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A Study on the Effect of Different Culture Media on the Mycelial Growth of *Pleurotus florida*, White Oyster Mushroom

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Abstract: The present work was designed to study the effect of different culture media on the mycelial growth of *Pleurotus florida,* white oyster mushroom. Different solid growth media viz. potato dextrose agar, malt extract agar, malt yeast extract agar, Saboraud's agar, Czapek dox agar and Glucose peptone agar medium. The mycelial diameter of the mushroom culture grown in all the six solid growth media was observed and recorded for ten days. The results showed that the malt extract agar media was found to support fastidious growth of mushroom culture followed by potato dextrose agar medium, yeast malt extract agar medium, saboraud's dextrose agar medium, glucose peptone agar medium and czapek dox agar medium. The results showed the medium preferences for the growth of mushroom culture of *Pleurotus florida.*

Keywords: *Pleurotus florida, mycelium, malt extract agar, fastidious growth.*

1. INTRODUCTION

Mushrooms are the premier recyclers on the planet. Fungi are essential to recycling organic wastes and the efficient return of nutrients back into the ecosystem. Not only are they recognized for their importance within the environment, but also for their effect on human evolution and health. (Paul Stamets, 1993). Mushroom cultivation is compatible with other farming and horticultural activities. It can be regarded as a very efficient system in recycling with no waste from production to consumption. The consumption of mushrooms can make a valuable addition to the often unbalanced diets of people in developing countries (Marshall and Nair, 2009). Mushroom is a tremendous boon to the idea of using this for mycoremediation process as a real-world solution. The cultivation of edible mushroom on agricultural and industrial wastes may thus be a value added process capable of converting these discharges, which are otherwise considered to be wastes, into foods and feeds (Kulshreshtha *et al.*, 2014).

Cultivation of edible mushrooms might be the only current process that combines the production of protein-rich food with the reduction of environmental pollution (Sanchez, 2010). It represents one of the most efficient biotechnological processes for lignocellulosic organic waste recycling (Mandeel *et al.*, 2005). Oyster mushroom has been widely cultivated in many different parts of the world. It has abilities to grow at a wide range of temperatures utilizing various lignocelluloses (Sanchez, 2010).

In India, at present, four mushroom varieties viz., *Agaricus bisporus, Pleurotus* spp., *Volvariella* spp. and *Calocybe indica* have been recommended for the year round cultivation. The Indian subcontinent is known worldwide for its varied agro climatic zones with a variety of habitats that favour rich mushroom biodiversity (Verma *et al.*, 2003). Meeting the food demand for the increasing population from the limited land resource is a big challenge for our Indian democracy in this

vulnerable climate change era. In addition to this, wide spread malnutrition and associated diseases are more common among the economically poor population. This compels us to search for cheap alternative quality nutritional sources for our huge population. Non green revolution otherwise referred as mushroom farming is one among the apt ways to meet this challenge because mushrooms grow on wastes without requiring additional land besides its exceptional nutritional and medicinal properties (Singh *et al*., 2011).

Pleurotus species are commonly called Oyster mushrooms. There are about 40 species of this mushroom. They enjoy worldwide distribution, both in temperate and tropical parts of the world. Oyster mushrooms now rank second among the important cultivated mushrooms in the world. It is one of the most commonly used edible mushrooms and is also used as a bioremediator (De Boer and Heuvelink, 2000). The oyster mushrooms (*Pleurotus* spp.) are in the third place after the white button and shiitake among the world mushroom production (Gyorfi and Hajdu, 2007).

The present work has been designed to study the effect of different culture media on the mycelial growth of *Pleurotus florida,* white oyster mushroom.

2. MATERIALS AND METHODS

2.1 Selection and collection of mushroom culture: In the present study, the mushroom culture of *Pleurotus florida,* procured from Vijaya mushrooms, Coimbatore, Tamil Nadu, India was used. The culture was subcultured and stored as agar slants. The stock cultures were maintained in the refrigerator. The chemicals used for the study were of analytical grade and was purchased from Himedia laboratories, Mumbai, India.

2.2 Assessment of growth pattern of different mushroom cultures in various solid growth media: The solid growth media selected for assessment of mushroom mycelial growth were

1. Potato dextrose agar medium
2. Malt extract agar medium
3. Malt yeast extract agar medium
4. Saboraud's agar medium

1) Czapek dox agar medium
2) Glucose peptone agar medium

The composition of the selected growth media are as follows

1) Potato dextrose agar medium

Ingredients	**g / l**
Potatoes, infusion from	200.00
Dextrose	20.00
Agar	15.00
Final pH (at 25°C)	5.6±0.2

2) Malt extract agar medium

Ingredients	**g / l**
Malt extract	30.00
Mycological peptone	5.00
Agar	15.00
Final pH (at 25°C)	5.4±0.2

3) Yeast malt extract agar medium

Ingredients	**g / l**
Peptic digest of animal tissue	5.000
Yeast extract	3.00
Malt extract	3.00
Dextrose	10.00
Agar	20.00
Final pH (at 25°C)	6.2±0.2

4) Saboraud's dextrose agar medium

Ingredients	**g / l**
Dextrose	40.00
Mycological, peptone	10.00
Agar	15.00
Final pH (at 25°C)	5.6±0.2

5) Czapek dox agar medium

Ingredients	**g / l**
Sucrose	30.00
Sodium nitrate	2.00
Dipotassium phosphate	1.00
Magnesium sulphate	0.50
Potassium chloride	0.50
Ferrous sulphate	0.01
Agar	15.00
Final pH (at 25°C)	7.3±0.2

6) Glucose peptone agar medium

Ingredients	**g / l**
Peptic digest of animal tissue	20.00
Dextrose	10.00
Sodium chloride	5.00
Agar	15.00
Final pH (at 25°C)	7.2±0.2

3. RESULTS AND DISCUSSION

The mushroom culture selected for the present study was inoculated in six different solid growth media and their mycelial diameter was measured and tabulated in the Table.1. The culture of *Pleurotus florida* was found to grow well in all the different growth medium. Among the six solid growth media, malt extract agar media were found to support fastidious growth of mushroom culture with the presence of higher amount of carbohydrates particularly maltose, proteins and other nutrients. This is followed by potato dextrose agar medium, yeast malt agar medium, saboraud's dextrose agar medium, glucose peptone agar medium and czapek dox agar medium. Though the mycelial diameter of the mushroom cultures in saboraud's dextrose agar medium, glucose peptone agar medium and czapek dox agar medium were in par with rest of the growth media, the density of the mycelia were low in these three growth media. Hence, malt extract agar medium was found to be an ideal media for growth of these mushroom cultures.

Table 1. Mycelial growth (cm) of *Pleurotus florida* mushroom culture in various growth media

Media	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10
Malt extract agar	0.20± 0.1	0.83± 0.15	1.63± 0.21	2.57± 0.12	3.53± 0.35	4.50± 0.3	5.93± 0.21	6.67± 0.15	7.57± 0.32	8.47± 0.06
Potato dextrose agar	0.17± 0.06	0.63± 0.15	1.43± 0.21	2.33± 0.21	3.40± 0.3	4.40± 0.36	6.07± 0.15	7.03± 0.21	7.77± 0.15	8.40± 0.2
Yeast malt agar	0.17± 0.058	0.87± 0.058	1.67± 0.15	2.57± 0.12	3.73± 0.06	4.53± 0.15	5.80± 0.1	6.87± 0.21	7.53± 0.31	8.37± 0.15
Saboraud's dextrose agar	0.17± 0.06	0.77± 0.15	1.53± 0.15	2.63± 0.15	3.67± 0.21	4.77± 0.31	5.63± 0.21	6.43± 0.32	7.57± 0.21	8.37± 0.15
Glucose peptone agar	0.17± 0.12	0.70± 0.2	1.53± 0.25	2.93± 0.15	3.63± 0.30	4.30± 0.26	5.07± 0.15	6.50± 0.26	7.53± 0.25	8.27± 0.15
Czapek dox agar	0.17± 0.06	0.77± 0.06	1.53± 0.15	2.73± 0.31	3.67± 0.25	4.90± 0.1	5.47± 0.31	6.40± 0.36	7.0 ± 0.26	8.20± 0.2

Mycological peptone present in the malt agar rapidly gives a luxuriant growth with typical morphology and pigmentation. Dextrin, a polysaccharide derived from high quality starch, and glycerol are included as carbon sources in malt extract agar medium. Peptone is provided as a nitrogen source and the acidic pH of the malt extract agar is optimum for the growth of yeasts and molds whilst restricting other bacterial growth. Mycelium is an important part for mushroom production as well as for production of several secondary metabolites used for therapeutic purpose. The mycelium growth depends on several factors such as growth media, pH, temperature, nutrient element and some environmental factors (Calam, 1971). Growth medium is the most important factor because it supplies necessary nutrient for the growth of mushroom mycelium.

Different media such as potato dextrose agar, yeast extract agar, malt extract agar, lamberts agar and compost extract agar are mostly used for the growth of mycelium (Pathak *et al,* 1998). Mycelium growth is the best tool to identify necessary nutrients for the production of fruiting bodies as mycelium growth requires short time in comparison with fruiting bodies development (Kalmis and Kalyoncu, 2006).

4. CONCLUSION

Mushroom cultivation provides solution to nutritional security, economical security and environmental security, where mushrooms utilize variety of agricultural residues and convert them into nutritious food which on consumption providing solution to nutritional security, which on marketing provides economical security and also provides a solution to environmental security by eliminating the waste productively. The quality of spawn plays an

important role in the growth and yield of mushrooms.

Hence, the selection of solid growth medium used for the growth and maintenance of mushroom culture is very essential. As observed in the present study, the malt extract agar and potato dextrose agar was supportive in the optimum growth of mushroom culture of *Pleurotus florida*.

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