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Studies on morphological and growth characters of new *Pleurotus* isolates

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Abstract
Oyster mushroom, *Pleurotus* sp. is suitable for commercial cultivation in subtropical regions and winter seasons in tropical regions of the world**.** The present study was carried out to isolate and characterize new *Pleurotus* isolates. Among a few collected isolates of *Pleurotus* sp., *Pleurotus* sp. isolate virutha1 produced well developed basidiocarp and it was compared with other cultivated *Pleurotus* spp. such as *P. djamor* isolate woody 1 and *P. florida*. These three Pleurotus spp. were analysed for different morphological traits *viz*., stipe length, diameter of the pileus, thickness of fruiting body, margin of fruiting body, colour of fruiting bodies and number of gills. Results indicated that all these three species of *Pleurotus* showed great diversity in their morphological characters. Typically, *Pleurous* sp. isolate virutha and *P. djamor* isolate woody 1 appeared astipitate (no stipe). Whereas *P. florida* had well developed stip. With regard to the colour, *P. djamor* isolate woody 1 appeared as white whereas *Pleurotus* sp. isolate virutha appeared light pink in colour at the initial growth phase and later growth phases, it appeared as white. *P. florida* appeared in creamy white in colour. All these *Pleurotus* spp. grown well in maize agar medium whereas potato dextrose agar medium supported slow growth.

Keywords: Oyster mushroom, phenotypic characters, basidiocarps

Introduction
The Indian subcontinent is blessed with numerous agroclimatic zones that harbour a wealth of fungal diversity. Though the occurrence of mushrooms is numerous in India, only some of them are cultivable and edible. Oyster mushroom (*Pleurotus* sp.) belongs to class *Agaricomycetes* and family *Pleurotaceae*. It grows naturally in the temperate and tropical region on dead and decaying wooden logs or generally on dying trunks of deciduous or coniferous woods. The oyster mushrooms have three distinct parts such as a fleshy shell or cap (pileus), a short or long lateral stalk known as stip and long ridges and furrows beneath the pileus known as gills or lamellae. The gills stretch from the edge of the cap down to the stalk and bear the spores. The spores are smooth, cylindrical and germinate on any kind of mycological media at intervals of 48-96 hrs. The mycelium of *Pleurotus* is pure white in colour. The *Pleurotus* genus includes a various group of aromatic edible fungi that are praised for their culinary purpose and high price because they are wealthy in protein, fiber, vitamins and minerals [1, 2]. Additionally to their nutritional value, these fungi produce vital biomolecules [3]. Thus, in the present study, we focus on isolation and characterization of new *Pleurotus* isolates with good agronomic traits.

Materials and methods
Culture and media
Several fruiting bodies of *Pleurotus* spp. were collected from different places in southern districts of Tamil Nadu during 2017-2018 and preserved at the department of plant pathology, Agricultural college and research institute, Killikulam, Vallanadu, Tamil Nadu. PDA medium was routinely used for culturing the mushrooms

Isolation and culturing of *Pleurotus* spp.
Well grown healthy sporocarps were collected from cultivated mushroom bed and from naturally grown on dead wood logs in different places and they were kept on a sterile tissue paper for 2-3 hours to evaporate the free moisture. The mushroom was surface sterilized with 70 % ethyl alcohol using absorbent cotton and it was split opened lengthwise into two halves employing a new sterilized blade. A little piece of plectenchymetous tissue was cut from the centre of the split mushroom at the junction point of the pileus and stip and inoculated on the

PDA medium, amended with 100 ppm streptomycin sulphate, at equidistance in triangular position and incubated at 28°C. The plates were observed daily for the growth of mycelium. The pure culture of the *Pleurotus* sp. was maintained on PDA slants for further use during this study. Three *Pleurotus* spp. *viz.*, *P. djamor*. isolate woody 1 and *Pleurotus* sp. isolate virutha and *P. florida* were used in this study.

Morphological characterization of *Pleurotus* spp.

Basidiocarp morphology for three *Pleurotus* spp. *viz*., *P. djamor*. isolate woody 1 and *Pleurotus* sp. isolate virutha and *P. florida* was assessed. Information on pileus phenotypic characters *viz*., diameter of pileus, its marginal shape, stirp length, colour of the basidiocarp, thickness of the pileus, number of gills, and number of strip present per bunch was noted.

Mycelial growth phenotype on different media

To study the mycelial phenotypic characters of *Pleurotu*s sp., five milli metre culture discs were cut with sterilized cork borer from advancing margins of the colonies and inoculated on the different media *viz*., PDA, oats agar medium, sorghum agar medium, maize agar medium, wheat agar medium supplemented with streptomycin sulphate (100 ppm). The plates were incubated at 28°C. Three replications were maintained for each medium. Radial growth of the mycelium was recorded when the mycelial growth covered in any one of medium.

Result and discussion

Isolation and culturing of the new *Pleurotus* sp.

Isolation of mycelium from the new *Pleurotus* sp. isolates virutha, *Pleurotus* sp. isolate woody 1, and *P. florida* were taken from the healthy basidiocarp using PDA medium. The mycelial growth from the inoculated tissue pieces was attained on the second day of incubation. Pure culture was obtained from the corner of the colony. This pure culture was used for further studies.

Phenotypic characterization of basidiocarp of *Pleurotus* spp.

Morphological characters of fruiting body of three *Pleurotus* spp. were studied. Each *Pleurotus* sp. has typical differentiating phenotypic characters as described below (Table 1).

Stipe length

Among the three *Pleurotus* spp. commercially cultivated *P. florida* produced fruiting bodies with long stipe (stipe length was 52.93 mm). *P. djamor* isolate woody 1 produced basidiocarps with rudimentary stipe or no stipe at all. *Pleurotu*s sp. isolate virutha is produced small sized stipe (stipe length was 26.11 mm). The result of the present study was similar to that reported by Mishra *et al.* (2015) [4].

Diameter of the pileus

Pileus diameter was maximum in *P.djamor* isolate woody1 (120.33mm) followed by *Pleurotus* isolate virutha (96.66mm) and *P. florida* (87.83mm). Similar results were found by Shubhra Shukla and Jaitly (2011) [5].

Thickness of fruiting body

Thickness of the pileus depends on the amount of plectenchymatous tissue present in the pileus. The thickness of the pileus was measured close to the intersection point of pileus and stipe. *P. florida* produced basidiocarp with maximum pileus thickness (13.43 mm diameter) followed by *Pleurotus* isolate virutha (7.76 mm diameter) and *P. djamor* isolate woody 1 had thickness of 5.33 mm diameter.

Margin of fruiting body

P. florida had pileus with smooth margin whereas *P. djamor* isolate woody 1 and *Pleurotus* isolate virutha had typical wavy margins.

Colour of fruiting bodies

P. florida produced creamy white colour basidiocarps whereas *P. djamor* isolate woody 1 produced white colour basidiocarps and *Pleurotus* sp. isolate virutha produced basidocarps initially pink in colour later its turn white in colour.

Number of gills

P. djamor isolate woody 1 and *Pleurotus* isolate virutha had 23 and 21 gills/cm^2 respectively. Whereas, *P. florida* had less number of gills 19.56 gills/cm^2.

Effect of the different media on the mycelial growth of *Pleurotus* spp.

Effect of different media on the mycelial growth *P. djamor* isolate woody 1, *Pleurotus* sp. isolate virutha 1 and *P. florida* was studied on PDA, oats agar medium, wheat agar medium, sorghum agar medium, rice agar medium and maize agar medium. The maximum mycelial growth for all the three *Pleurotus* spp. was observed on maize and rice agar media. The maximum mycelial growth of *P. florida* was recorded on sorghum agar medium (90 cm), maize agar medium (90 cm), wheat agar medium (89.67 cm) followed by rice agar medium (87 cm) and minimal mycelial growth observed on PDA (57 mm). The maximum mycelial growth of *P. djamor* isolate woody was observed on maize agar medium (90.00) followed by rice agar medium (89.33), oats agar medium (87.33), sorghum agar medium (62.66), and PDA medium (57.00) The minimal mycelial growth observed on wheat agar medium (49.66). The maximum mycelial growth of *Pleurotus* sp. isolate virutha was observed on maize agar medium (69.00), rice agar medium (67.66), oats agar medium (47.66), PDA medium (42.00), sorghum agar medium (36.66) and minimal mycelial growth observed on wheat agar medium 21.00). Generally grain based media supports the mycelial growth of *Pleurotus* spp**.** (Figure 1, Table 2).

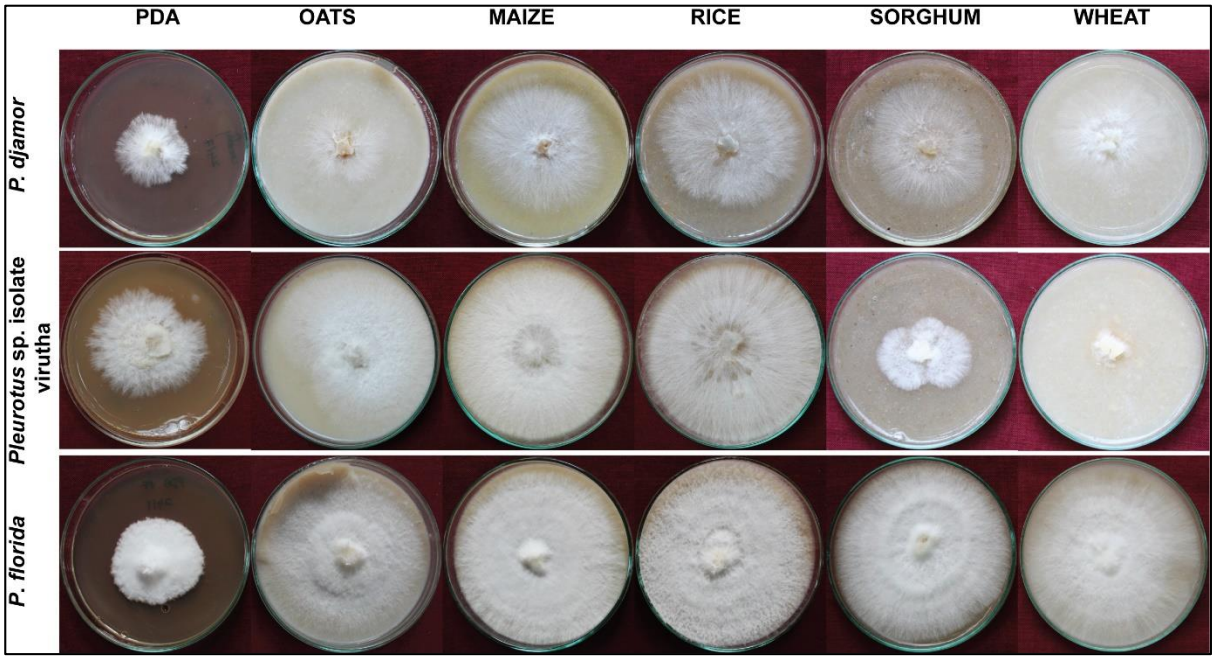

Fig 1: Effect of the different media on the mycelial growth of *Pleurotus* spp.

Table 1: Morphological characterization of basidiocarp of *Pleurotus* spp.

Pleurotus spp.	Diameter of pileus(mm)			Length of stipe(mm)			Appearance of pileus margin	Thickness of pileus	Number of gills	Colour of fruiting bodies
	Primdial Stage	Mature Stage	Harvesting stage	Primodial Stage	Mature Stage	Harvesting stage				
Pf	5.16^{c}	84.33^{a}	87.83^{c}	11.00^{b}	49.83^{a}	52.93^{a}	Smooth	13.43^{a}	19.56^{c}	Creamy white
Woody	15.33^{a}	80.50^{a}	120.33^{a}	5.10^{c}	12.00^{c}	15.00^{c}	Wavy and broken	5.33^{c}	23.33^{a}	White
Virutha	11.33^{b}	54.00^{c}	96.66^{b}	13.66^{a}	22.00^{b}	26.11^{b}	Wavy	7.76^{b}	21.16^{b}	Initially pink later white

Table 2: Effect of different media on the mycelial growth of *Pleurotus* spp.

Pleurotus spp.	Mycelial growth					
	PDA	WHEAT	RICE	SORGHUM	MAIZE	OATS
Pf	57.33^{c}	89.67^{a}	87.33^{ab}	90.00^{a}	90.00^{a}	84.00^{b}
Woody 1	57.00^{b}	49.66^{c}	89.33^{a}	62.66^{b}	90.00^{a}	87.33^{a}
Virutha 1	42.00^{c}	21.00^{d}	67.66^{a}	36.66^{c}	69.00^{a}	47.66^{b}

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