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Evaluation of different media on mycelial growth of *Pleurotus* species (PL-21-09)

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Abstract
Mushroom are macro-fungi with a distinctive fruiting body which can be either epigeous hypogeous and large enough too seen with naked eye and picked by hand. *Pleurotus* is a genus of fungi commonly known as oyster mushrooms. It is also known as ‘‘Dhingri’’ Mushroom. The present experiment was conducted to see the study of effect of different media on mycelial growth of *Pleurotus* species *in-vitro* condition. In the experiment seven types of media *viz.* Malt extract agar (MEA), wheat extract agar (WEA), yeast malt agar (YMA), oat meal agar (OMA), sabouraud dextrose agar (SDA), czapek dox agar (CDA) and potato dextrose agar media was use as control with thee replications. The result showed that the maximum growth of (90 mm) was recorded in malt extract agar followed by oat meal agar (89.66mm) followed by yeast malt agar media (80.50 mm) and minimum growth (63.33 mm) was recorded in potato dextrose agar which was statistically lower than all treatment and the maximum dry mycelium weight (10.00 mg/100 ml) was observed in Malt extract broth (MEB) and minimum dry mycelium weight (5.66 mg/100 ml) was observed in potato dextrose broth and dry matter growth rate (mg/day) of *Pleurotus* species (PL-21-09), maximum dried mycelial growth rate (0.66 mg/day) was observed in malt extract broth (MEB) followed by oat meal broth (0.60 mg/day). The minimum dried mycelial growth rate (0.37 mg/day) was observed in potato dextrose broth.

Keywords: Oyster mushroom, different media, mycelial growth, dry matter, and broth media

Introduction
Mushroom are macro-fungi with a distinctive fruiting body which can be either epigeous hypogeous and large enough too seen with naked eye and picked by hand (Chang and Miles 1993) [3]. Mushroom can help in solve the deficiency of nutrients and disease problems in the man. *Pleurotus* is a genus of fungi commonly known as oyster mushrooms (Khan *et al*. 2008) [5]. It is also known as ‘‘Dhingri’’ Mushroom. These mushrooms are very popular for their delicious taste in nature, delicate texture, and very excellent nutritional value. This genus (*Pleurotus species*) has belonging to the Class- Basidiomycetes, Order-Agaricales and family Pleurotaceae. (Boa *et al.* 2004) [2]. Oyster Mushroom that can be found be in various habitats worldwide. They are primarily saprophytic and these fungi decompose the cellulosic dead organic material. It may feed on dead or decaying wood, or trunk of tree. All species of *Pleurotus* have deccurent gills or gills that are attached to and extend down the stipe, and a white spore print sometimes visible on adjacent caps in a cluster or on the mushroom substrate. Their smooth caps are often fan-shaped or self like, and their flesh is tender or meaty, not brittle or tough. Oyster mushrooms have a unique flavor and aromatic quality which are rich in carbohydrates, vitamin, protein, fibre and minerals (Naraian *et al*. 2016) [7]. According to some studies, components like-Lovastatin, glycopeptides, D-Glucan (pleuran), lectins and polysaccharides have recognized from oyster mushroom. These compounds compounds primarily act as antibiotics, antiviral, anti-inflammatory, antioxidants, antitumor, immunomodulating anti-allergic, antihypertensive, antidiabetic, antifungal, anticancer, antiaging, antimetastatic anticarcinogenic, antineoplastic, antiarthrictic, antiatherogenic antiproliferative and anticholesterolic agent Venturella *et al*., (2021) [9]. The oyster mushroom provides nutrient in a 100 gram of fresh mushroom moisture 89.2% Protein 2.9%, Lipid 0.19%, Ash 0.73% Carbohydrates 6.94%, Fiber 2.8%, β-glucan 3.01%, Energy 33 kcal and vitamin such as Thiamin 0.07 mg, Riboflavin 0.244 mg, Niacin 5.75 mg, Vitamin B-6 - 0.099 mg, Biotin 7.04 µg, Folate 63 µg and amino acid such as Ergothioneine 14 mg and Minerals such as calcium 2.5 mg, Iron 0.7 mg, magnesium 13.9 mg, Phosphorous 86 mg, Potassium 282 mg, Sodium 1 mg, Zinc 0.68 mg, Manganese 0.086 mg and Selenium 1.4 µg.

Materials and Methods

Experimental site

The experiment were conducted during 2022-2023 in Mushroom Research and Training Centre, Department of Plant Pathology, Sardar Vallabhbhai Patel University of Agriculture and Technology- Modipuram- Meerut, Uttar Pradesh, India, Which is situated at western side of the Delhi to Dehradun National highway (NH-58) at a distance of 10 kilometer away in the north of the Meerut city. The Meerut district situated between 29° 01'N latitude and 77° 45'E longitude at an altitudes 237 meter above the level of sea.

Establishment of pure culture

The culture of *Pleurotus* species strain (PL-21-09) were obtaibned from Directorate of Mushroom Research (DMR), Solan, Himachal Pradesh, India. Culture were purified and maintained by single hyphal tip method. For this purpose, the culture were grown on Potato Dextrose Agar medium (PDA) for 9-10 days. Single branched of hypha from the periphery of the growing colony were marked under low power (10x) in the compound microscope and replaced to PDA slant and petri dishes. These were incubated at 25 °C for approximately one week, again sub cultured on PDA and after that stored in a refrigerator at 10-12 °C room temperature for further use.

Preparation of different media

In present study, seven media were evaluated *viz,*: (1) Malt extract Agar (MEA): Malt extract powder (20 g), agar agar (20 g) and distilled water (1000 ml), (2) Wheat extract agar medium: Wheat grain (200 g), agar agar (20 g) and distilled water (1000 ml), (3) Yeast malt agar (YMA): Malt extract powder (20) Agar-Agar (20 g), Yeast (2 g), and distilled water (1000 ml), (4) Oat meal agar (OMA):Oat meal powder (20 g), agar agar (20 g), and distilled water (1000 ml), (5) Sabouraud dextrose agar (SDA): Peptone (10 g), Dextrose (40 g), agar agar (20 g), and distilled water (1000 ml), (6) Czapek dox agar (CDA): agar agar (20 g) Sucrose (30 g), Sodium Nitrate (3 g) Dipotassium hydrogen Phosphate (1 g) Magnesium Sulphate (0.5 g) Potassium chloride (0.5 g) Ferrous Sulphate (0.1 g) and distilled water (1000 ml), and (7) Potato dextrose agar (PDA): peeled potato (200 g), agar agar (20 g) and distilled water (1000 ml), media were used for growth of *Pleurotus* species (PL-21-09). This media suspension was dispensed in 500 ml capacity of conical flask and take care that do not more than 2/3 part of conical flask.

For broth, all ingredients were used for different media except agar were mixed as described above and 100 ml media in each conical flask was dispensed.

Sterilization of media, pouring and inoculation

The conical flasks containing all media were tightly plugged with non- absorbent cotton. This medium was sterilized in autoclave at 121 °C and 15psi (at 1.1 kg/cm² pressure) for 20 minutes. The media were prepared and 20 ml medium was poured individually in petriplates. After solidifying media, plates were aseptically inoculated with 9mm diameter disc of a 10 day old *Pleurotus* species culture at centrally point of plates. After inoculation plates were incubated 25 °C and the observed for mycelial growth rates each treatment had three replications. After 3 days, 6 days and 9 days observed mycelial growth on different medium.

Statistical analysis

The completely randomised (CRD) was used, and the result were statistically analysed. Critical difference (CD) was calculation using the analysis of variance (ANOVA) method at a significance level of 5% for comparison with other treatment (Gomez, 1984, Kumar *et al*. 2019) [4, 6].

Results and Discussion

Effect of different media on mycelial growth and dry matter weight of *Pleurotus* species (PL-21-09)

The experiment was conducted for the study of effect of different media on mycelial growth of *Pleurotus* species *in-vitro* condition. In the experiment seven different types of media *viz*. Malt extract agar (MEA), wheat extract agar (WEA), yeast malt agar (YMA), oat extract agar (OEA), sabouraud dextrose agar (SDA), Czapek Dox agar (CDA) and potato dextrose agar media (PDA) was use as control with thee replications.

The observations of mycelial growth were recorded on 3rd, 6th and 9th days after inoculation. On 3rd day, maximum radial growth (27.66mm) was recorded in malt extract agar followed by oat meal agar (26.50 mm) followed by yeast extract agar (20.83mm) and minimum radial growth (16.66 mm) in potato dextrose agar. On 6th day maximum radial growth (61.00 mm) was recorded in malt extract agar followed by oat meal agar (48.66 mm) followed by yeast extract agar (38.50 mm). Minimum radial growth (30.33 mm) was recorded in potato dextrose agar which was statistically lower than all treatment. On 9th day maximum radial growth (90.00 mm) was recorded in malt extract agar followed by oat meal agar (89.66mm) followed by yeast extract agar (80.50 mm). Minimum radial growth (63.33 mm) was recorded in potato dextrose agar which was statistically lower than all treatment. Growth rate (mm/day) at 9th days was recorded in *Pleurotus* species (PL-21-9). The maximum growth rate of (10 mm/day) was recorded in malt extract agar followed by oat meal agar (9.96mm/day) followed by yeast malt agar media (8.94mm/day) and minimum growth (7.03 mm/day) was recorded in potato dextrose agar which was statistically lower than all treatment.

The maximum dry mycelium weight (10.00 mg/100 ml) was observed in Malt extract broth (MEB) which was Singnificantly higher than all treatment followed by oat meal broth (9 mg/100 ml). Minimum dry mycelium weight (5.66 mg/100 ml) was observed in potato dextrose broth. Dry matter growth rate (mg/day) of *Pleurotus* species (PL-21-09), maximum dried mycelial growth rate (0.66 mg/day) was observed in malt extract broth (MEB) followed by oat meal broth (0.60 mg/day). The minimum dried mycelial growth rate (0.37 mg/day) was observed in potato dextrose broth.

The observations of mycelial growth were recorded are shown in Table 1.

Table 1: Effect of different media on mycelial growth and dry matter weight of *Pleurotus* species (PL-21-09).

S. N.	Treatments Details	Mycelial growth (mm)			Growth rate (mm/day)	Dry matter weight (mg/100 ml)	Dry matter growth rate (mg/day)
		3th Day	6th Day	9th Day			
1.	Malt extract agar media	27.66	61.00	90.00	10.00	10.00	0.66
2.	Wheat extract agar media	17.50	31.50	68.33	7.59	6.33	0.42
3.	Yeast malt agar media	20.83	38.50	80.50	8.94	8.66	0.57
4.	Oat meal agar media	26.50	48.66	89.66	9.96	9.00	0.6
5.	Sabouraud dextrose agar media	19.16	36.83	78.00	8.66	8.33	0.55
6.	Czapek Dox agar media	18.00	33.83	69.50	7.72	7.66	0.51
7.	Control (PDA)	16.66	30.33	63.33	7.03	5.66	0.37
CD at 5%		1.31	1.82	1.47	-	1.092	
SE (m)		0.44	0.61	0.57	-	0.356	

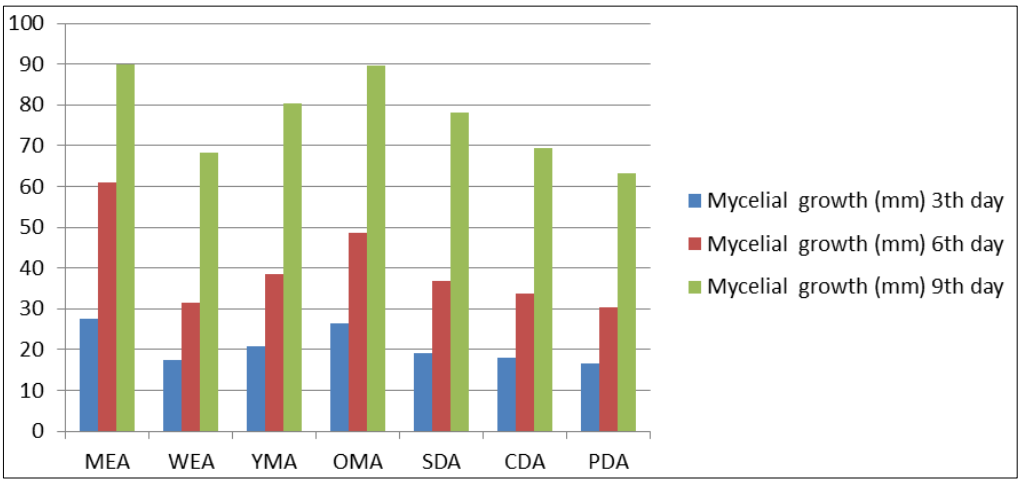

Fig 1: Effect of different media on mycelial growth of *Pleurotus* species (PL-21-09).

Baliyan (2008) [1] observed that maximum radial growth on Malt extract agar (MEA) media as compared to Potato dextrose agar (PDA) and Oat meal agar (OMA) in *Pleurotus sajor caju*. also reported that significantly faster growth rate 11.25 mm/day and mycelial growth 90.00 mm on MEA media while the minimum growth (71.66 mm) was observed in case of *Pleurotus flabellatus* on PDA, the *Pleurotus florida* showed maximum growth 76.00 mm. *Pleurotus fossulatus* showed maximum growth (74.33 mm). These results were almost similer with our findings.

Thanh *et al*. (2020) [8] also tested the different culture media on mycelial growth of *Pleurotus ostreatus*. The result revealed that maximum radial growth rate (1 cm/day) was found in Malt extract agar media while minimum growth rate (0.92 cm/day) was recorded in Potato dextrose agar media**.** These findings were almost similar with our findings.

Conclusion

In the present investigation on Malt extract agar Medium (MEA), Oat meal agar Medium (PDA) and Yeast malt agar medium (YMA) were found to maximum mycelial growth rate and while comparatively less mycelial growth were recorded on Sabouraud dextrose agar medium (SDA), Czapek Dox agar medium (CDA), Wheat extract agar media (WEA) and Potato Dextrose agar (PDA) medium.

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