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Research Article

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Production of *Pleurotus platypus* and its nutrient analysis

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ABSTRACT

Mushrooms have been a food supplement in various cultures and they are cultivated and eaten for their edibility and delicacy. They fall between the best vegetables and animal protein source. Mushroom consider as a distinctive food since the beginning of human evolution. As a fruit body of an edible white rotungus, oyster mushroom belongs to Pleurotus, Pleurotaceae, Agaricales and Basidiomycota. One species of oyster mushroom Pleurotus platypus spawn were produced by using sorghum grains. The mushroom was grown on paddy straw and average yield was calculated 410g and 273g in first and second harvesting. Whereas average yield 910g was recorded. The biochemical analysis confirms that the protein, carbohydrate, lipid and amino acid in Pleurotus platypus. The total protein was 9.1 mg/g, carbohydrate 6.7mg/g, lipid 1.27 mg/g and amino acid 1.35 mg/g were recorded.

Key words: Mushroom, *Pleurotus platypus*, Spawn and Oyster mushroom.

INTRODUCTION

A mushroom is defined as macro fungus with a distinctive fruiting body which can be either epigeous or hypogenous. The macro fungi have fruiting bodies large enough to be seen with the naked eye and to be picked up by hand. The common name oyster mushroom refers to several species of edible mushroom belonging to the genus *Pleurotus*. Total dependence on wild mushrooms entirely, for food should be regarded as a means of harnessing the resources associated with mushroom as a crop. In recent times specific mushrooms are cultivated for their food Mushrooms are valuable health foods low in calories, high in vegetable proteins chitin iron zinc fibre essential amino acids, vitamins, and minerals, such as copper that help the body to produce red blood cells [1].

Mushroom is a simple form of eukaryote in the group fungi of the plant kingdom. Mushroom have been eaten and appreciated for their flavor, economic and ecological values and medicinal properties for many years. They have a chemical composition, which is attractive from the nutritional point of view. In general, mushroom contains 90% of water and 10% of dry matter. The protein content various between 27% and 48% carbohydrates are less than 60% and lipids 2.8%. There are at least 12,000 species of fungi that can be considered to be mushrooms with at least 2000 species showing various degrees of edibility. Generally edible species are called as mushrooms and poisonous one as toad stools. Furthermore, over 200 species from the wild are being used for various traditional medication purposes and 35 mushroom species have been cultivated commercially and of these, around 20 are cultivated on an industrial scale. The most cultivated mushroom worldwide are *Agaricus bisporus* (button mushroom), *Lentinusedodes* (Shiitake), *Pleurotus*sp. (Oyster mushroom), *Volvariella volvacea* (Paddy straw mushroom) and *Calocybe indica* (Milky mushroom) [2].

Pleurotus platypus is a fungus found in both tropical and temperate climates throughout the world. *P. platypus* is white-rot fungi on hardwood trees, although some also decay conifer wood. In addition to being sapro trophic, it well grow in cool climatic condition, the temperature range was varied from 23° C – 30° C. The caps may be laterally attached (with no stem). If there is a stem, it is normally eccentric and the gills are decurrently along it. The term pleurotoid is used for mushrooms having this general shape. The spores are smooth and elongated (described as"cylindrical"). Where hyphae meet, they are joined by clamp connections. *P. platypus* is not considered to be a bracket fungus [3].

EXPERIMENTAL SECTION

Pleurotus platypus (P.p) was the material used for the present study. Mother spawn was raised from the fruit body of *P. platypus* which appeared on the straw bed inoculated with the spawn material from Sri Amman Biocare (SAB), Thirukkanurpatti, Thanjavur District, Tamil Nadu.

Preparation of Mother Spawn

Spores of *P. platypus* was collected directly from the fruit body and inoculated on PDA Medium. The inoculated petri plate was incubated at 25°C, for three days. The mycelium of *P. platypus* appeared on the petri plates were used as inoculums.

Preparation of spawn bottle

The spawn of *P. platypus* was multiplied in the "KalanKudil" (Mushroom house). Laminar flow was used for spawn inoculation. Half cooked sorghum grains were used as the substrate for mushroom spawn. Sorghum grains were filled in the ploy propylene bag again sterilized in a pressure cooker at 15 lbs pressure for 20 minutes. These sterilized Polypropylene bags were stored in a laminar flow, which previously treated with alcohol and UV radiation.

The mycelium of *P. platypus* which appeared in the petri plates was inoculated in the bottle containing sorghum grains that were closed with non absorbent cotton plug and stored in the "KalanKudil" for 15 days.

Preparation of mushroom beds

Mushroom beds were prepared using paddy straw substrate to find out the yield and quality of mushroom. The one spawn bottle can use to prepare two mushroom beds. In our study three beds were prepared, size of each bed was 30 x 60cm.

The poly propylene bag method was chosen for mushroom culture. Fresh paddy straw was chopped into pieces of 2-3 inches length and soaked in water for 8 hours and water was then drained off from the paddy straw. After words the paddy straw was sterilized using vertical autoclave at 15 lbs pressure for 20 minutes. The sterilized paddy straw was placed on a wire mesh net for draining off excess water. Polythene bags in the size of 30 x 60 cm were procured and filled with the treated paddy straw as follows.

Before preparing mushroom beds all the instruments were sterilized with a dilute solution of potassium permanganate and alcohol.

A polypropylene bag was tied at one end and sterilized paddy straw was filled through the open end for about 5 cm. A handful of spawn from the bottle was spread towards the periphery of this layer. Over the spawn some more paddy straw was put and pressed lightly. This process was repeated five times. The mouth of polypropylene bag was rolled and closed with stapler pins. Holes were made over the polypropylene bags for aeration. After 15 days it was observed that the mycelia of Pleurotus had grown all over the paddy straw. Now the polythene cover was peeled off and the compact lump of paddy straw was placed in a cool shady room and sprayed with water 3-4 times per day.

Nutrient analysis

The fruit bodies of mushroom on various substrates were dried and subjected to nutrients analysis like Protein, Amino acid, Carbohydrate and Lipid by [4],[5],[6] and [7].

RESULTS

Preparation of Mother Culture
White mycelia colony of *Pleurotus platypus* was observed after 3days of incubation.

Preparation of Spawn Bottle
The inoculated spawn bottles were found to contain white mat of *P. platypus* mycelia after 15 days. These bottles were used for seedling of the mushroom bed.

Production of mushroom:
The mushroom fruit body was harvested three times in 3-4 days interval, all the harvested mushrooms were weighed each bed. The average yield was in first harvest 450g, 410g, and 370g in replication 1, 2 and 3 respectively. In second harvesting 3 and 4was also calculated and recorded. Among the four harvests the maximum yield was gradually decreased compared with first harvest (**Table 1).**

Table:1 Yield of *P.Platypus* by using paddy straw

S.No.	Mushroom Harvest	Mushroom Yield in g		
1	Ist harvest	**R1**	**R2**	**R3**
		450	410	370
2	IIndharvest	310	290	220
3	IIIrd harvest	130	160	180
4	IVth harvest	50	60	100
Total		940	920	870

Nutritional status of cultivated Mushrooms
The mushrooms were degrade the agro waste like paddy straw by producing enzymes and converted in to their feed. The *P. platypus* utilized the substrate and developing highly nutritional valued fruit bodies. That the fruit bodies contain nutritional quality *viz*, Protein, Carbohydrate, free Amino acid and Lipid content. The mushroom fruit bodies were analyzed and the results were recorded (**Table 2).**

Table: 2 Biochemical analysis of *P. Platypus*

S.No	Parameters	Mg/g^{-1}
1	Protein	9.1
2	Carbohydrate	6.7
3	Lipid	1.27
4	Amino acid	1.35

DISCUSSION

India is characterized by varied agro-climatic conditions. According a variety of agricultural crops is grown. There are enormous potential of agro-wastes in India, which include crop residues, tree wastes and aquatic weeds. They form the potential renewable resources. To wave better exploitation of the agro wastes several methods have been adopted. One such method is solid state fermentation of the straw the through mushroom cultivation. Mushroom cultivation is an eco friendly method of solid waste management. It is obvious that mushroom cultivation open's the dead lock in the biological degradation of natural resources. Recognizing the potentials of edible mushroom, the Govt. of India also included "Edible mushroom cultivation" as one of the trades under the TRYSEM. (Training for rural youth and self employment) project during the VIII five year plans. In the present study average yield was in first harvest 450g, 410g, and 370g in replication 1, 2 and 3 respectively. In second harvesting 3 and 4was also calculated and recorded.

Mushrooms, rapidly becoming recognized as a promising source of novel proteins. Several proteins showing unique features have been isolated including lectins, ligno cellulolytic enzymes, proteases inhibitor. They can offer solutions to several medicinal and biotechnological problems such as microbial drug resistance, low crop yield and demands for renewable energy. Whereas, large scale production and industrial application of some fungal proteins proves their biotechnological potential and establishes higher fungi as a valuable although relatively unexplored, source of unique proteins.

Trace elements are essential for human health, which having important physiological effect on different organs and cellular mechanisms. Mushrooms fruit bodies are rich in vitamins, mainly vitamin B1, vitamin B2, vitamin C and vitamin D2 [8]. The vitamin of group B are abundant particularly thaiamine, riboflavin, pyridoxine, pantothenic acid, nicotinic acid, nicotinamide, folic acid and cobalamin as well as other vitamins such as ergosterol, biotin and tocopherols [9].

Mushrooms are protein rich eco friendly food and it is cultivable initially as an empirical process. But the scientific understanding of mushroom cultivation will help in improving the cultivation technology [10]. Similar reports were also given by [11,12] suggested the use of sugarcane trash for the production of oyster mushroom. The present study revealed that paddy straw was the most suitable substrate for the cultivation of *P. platypus.*

CONCLUSION

Pleurotus platypus was edible mushroom with potential celluloytic ability were grown on various agro wastes like paddy straw and other agro waste. The yield was maximum gathered when paddy straw used as the substrate. The nutritional quality to Protein, Carbohydrate, Amino acids and Lipids were studied in cultivated mushroom. Thus it is evident from the present that *P. platypus* can use effectively in the recycling of agro waste materials.

In the present study was concluded that edible mushroom cultivation technology is very effective for entrepreneur. It eradicate unemployment problem, nowadays mushroom was used as important nutritional food by all people. Mushroom dishes compete against malnutrition in all age groups. So the oyster mushroom (*Pleurotus platypus*) cultivation technique is useful for all.

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