6 were better performance in all the yield related characters. Josephine and Sahana (2014) stated that Tamil Nadu is most suitable condition for cultivation of milky mushroom by using paddy straw. The straw substrates took 14 days for spawn run, 7 days for pin head formation, 7 days for first harvest and harvested 500 gms yield/1500 gm

substrate. Kumar *et al.* (2011) Investigated the different strains of milky mushroom to identify the potential strains of milky mushroom in relation to yield. Among the five strains of *C. indica*, the strain earlier spawn (16 days) run and minimum (23days) days for pin head initiation, maximum (64/bag) number of pinhead initiation, more (26/bag) number of fruiting body and maximum yield (620 g/kg substrate) was recorded was observed in strain CI-6.

From the result we conclude that the strain CI-3 (*Calocybe indica*) performed well in all the aspects of yield attributed characters like earlier spawn running, maximum diameter of pileus, highest stipe length, maximum number of harvest and maximum yield. All the strains significantly differ from each other by recording yield and growth parameter. So the strain CI-3 performed well in Madurai (Tamil Nadu) and it was suitable for commercial cultivation.

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