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The Future of Farming: Mushroom Cultivation as a Rural Youth Livelihood of Tamil Nadu

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ABSTRACT: Sustainable farming and distribution practices are a pressing challenge for all of us today. This is due to the increasing population and younger generations having less knowledge about agriculture and its modernization, stemming from the belief that "agriculture belongs to rural individuals and not urban ones." This research is largely fuelled by a foolish idea. The location was selected near the wetland of Pushkaram College of Agriculture Sciences, Pudukkottai. The mushroom unit with 11× 11 feet diameter with a height of 12 feet accompanied with proper space, good aeration, light, water sources, and drainage facilities. In this study, 20 mushroom beds were prepared by students and the harvest starts from 21 DAS. Totally, three harvests were done and it was marketed in local farmers' weekly markets. Among the three harvests, optimum yield recorded at 6.35 kg/harvest.

Keywords: *Aspergillus* spp., Contaminants, Oyster mushroom, SDGs, Spawn.

INTRODUCTION

Despite the fact that the world's population is expected to reach 9.8 billion in the upcoming years, "ending hunger" will be a top priority for global agriculture by 2050. Food security and agricultural productivity are in grave danger as a result of this (Vagsholm *et al*., 2020). The introduction of agricultural mechanization, which lowers production and degrades the land, has a significant impact on the transformation of rural areas into urban areas, which is what we have achieved today (Daum, 2023). Climate change, the emergence of new pests and diseases and their effects, the conversion of farmers into day laborers, pollution of the soil and environment, variety mitigation, infertility brought on by inadequate distribution of nutrient-dense foods, malnutrition, consumption of altered food habitats, the spread of new diseases and human health disorders, changes in the livelihoods of the younger generation, etc. (Myers *et al*., 2017). Urgent solutions are needed for these disputes, as well as long-term financial stability for farmers through higher yields, appropriate crop management, and reliant smart agriculture through the production and distribution of mushrooms. Implementing the integrated sustainable development goals (SDGs) in agriculture and food security through the establishment of bee hives, vermicompost plants, biogas plants, and biological control production is the answer. Among these, mushroom cultivation is the most efficient due to its minimal space needs, inexpensive inputs, and simple farming methods that also involve cropping. In addition, mushrooms have very special development and nutritional characteristics (Nanje Gowda and Kurikar 2021). Four types of edible mushrooms are widely grown around the world: *Pleurotus* spp. (oyster mushroom), *Agaricus bisporus* (button mushroom), *Calocybe indica* (milky mushroom), and *Volvariella volvacea* (paddy straw mushroom). Pleurotus species are distinct from the others in terms of their growing habitat and cultivation characteristics, such as their ability to adapt to tropical climates and their ease of practice (Kumar *et al*., 2021). They are also high in vitamins C and B complex. It is mostly composed of edible nutritional components, such as proteins (1.6 to 2.5%), minerals K, Na, P, Fe, and Ca, and antibacterial compounds (pleurotin) (Leong *et al.*, 2021). Above all, these components are

extremely nourishing and beneficial to human health, preventing heart disease, controlling blood sugar, activating neurotransmitters, preventing tumors, stimulating the immune system, and lowering aging factors. In light of these compelling backdrops, the oyster mushroom production project was conducted in collaboration with students of Pushkaram College of Agriculture Sciences, Pudukkottai.

MATERIALS AND METHODS

Development of mushroom production unit. The location was selected near the wetland of Pushkaram College of Agriculture Sciences, Pudukkottai. The mushroom unit with 11× 11 feet diameter with a height of 12 feet accompanied with proper space, good aeration, light, water sources, and drainage facilities in the direction towards west to east fenced by coconut leaf sheaths.

Collection of spawn. The 20 days old cultivating spawn of oyster mushroom (*Pleurotus citrinopileatus* – CO1) was collected from the Department of Plant Pathology, Agricultural College and Research Institute, Kudumiyanmalai. It was kept under 4°C laboratory for further use.

Spawning. Two days before spawning, the cultivation room was pre-disinfected by using formaldehyde (40%) and potassium permanganate (15 g.). Before spawning, wash hands thoroughly with antiseptic liquids and take a polythene pocket with a size of 24×12'' (inches) and tie the bottom end with a thread and turn it inwards. Open a spawn bag, squeeze and mix thoroughly and divide into two halves for two bed preparation by a single spawn bag. After filling the shade, dried straw at a height of 3'' in the bottom of polythene pockets is uniformly spread by hands. Then take a handful of spawn and sprinkle over the straw layer mostly put on edges of the layer. Repeatedly, fill the second layer at a height of 5'' and spawning again up to prepared five layers with gentle press on the bed and tied with thread tightly. Make six holes randomly for ventilation as well as to remove excess moisture and avoid the accumulation of CO_2 inside the bag. Totally, twenty bags (20) were prepared in two cropping and it was further kept in the cultivation room with recommended systems.

Cropping. After, it was placed in the method of hanging rope system as followed by two per rope and maintained the temperature at 22-25°C accompanied with relative humidity of 85 - 90% inside of the cultivation room through wettable gunny sacks throughout harvest with periodical monitoring and totally the cultivation has repeatedly thrice.

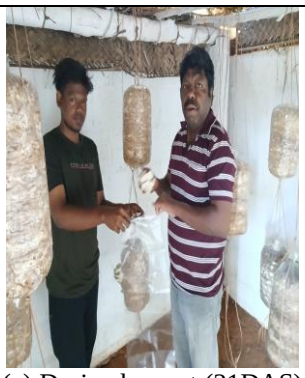
Harvesting. Twenty one days after cropping the matured buds or wings erupted from the bags, and it was gently harvested by sterile knives by smart cuttings during two harvests and kept in polythene covers and sealed for avoiding the contamination during storage. Aforesaid all practices were completely handled by the students along with a technical advisor. In total, two harvests (07.06.2024 to 04.09.2024) were completed and the yield of mushrooms was calculated. It was further sold in mushroom producer cum wholesaler in Pudukkottai at a rate of Rs. 200 /kg. Periodical monitoring was followed for assessment of contamination in mushroom production and it was further calculated by the reference of Elsisura and Figueroa (2022).

$$\text{Percent of Contamination (\%)} = \frac{\text{No. of contaminated bags}}{\text{Total No. of bags}} \times 100$$

Statistical analysis. The recorded data of the present study were analyzed by Statistical Package for Social Science data (SPSS) IBM software version 16.

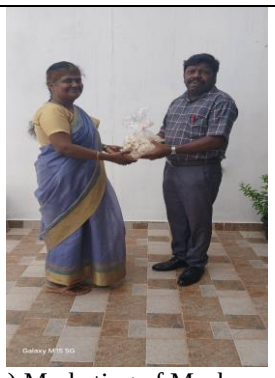
RESULTS AND DISCUSSION

Assessment of yield and contamination. In the hanging rope system, the yield was obtained at 6.35 kg. /Harvest (Table 1, Fig. 1). It was further sold in farmers cum mushroom producers in Pudukkottai. In assessment of contamination recorded around 33-100% during cultivation due to *Aspergillus*, *Penicillium* and *Trichoderma* spp. These results confirmed by Elsisura and Figueroa (2022) during cultivation of *Pleurotus* spp. and *Calocybe indica* (Panda and Biswas 2021) in various substrates such as cassava peels, coconut residue, coffee waste, saw dust, limestone, molasses, rice bran and water Among them fresh weight of mushroom has increased during the combo application of all substrate significantly increased yield and reduced the contamination compared than individual (Sarita *et al*., 2023).



(a) During harvest (21DAS)

(b) After packing



(c) Marketing of Mushroom

Fig. 1. Growth and development of Oyster mushroom (*Pleurotus citrinopileatus* – CO-1) under hanging rope system.

Table 1: Oyster mushroom (Variety CO-1) productions during June – September, 2024 under small scale level of farming.

Sr. No.	ID. No.	Students Name	Yield (grams)			Mean (grams)
			Ist harvest	IInd harvest	IIIrd harvest	
1.	2020049001	Student 01	0.00	0.00	0.00	0.00
2.	2020049010	Student 02	0.00	0.00	0.00	0.00
3.	2020049025	Student 03	212.2	120.0	-	110.73
4.	2020049028	Student 04	260.5	150.5	170.5	193.76
5.	2020049029	Student 05	302.3	154.6	141.2	199.36
6.	2020049044	Student 06	74.6	222.2	212.5	169.76
7.	2020049046	Student 07	124.6	141.2	139.1	134.96
8.	2020049058	Student 08	475.5	212.5	124.6	128.20
9.	2020049060	Student 09	-	-	-	0.00
10.	2020049061	Student 10	131.3	-	-	43.76
11.	2020049064	Student 11	175.0	120.0	-	98.33
12.	2020049065	Student 12	302.0	50.2	-	117.40
13.	2020049066	Student 13	141.2	130.2	-	90.40
14.	2020049074	Student 14	212.0	123.0	-	111.66
15.	2020049082	Student 15	236.0	-	-	78.66
16.	2020049100	Student 16	-	-	-	0.00
17.	2020049110	Student 17	246.4	-	-	82.13
18.	2020049111	Student 18	197.0	-	-	65.66
19.	2020049115	Student 19	152.0	125.0	-	92.33
20.	2020049118	Student 20	604.7	171.5	-	258.73
Total			3.84	1.72	787.6	
			6.35 kg.			
CD (0.05)			1.67			

*Mean of three cultivation; Treatments found significant at 5% level of CD.

CONCLUSIONS

During June to September of 2024, the mushroom production was successfully handled by students from collection of spawn from sale after harvesting. In this period, the weather conditions were favorable to mushroom production from spawning to harvest and it significantly reduced the incidence of contaminants. So, the growth promotion and reduction of pathogens' occurrence has mostly related to climatic factors. While, cultivation of oyster mushroom along with under favorable climatic regimes (22-25°C and 85-90% RH) betterment outcomes are given to farmers.

FUTURE SCOPE

The prospects for farming in Tamil Nadu, especially for the rural youth, are significantly enhanced by the opportunities presented by mushroom cultivation. This practice stands out as a sustainable, economically feasible, and skill-building endeavor, capable of reshaping agricultural practices and offering alternative sources of income for many individuals. By leveraging the advantages of mushroom farming, Tamil Nadu has the potential to empower its younger population, encourage sustainable agricultural methods, and foster rural development. As we progress further into the 21st century, the adoption of innovative agricultural techniques such as mushroom cultivation may prove to be a crucial factor in establishing a robust rural economy. Through investments in training, resources, and market development, Tamil Nadu can pioneer the transformation of rural livelihoods via sustainable agriculture, thereby crafting a promising future for farming within the region's agricultural story.

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