International Journal of Botany Studies
www.botanyjournals.com
ISSN: 2455-541X
Received: 01-03-2022, Accepted: 16-03-2022, Published: 31-03-2022
Volume 7, Issue 3, 2022, Page No. 245-247

Effect of various bed substrates on yield performance of *Tricholoma giganteum* (TGSLM)

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Abstract
The mushroom *Tricholoma giganteum* was collected from Yercaud hills of Salem district in Tamil Nadu. It is the new edible milky mushroom resembles like *Calocybe indica* which can be grown at high temperature during summer season. Present study was carried out to evaluate the effect of different agro cellulosic wastes for production of the *T. giganteum* (TGSLM). Among the different substrates tested, paddy straw substrate showed the superior result which recorded minimum days for spawn run (21.55 days), pinhead formation (13.11 days) and for first harvest (19.14 days) with least total number of day for first harvest (40.39 days) and maximum yield of 1698.14 g/bed dry substrate. The highest biological efficiency 169.81% was also obtained in the paddy straw substrate. Followed by banana dry leaf substrate was recorded as the next best superior substrate for cultivation of milky mushroom *Tricholoma giganteum*.

Keywords: paddy straw, spawn run days, pin head formation, first harvest and yield

Introduction
Food is one of the vital necessities of life. It provides energy for all the activities of life. From ages, humanity is struggling with malnutrition and food scarcity because of poor agriculture production due to various factors. The growing population, urbanization and desertification making this problem more difficult [4].
To overcome this problem by providing nutritional food and utilization of agro wastes, mushroom production plays one of the major role. The mushrooms are generally termed as fleshy fungi of the class *Ascomycetes* and *Basidiomycetes* [5].
Among the plenty of edible mushrooms in India, only *Pleurotus* spp., *Agaricus bisporus*, *Volvariella volvacea* and *Calocybe indica* are being cultivated by the growers. *Tricholoma giganteum* Massee (Syn - *Macrocybe gigantea*), another edible summer mushroom is widely distributed in tropics of Asia and Africa. In India it is mostly seen in Hooghly, West Bengal. It is pure white in colour and resembling the morphology of *C. indica* which is larger than *C. indica* and fleshier than *A. bisporous* [1].
Because of edible nature of mushroom and their nutritional aspects researchers tried to cultivate the mushrooms. Mushrooms can grow well on woody materials, cellulose, lignin rich products and agro wastes. Now a days huge amounts of natural wastes are created by every year which can be possibly reused as a substrate for mushroom cultivation [14]. Currently mushroom cultivation is the only economic way of upgrading lignocellulose wastes. It also provides an economically acceptable alternative food with superior taste and quality, as well as high value-added secondary metabolites such as enzymes or polysaccharides [9].
For the production of milky mushrooms various substrates were utilized based on their locality and low cost agro wastes such as paddy straw, wheat straw, maize straw etc. The cultivation of milk mushroom in Tamil Nadu has wide scope because of suitable environment and availability of substrates. Keeping this in a view the present study was conducted to find out the potentiality of different substrates for growth and yield performance of milky mushroom *T. giganteum* (TGSLM).

Materials and method
The study was carried out during the year 2018-19 in the Department of Plant Pathology Laboratory, Annamalai University, Chidambaram. It is located at the 11º24'N latitude and 79º44'E longitude at an altitude of +5.79 m above MSL.

Isolation and maintenance of culture
The mushroom *Tricholoma* was collected from Yercaud hills of Salem district in Tamil Nadu. The mushrooms were pure cultured from the cap using tissue culture method and maintained on Potato Agar slants and used for further studies. Then the new isolate was named as *T. giganteum* (TGSLM).

Meteorology of cropping house
Temperature (30-35°C) and relative humidity (90 to 95 %) in the cropping house was maintained by spraying with water on the walls of cropping house covered with gunny bags.

Preparation of bed substrate
Well dried paddy straw about 10-12 kg was immersed in 100 lit of water containing 120 ml formaldehyde and 12.5 g carbendazim to 16-18 hrs for sterilization of bed substrates. After soaking the paddy straw, the mouth of the drum is covered with polythene sheet to avoid release of the gases coming out from formaldehyde. Paddy straw substrate was taken out from the drum and drained off in the next day morning. Drained paddy straw substrate was kept on wire mesh frame and spread over a polythene sheet to dry for 1 to 1.5 hours depending on the prevailing weather condition. Moisture content of the paddy straw was maintained at 65 to 70 per cent which was confirmed by squeezing the paddy straw with palm ensuring no gripping of water from the substrate.

Spawning
Polypropylene bags (60 cm × 30 cm) of 100 gauge were used for bed preparation. The bottom of the bag was tied with a rubber band to make a cylindrical shape to the bed. Then the bag is sterilized with spirit dipped cotton by swapping and then the bag was turned over so that the tied portion comes inside. The bag was filled with alternate layers of straw (1 kg sterilized dry straw per bag) and spawn (150 g/kg of dry straw). Five layers of paddy straw and four layers of spawn were maintained in each bed. The bag was then tied with a rubber band along with a label of the species and date of spawning. About 10-15 holes were made into the polythene bags for the exchange of air and gases [7]. The spawned bags were kept in a mushroom growing room, where appropriate temperature (30-35°C) and relative humidity (90-95 %) were maintained by frequent sprinkling of water on walls and floor of cropping house [1].

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Different substrates *viz.*, paddy straw, banana dry leaf, cotton waste, combination of paddy straw + banana dry leaf were used to find the suitable substrates for cultivation of *T. giganteum* (TGSLM). The beds were prepared with different substrates as described earlier and maintained in cropping room. The yield parameters viz., days of spawn run, days for pinhead formation, days for first harvest, total number of days to first harvest, yield per bed and biological efficiency were assessed and recorded.

Harvesting
Harvesting was done by slight twisting and pulling of sporophores before colour change of the sporophores. Three harvests were taken from the same bed at an interval of 6-7 days.

Weight of sporophore
The freshly harvested sporophore was immediately weighed and recorded.

Yield of mushroom
The cumulative yield in each replication was recorded by summing up the fresh weight and the number of picking, and recorded as weight (kg) per kg of the substrate.

Biological efficiency
The biological efficiency was calculated using the formula Chang *et al* (2).

$$\text{Biological efficiency } \% = \frac{Fresh\ weight\ of\ mushroom}{Dry\ weight\ of\ substrate} \times 100$$

Result and discussion
Among the various bed substrates tested, paddy straw and banana dry leaf recorded at par results in improving the yield. Banana dry leaf took minimum days for spawn run (21.22 days) when compared to paddy straw (21.55 days), but in the case of pin head formation (13.11 days), days for first harvest (19.14 days), total number of days to harvest (40.39), paddy straw recorded minimum days and maximum yield (1698.14 g/bed). Whereas combination of paddy straw + banana dry leaf was placed in 3rd position in yield (1314.32 g/bed) and spawn run days (24.31 days) (Table 1). Similar to present findings, Lakshmipathy [8] tested two substrates and found that high biological efficiency was recorded on paddy straw, which was on par with maize substrate. Patel and Trivedi [11] indicated that paddy straw as the best substrate for *C. indica* which took 18.4 days for spawn run and 134.86 % biological efficiency. Meanwhile, Kumar *et al.* (2015) tested different agricultural wastes as bed substrates for *C. indica* production and found wheat straw alone recorded the superior performance. Similarly Vivek Singh [15] also found wheat straw substrate was performing well and yielded 1052.50 g/bed. Also, various workers reported that wheat straw substrate as the best in yield performance of *C. indica* [12, 3, 13]. These earlier reports lend support to the present findings and thus we can conclude that components present in paddy straw such as lignin, cellulose and water soluble carbohydrates and nitrogen free content could be the reason for better yield performance of *T. giganteum* (TGSLM).

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Table 1

S. No	Bed substrate (Treatments)	Spawn run (Days)	Pin head formation (Days)	No. of harvest			Total no. of days to first harvest	Yield (g/bed)	Bio -efficiency (%)
				1st	2nd	3rd			
1.	Paddy straw	21.55 [a]	13.11 [a]	19.14 [a]	24.22 [a]	30.18 [a]	40.39 [a]	1698.14 [a]	169.81
2.	Banana dry leaf	21.22 [a]	14.21 [a]	20.27 [ab]	25.43 [a]	31.22 [a]	41.49 [a]	1690.08 [a]	169.03
3.	Cotton waste	26.15 [b]	18.99 [c]	24.59 [c]	31.99 [b]	36.45 [b]	50.74 [b]	920.45 [c]	92.05
4.	Combination of Paddy straw + Banana dry leaf	24.31 [b]	16.72 [b]	22.52 [bc]	29.95 [b]	34.99 [b]	46.83 [b]	1314.32 [b]	131.43

References

1. Akhtar NS, Dayaram, Chandan Kumar. Yield Performance and Economics of rain Based Spawn on *Tricholoma giganteum.* Current Journal of Applied Science and Technology,2018:31(4):1-9.
2. Chang ST, Lau OW, Cho KY. The cultivation and nutritive value of *Pleurotus sajor – caju*. European J. Appl. Microbiol. Biotechnol,1981:12:58-62.
3. Gitte vijaykumar, Priya John, Kotgire Ganesh. Selection of different substrates for the cultivation of milky mushroom (*Calocybe indica* P&C). Indian Journal of Traditional knowledge,2014:13(2):434-436.
4. Global Hunger Index Global Hunger Index by Severity http://www.globalhungerindex.org/results, 2018.
5. Hawksworth DL. Mushrooms: the extent of the unexplored potential. Int J Med Mushroom,2001:3:333-337.
6. Kumar R, Singh G, Mishra P. Influence of different substrates and Environmental factors on yield of two strains of *Calocybe indica*. J Mycopathol Res,2015:53(1):75-82.
7. Kumari Nirupa, Kudada N. Effect of casing soil thickness on growth and yield of milky mushroom (*Calocybe indica*). Journal of Pharmacognosy and Phytochemistry,2018:7(2):3619-3623.
8. Lakshmipathy G, Jayakumar A, Abhilasha M, Raj SP. Optimization of growth parameters for increased yield of the edible mushroom *Calocybe indica*. African Journal of Biotechnology,2012:11(11):7701-7710.
9. Megha Suman, Geeta Sharma and Ishwar Prakash Sharma. *In vitro* Action of Temperature, pH and Light on *Macrocybe giganteuin* (Giant Mushroom) Mycelia Growth. Research Journal of agricultural sciences,2018:9(1):211-213.
10. Nudrat Sanzida Akhtar. Evaluation of *Tricholoma giganteum* mushroom strain for yield potential in Bihar. M.Sc. (Ag.) Thesis submitted to Dr. Rajendra prasad central agricultural university Pusa, Samastipur, Bihar, India, 2018.
11. Pinkal Patel, Ratna Trivedi. Effect of substrate and spawn rate on the growth parameter, yield and biological efficiency of *Pleurotus sajor-caju*. International Research Journal of Natural and Applied Sciences,2014:1(6):2349-4077.
12. Rawal P, Doshi A. Evaluation of substrate for organic cultivation of milky mushroom (*Calocybe indica*) strain APK-2. Periodic Research,2014:2(4):28-30.
13. Sandeep Kumar Suman, Mithilesh kumar, Dayaram. Int J Curr Microbiol App Sci. Special Issue,2018:7:3694-3699.
14. Vijay Vardhan Pandey, Anuradha Kumari, Manoj Kumar, Jalaj Saxena, Charul Kainthola and Amit Pandey. Mushroom cultivation: Substantial key to food security. Journal of Applied and Natural Science,2018:10(4):1325-1331.
15. Vivek Singh, Pradip Kumar, Sanjeev Kumar, Ketan Kumar. Yield performance of collected wild milky mushroom (*calocybe* sp.) Plant Archives,2017:17(1):81-18.