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Assessment of mycelial growth, characteristics and spore morphological characteristics of different species of *Pleurotus*

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Abstract
Oyster mushrooms namely *Pleurotus* species are described as 'food delicacies' because of their characteristic biting texture and flavour. They may have the most color variety of all edible mushrooms: White, Yellow, Purple, Gray, Brown, and Black oyster mushrooms are common and popular. The distinct flavor of oyster mushrooms makes them a delightful accompaniment to seafood and shellfish. The impact of media on different spp. of *Pleurotus* (oyster mushroom) were assessed in *in vitro* condition and morphological characters of spores of different species of *Pleurotus*, where studied an observation for spore size, shape, color and spore print color was observed. Mycelial growth was differed significantly on PDA (Potato dextrose agar) with each other. The significantly maximum mycelial growth 90 mm with White thick mycelial growth with regular margin was recorded simultaneously in four species *viz.*, PL-17-01, PL-17-02, PL-17-03 and PL-17-05, however PL-17-08 gave significantly lowest (52.5mm) growth with white mycelial growth with two concentric rings and irregular margins. Maximum length (4.0mm) and width (1.85mm) was recorded in PL-17-11 and PL-17-02 respectively while PL-17-12 and PL-17-10 gave minimum length (2.25mm) and width (0.97mm). Oval to cylindrical shape basidiospores where observed in all the studied species of *Pleurotus* spp. and color of basidiospores was hyaline in all the species. White color spore print was observed in PL-17-01, PL-17-03, PL-17-05, PL-17-06, PL-17-07 and PL-17-08 and grayish color was recorded in four species of *Pleurotus* (PL-17-02, PL-17-04, PL-17-09 and PL-17-11). Light yellow and cream color was observed in PL-17-10 and PL-17-12 respectively.

Keywords: *Pleurotus* species (Oyster mushroom), PDA, mycelial growth, spore size, shape, color and spore print color

Introduction
Oyster mushrooms represent basidiomycetous fungi, characterised by edible fruit bodies with eccentric stalk attached to the pileus that opens like an oyster shell during morphogenesis. Mushrooms are generally divided into edible and non edible mushrooms with their flavor, texture; nutritional value and high productivity per unit area have been identified as an excellent food source to alleviate malnutrition in developing countries (Eswaran & Ramabadran 2000) [3]. The utilization of potato dextrose agar formulation as a culture media for growing of different species of *Pleurotus.* The process of culturing mushrooms has three main steps: isolating the mushroom from the fruiting body, preparing primary and secondary spawn, and culturing the mushroom from spawn to harvest fruiting bodies. The aim of this study was to evaluate the effects and to find out the mycelial growth and mycelial biomass on PDA (Potato dextrose agar media) of twelve *Pleurotus* spp. (PL-17-01,PL-17-02,PL-17-03,PL-17-04,PL-17-05,PL-17-06,PL-17-07,PL-17-08,PL-17-09,PL-17-10,PL-17-11,PL-17-12). Among the twelve species of *Pleurotus*, most of the species had complete mycelial radial growth in PDA culture plate. There are various morphological characters like (size, shape, colour) of basidiospores was recorded for further study of fruiting body by taking spore print in black sheet paper of all twelve *Pleurotus* spp. (Naik *et al.* 2018) [4] Different species, of *Pleurotus* can grow very well in variable temperature conditions hence they are ideally suited for cultivation throughout the year in various regions of tropical country like India. Among all cultivated mushroom genera, *Pleurotus* comprises the largest number of species and varieties.

Most of them grow well at temperature less than 20^0C and some others species prefer temperatures between 24^0C and 30^0C. So cultivation of oyster mushrooms can be done round the year. Different types of mushrooms cultivated worldwide, strains belong to the genus *Pleurotus* such as *P. ostreatus, P. sajor-caju,* and *P. florida* are widely cultivated as source of food and many nutraceuticals and bio therapeutic molecules. *P.ostreatus* are rich source of proteins, minerals & vitamins (Caglarirmak 2007) [2]. Therefore, different studies have been carried out related to classification, cultivation, bioactive compounds isolation/characterization, and preclinical research in both *in-vivo* and *in- vitro* models to assess the functionality of the therapeutic molecules of *Pleurotus* spp.

Materials and methods

Source of material: All the accession of *Pleurotus* spp. were obtained from All India Co-ordinate Mushroom Improvement Project (AICMIP), Department of Plant Pathology, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) and the culture were kept at 4^0C for all different study. All the requirements used in the research were availed by the department of Plant Pathology, College of Agriculture, IGKV, Raipur (CG).

Preparation of media: Following media were used during the period of present investigation and the ingredients are as follow:-Potato dextrose agar (PDA) -Potato (peeled and sliced) 200gm, dextrose20 gm, agar-agar 20 gm, distilled water1000ml.

Isolation, purification and maintenance: Fresh and young sporophore were chosen for the isolation of *Pleurotus* species and their purification was performed on PDA slant. The complete isolation work was performed in laminar air flow, which was sterilized by turning on ultraviolet light as well as alcohol. In order to remove dust and straw particles, the fruiting body was washed with moistened cotton. It was then sterilized with 95% ethyl alcohol on the surface and cut from the stipe and pileus intersection into tiny pieces. These tiny pieces were transmitted aseptically into 20 ml solidified PDA petriplates. At the moment of mixing, a small quantity of streptomycin was mixed in PDA to avoid contamination of the bacteria. The petriplates have been incubated for 2 to 5 days at 25± 2ºC. Hyphal tip technique (Biswas, 1992) [1] was used for purification and sub cultured to acquire pure culture. The pure culture was held on PDA slants and retained for further research in the refrigerator at 4^OC.

Measurement of mycelial growth: The vegetative growth of the mycelium of *Pleurotus* on the PDA (Potato dextrose agar) media was assessed by measuring daily (in cm diameter) after 24 hours upto full growth of mycelium in Petri plates.

Microscopy: For the study of measurement of, all species of oyster mushroom were cut into section and placed on object of light microscope and observation was recorded for various parameters like spore shape and colour. For measuring the size of spore of all species used digital camera through compound microscope. Microscope name (Nikon eclipse, E200) in the magnification (40X) and photos were captured in digital camera.

Spore print: The pileus/cap of each species was removed with the help of a scalpel and the entire pileus were kept on transparency as well as black sheet and covered with a bowl which was covered with a moist blotting paper from inside.

Result and discussion

The impact of media on different spp. of *Pleurotus* (oyster mushrooms) were assessed in *in-vitro* condition showed significantly difference in radial growth for and their characteristics on PDA (Potato Dextrose Agar) medium. Mycelial growth was differed significantly on PDA with each other. The significantly maximum (90 mm) mycelial growth was recorded simultaneously in four species *viz*., PL-17-01, PL-17-02, PL-17-03 and PL-17-05, however PL-17-08 gave significantly lowest (52.5mm) growth. The other species were statistically differ significantly min each other had 83.5,72.0,67.0,66.5,61.0 and 60.5 mm, mycelial growth was occurred in PL-17-12,PL-17-07,PL-17-06,PL-17-11,PL-17-09,PL-17-04,PL-17-10 respectively, except PL-17-04,PL-17-09,and PL-17-10 while were at par with each other, similarity there was in significantly difference noted in PL-17-06 and PL-17-11.White thick mycelial growth with regular margin was observed in PL-17-01,PL-17-02, PL-17-03,and PL-17-05 whereas PL-17-08 gave white mycelial growth with two concentric rings and irregular margins. The other species showed dull white to white space mycelial growth with one or two concentric rings.

Pleurotus spp. grown in different nutrient media and suggested that oat meal, potato dextrose agar (PDA) and malt extract agar (MEA), to be most prominent for mycelial growth of *Pleurotus spp*. (Subharban and nair, 1994) [7]. Kapoor *et al.* (1997) [5] reported malt extract and potato dextrose agar (PDA) to be better for mycelial growth of *Pleurotus fossulatus* and *Pleurotus ostreatus*. Similarly in the current findings Saha, (2017) [6] found that in experiment of different nutrient media like potato dextrose agar (PDA) malt extract agar (MEA) and wheat extract agar (WEA),strain PL-17-04 of *Pleurotus* spp. showed significantly better growth of mycelium in Potato dextrose agar.

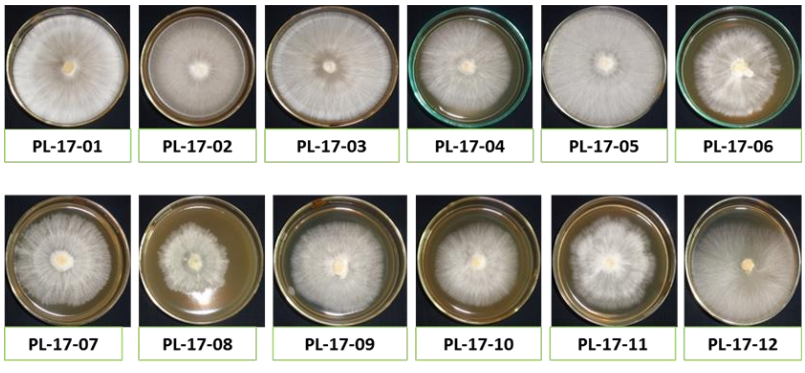

Fig 1: Mycelial growth and characteristics of different species of oyster mushroom

Table 1: Assessment of mycelial growth and characteristics of different species of *Pleurotus*

S. N.	Species	Radial growth(mm*)	Mycelial character
1	PL-17-01	**90.0**	White mycelium with regular margin, thin growth at center
2	PL-17-02	**90.0**	White mycelium with regular margin
3	PL-17-03	**90.0**	White mycelial mat with regular margin, thin grow that center
4	PL-17-04	60.5	White cottony growth of mycelium, with irregular margin
5	PL-17-05	**90.0**	White cottony growth of mycelium, with regular margin, thin growth of center
6	PL-17-06	67.0	White mycelium growth with irregular and rough margin with one concentric ring
7	PL-17-07	72.0	White mycelium growth with two concentric rings and thick growth at center irregular margin
8	PL-17-08	**52.5**	Mycelial mat are white with two concentric rings, irregular and rough margin
9	PL-17-09	61.0	Cottony mycelial growth with two concentric rings and irregular margin
10	PL-17-10	60.5	Mycelial are cottony with single concentric ring
11	PL-17-11	66.5	Cottony mycelium with three concentric rings and margin are irregular
12	PL-17-12	83.5	Mycelial mat are thin growth and cream in colour of mycelium
	SE(m)±	0.248	
	C.D	0.708	

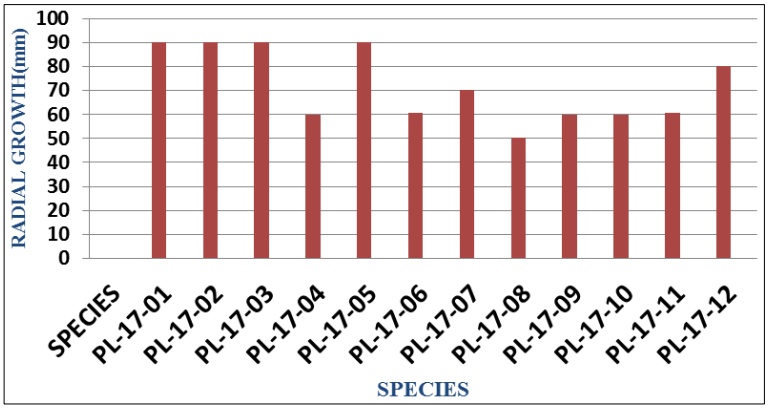

Fig 1: Effect of PDA media on radial growth of different species of *Pleurotus.*

Morphological characters of spores of different species of *Pleurotus*

The morphological characters of spores of different species of *Pleurotus*, where studied an observation for spore size, shape, color and spore print color was observed. The data are given in (Table 2) Maximum length (4.0mm) and width (1.85mm) was recorded in PL-17-11 and PL-17-02 respectively while PL-17-12 and PL-17-10 gave minimum length (2.25mm) and width (0.97mm). Oval to cylindrical shape basidiospores where observed in all the studied species of *Pleurotus* spp. and color of basidiospores was hyaline in all the species. The spore print color was noted and white color was observed in PL-17-01, PL-17-03, PL-17-05, PL-17-06, PL-17-07 and PL-17-08 and grayish color was recorded in four species of *Pleurotus* (PL-17-02, PL-17-04, PL-17-09 and PL-17-11). Light yellow and cream color was observed in PL-17-10 and PL-17-12 respectively and data are presented in (Table no.2)

Table 2: Morphological character of spores of different spp. of *Pleurotus*. [40X]

S. N.	Species	Morphological character				
		Size(mm)*		Shape	Colour	Spore print colour
		length	width			
1	PL-17-01	2.87	1.30	cylindrical	hyaline	White
2	PL-17-02	3.02	1.85	Oval	hyaline	Grayish
3	PL-17-03	2.70	1.05	Oval	hyaline	White
4	PL-17-04	3.12	1.42	cylindrical	hyaline	Grayish
5	PL-17-05	2.85	1.07	cylindrical	hyaline	White
6	PL-17-06	3.12	1.17	cylindrical	hyaline	White
7	PL-17-07	2.95	1.02	cylindrical	hyaline	White
8	PL-17-08	3.07	1.07	cylindrical	hyaline	White
9	PL-17-09	2.40	1.15	Oval	hyaline	Grayish
10	PL-17-10	2.35	0.97	Oval	hyaline	Light yellow
11	PL-17-11	4.00	1.07	cylindrical	hyaline	Grayish
12	PL-17-12	2.25	1.07	cylindrical	hyaline	Cream

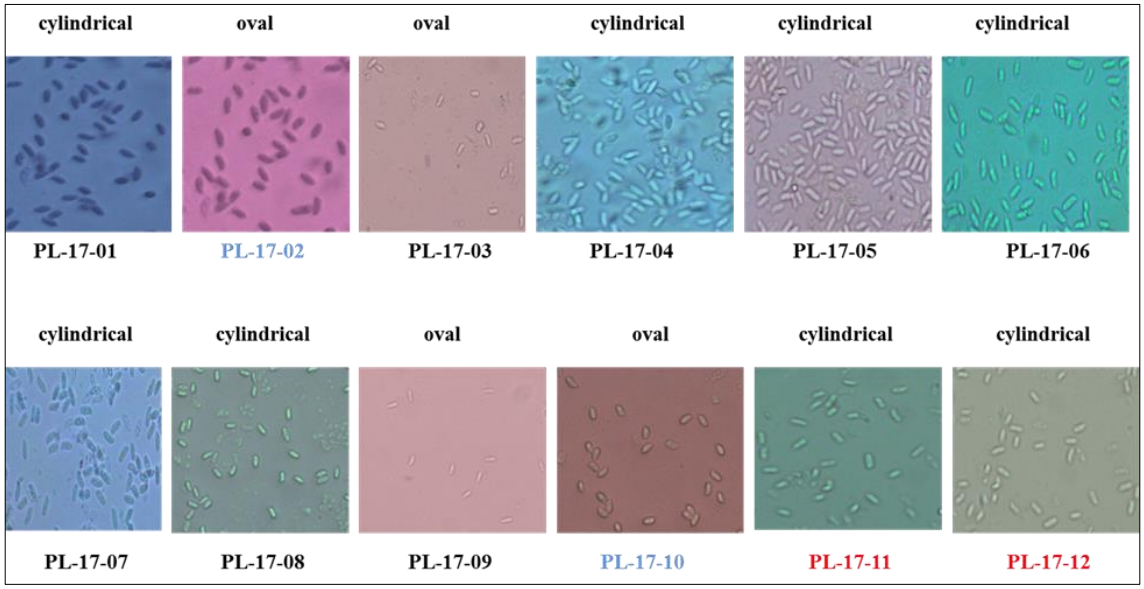

Fig 2: Morphological characteristics of spores of different spp. of *Pleurotus*. (40X)

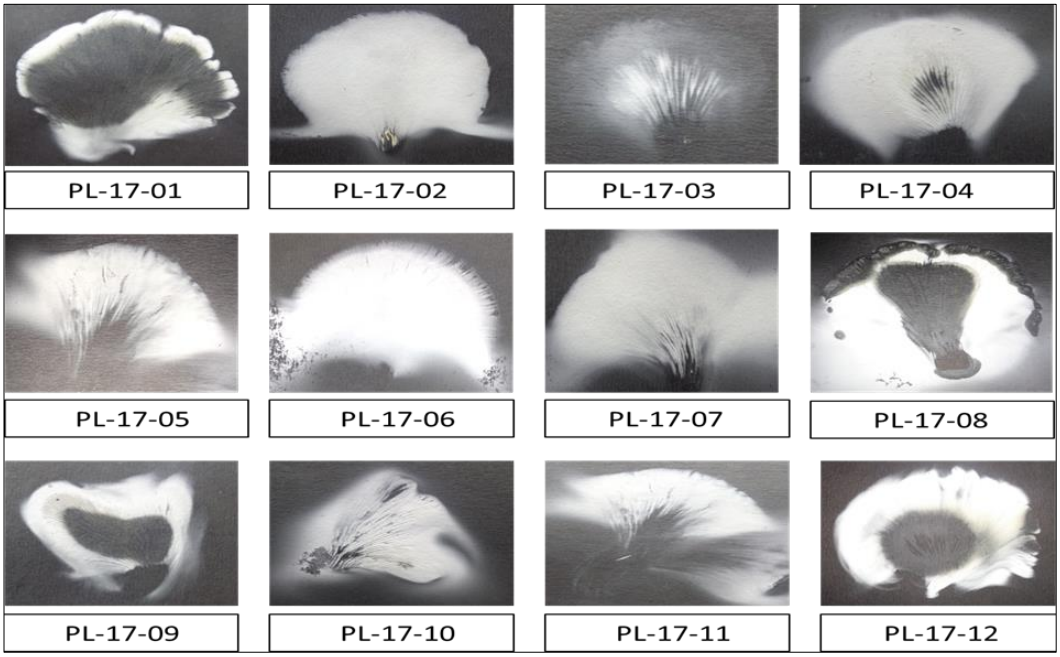

Fig 3: Spore print of different *Pleurotus* species.

Conclusion

The conclusion of this experiment conducted showed that among all the species of *Pleurotus* was shows significant mycelial growth and showed differ in mycelial character. Potato dextrose agar medium was excellent for the mycelial growth of *Pleurotus* spp. significantly maximum mycelial radial growth was recorded simultaneously in four species *viz*., PL-17-01, PL-17-02, PL-17-03 and PL-17-05. Mycelial colour was significantly close to each other (white color) except PL-17-10 which appears light yellow in color and spore color was hyaline.

References

1. Biswas MK. Exploring of methods for increasing of Biological Efficiency of Oyster mushroom (*Pleurotus florida*) at Raipur, M.Sc. Thesis submitted to I.G.K.V. Raipur, 1992.
2. Caglarirmak. Nutrients of exotic mushrooms (*Lentinula edodes* and *Pleurotus species*) and an estimated approach to the volatile compounds. Food Chemistry. 2007; 105:1188-1194.
3. Eswaran A, Ramabadran R. Studies on Physiological, Cultural and Postharvest Aspects of Oyster Mushroom, (*Pleurotus eous)* (Berk.) sacc. Tropical Agricultural Research. 2000; 12:360-374.
4. Naik Ravi, Chandra R, Ray A. Suitability of different culture media for mycelial growth Of Oyster mushroom (*Pleurotus ostreatus*) (jacq. fr.) p. kumm. Indian Journal of Scientific Research. 2018; 08(2):71-74.
5. Kapoor S, Sharma A, Phutela RP, Sodhi HS. Physiological studies on *Pleurotus fossulatus*. Paper presented in Indian Mushroom conference 97 held at NCMRT, Solan from 10-13th, 1997; 65.
6. Saha. Studies on seasonal variation in yield and yield attributing characters of different strains of *Pleurotus* species, M.sc.(Ag) Thesis, I.G.K.V, Raipur, 2017, 73.
7. Subharban M, Nair MC. Physiological studies on *Pleurotus* spp. Mushroom Res. 1994; 3(1):99.