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Effect of *Pleurotus djamor* Mushroom on Mycelial Growth Across Different Agar Media

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ABSTRACT

This study investigates the mycelial growth of *Pleurotus djamor*, commonly known as the pink oyster mushroom, on various agar media to determine the optimal conditions for its cultivation. The agar media tested include Potato Dextrose Agar (PDA), PDA supplemented with Calcium Carbonate (CaCO3), Sabouraud Dextrose Agar (SDA), Yeast Extract Agar (YEA), and Wheat Bran Agar (WBA). *Pleurotus djamor* is a widely cultivated edible mushroom species, known for its distinctive pink coloration, rapid growth, and potential nutritional and medicinal benefits. Successful cultivation of this mushroom depends heavily on the mycelial growth stage, which in turn is influenced by the composition of the growth medium. The study was designed to assess how different nutrient compositions in these agar media affect the mycelial expansion of *P. djamor.* The fungal strain was inoculated on each medium and incubated at 25°C in the dark. Mycelial growth was monitored daily, and the diameter of the colonies was measured to quantify the growth rate and overall mycelial vigor. Results revealed that Wheat Bran Agar (WBA) supported the most robust mycelial growth, with the mycelium covering the plate in a shorter time compared to other media. This medium, enriched with wheat bran, provided a nutrient-rich environment, particularly high in carbohydrates and proteins, which are crucial for the rapid and vigorous development of *P. djamor*. In contrast, Sabouraud Dextrose Agar (SDA) and Yeast Extract Agar (YEA) were found to be less suitable for P. djamor, exhibiting sparse and weak growth. PDA, a commonly used medium for fungal cultivation, supported good growth but was less effective than WBA. The addition of CaCO3 to PDA resulted in moderate growth, suggesting that pH buffering has a role, though not as significant as nutrient composition in influencing mycelial expansion. This study concludes that Wheat Bran Agar is the most effective medium for promoting the mycelial growth of *Pleurotus djamor*. These findings highlight the importance of selecting a suitable growth medium based on the specific nutritional requirements of the fungal species, which is essential for optimizing cultivation practices.

Key words: *Pleurotus djamor, Agar media, Mycelial growth, Wheat Bran Agar, Potato dextrose Agar, Sabouraud dextrose agar, Yeast extract agar*

Introduction

The genus *Pleurotus*, commonly known as oyster mushrooms, represents a diverse group of fungi with significant economic, nutritional, and ecological importance (Bach *et al*., 2017). Among the various species within this genus, *Pleurotus djamor*-the pink oyster mushroom-stands out due to its vibrant color, rapid growth, and adaptability to a broad range of environmental conditions. These unique attributes have made *P. djamor* a subject of interest in both commercial cultivation and scientific re-

search.

Biological and Ecological Significance of *Pleurotus djamor*

Pleurotus djamor is easily recognized by its striking pink coloration, attributed to the presence of carotenoids. These pigments not only contribute to the mushroom's visual appeal but also have antioxidant properties, enhancing the mushroom's value as a functional food The species' ability to grow rapidly and colonize various substrates is linked to its efficient ligninolytic enzyme system, which can break down complex organic materials like lignin, cellulose, and hemicellulose. This enzymatic activity is crucial for nutrient cycling within ecosystems, particularly in the forested areas where *P. djamor* naturally thrives. Nutritionally, *P. djamor* is a rich source of proteins, vitamins, and minerals (Siti-Nuramira *et al*., 2022). It contains all essential amino acids, with a protein content that rivals that of animal products. Also, it is low in fat and high in dietary fiber, contributing to health benefits such as cholesterol reduction and improved digestive health. The bioactive compounds in *P. djamor*, including polysaccharides, terpenoids, and phenolic compounds, exhibit Antioxidant, Antimicrobial, and Immunomodulatory effects, making this mushroom a potential candidate for nutraceuticals and functional foods (Ýnci *et al*., 2024; Süfer *et al*., 2022).

Economic Importance and Cultivation Practices

The cultivation of *Pleurotus* species, including *P. djamor*, has expanded globally, driven by the increasing demand for sustainable and nutritious food sources. Oyster mushrooms are typically grown on agricultural waste products like straw, sawdust, and cotton waste, which are inexpensive and readily available (Sathiyaseelan *et al*., 2024). This practice not only reduces production costs but also promotes environmental sustainability by recycling waste materials. *P. djamor* is particularly favored by cultivators due to its ability to grow on a wide range of substrates and its short cultivation cycle, which can yield multiple harvests within a few weeks. Successful cultivation depends on optimizing growth conditions, especially during the mycelial phase, which is the vegetative stage where the fungus develops its network of hyphae. The mycelium serves as the foundation for fruiting body development, and its growth is influenced by factors such as temperature, pH, humidity, and the composition of the growth medium (Magday Jr. 2014). The choice of substrate is critical as it provides essential nutrients for mycelial growth. An optimized medium not only supports rapid and robust mycelial development but also enhances the overall yield and quality of the mushroom crop.

Role of Agar Media in Mycological Research

Agar media are essential tools in mycological research, offering a controlled environment to study fungal growth. These media are made from agar, a gel-like substance derived from seaweed, and are supplemented with various nutrients. Agar media allow researchers to investigate the effects of different nutrients, pH levels, and environmental factors on fungal growth, which is crucial for understanding the nutritional requirements of fungi and developing optimized cultivation practices. Several types of agar media are used in mycological studies (Gutarowska and Piotrowska, 2007), each tailored to meet the specific needs of different fungi. Potato Dextrose Agar (PDA) is widely used for culturing fungi, particularly saprophytic species like Pleurotus. PDA provides a balanced mix of carbohydrates, vitamins, and minerals, making it ideal for initial cultivation and maintenance of fungal cultures. Sabouraud Dextrose Agar (SDA), another common medium, is rich in dextrose and peptone, supporting the growth of fastidious fungi. However, SDA's high sugar content can lead to slower growth in non-pathogenic fungi like *P. djamor*, which may require a different nutrient balance for optimal development. Other specialized media, such as Wheat Bran Agar (WBA) and Yeast Extract Agar (YEA), cater to the specific nutritional needs of certain fungi. WBA, enriched with wheat bran, provides a nutrient-rich environment that can promote mycelial growth (Das and Abdulhameed, 2020). YEA, rich in nitrogenous compounds, is suitable for culturing bacteria and certain fastidious fungi, though its effectiveness in supporting *P. djamor* growth is less well understood.

Nutritional Requirements and Mycelial Growth of *Pleurotus djamor*

The mycelial stage is crucial for the successful cultivation of *P. djamor*, as it lays the foundation for the development of fruiting bodies (Pan *et al*., 2024). Mycelium consists of a network of hyphae that absorb nutrients from the substrate. Carbohydrates, proteins, and amino acids are essential for mycelial

growth. Simple sugars like glucose and dextrose provide a quick energy source, while more complex carbohydrates, such as those in wheat bran, promote sustained mycelial development. Nitrogen, a key component of amino acids, is also vital for mycelial growth, but an excess can inhibit development, highlighting the importance of optimizing nutrient ratios in the growth medium (Liu *et al*., 2018). The pH of the growth medium is another critical factor, with fungi generally preferring slightly acidic conditions. The addition of calcium carbonate ($CaCO_3$) can buffer the pH, stabilizing the medium and potentially enhancing mycelial growth. Temperature and humidity also play a significant role, with *P. djamor* typically thriving at temperatures between 25 °C and 30 °C and high humidity levels.

Previous Studies and Gaps in the Literature

While many studies have focused on the cultivation of *Pleurotus* species, particularly in optimizing substrate composition and environmental conditions, research specifically on the mycelial growth of *P. djamor* on defined agar media is limited. Most studies emphasize fruiting body production and substrate optimization, leaving gaps in understanding the factors influencing early mycelial development.

Materials and Methods

Fungal Strain

The *Pleurotus djamor* strain used in this study was sourced from a certified culture collection to ensure the authenticity and purity of the fungus. To maintain the strain's viability and freshness, it was cultivated on Potato Dextrose Agar (PDA) slants and stored at 4 °C until required for experimentation.

Media Preparation

Five distinct agar media were prepared using standard laboratory protocols to assess the mycelial growth of *P. djamor*.

Potato Dextrose Agar (PDA) was prepared by boiling 200 g of potato in water to extract the infusion, which was then filtered. To this infusion, 20 g of dextrose and 15 g of agar were added. The mixture was heated until all components dissolved, followed by autoclaving at 121 °C for 15 minutes. The sterilized medium was then poured into sterile Petri dishes.

PDA with Calcium Carbonate (PDA+$CaCO_3$) was prepared similarly to PDA, with the addition of 10 g of Calcium Carbonate to the medium before autoclaving. This modification was made to evaluate the impact of pH buffering on mycelial growth.

Sabouraud Dextrose Agar (SDA) was composed of 40 g of dextrose, 10 g of peptone, and 15 g of agar, dissolved in 1 liter of distilled water. After ensuring complete dissolution of the ingredients, the medium was autoclaved at 121°C for 15 minutes and subsequently poured into Petri dishes.

Yeast Extract Agar (YEA) was prepared by dissolving 5 g of yeast extract, 20 g of dextrose, and 15 g of agar in 1 liter of distilled water. Following autoclaving at 121°C for 15 minutes, the medium was poured into Petri dishes for further use.

Wheat Bran Agar (WBA) was prepared by mixing 30 g of wheat bran with water and simmering the mixture for 30 minutes. The solution was then filtered to obtain a wheat bran extract, to which 15 g of agar were added. The medium was autoclaved at 121 °C for 15 minutes and poured into Petri dishes.

Inoculation and Incubation

For each agar medium, a 5 mm diameter plug of P. djamor mycelium, taken from a fresh culture, was inoculated onto the surface of the prepared plates. The inoculated plates were then incubated at 25°C in the dark to simulate optimal growth conditions. Mycelial growth was observed daily, and measurements were taken using a ruler to track the expansion of the mycelium. The growth was monitored until the mycelium either fully colonized the plate or ceased to expand further.

Experimental Design

The experiment was conducted in triplicate for each medium, with three independent samples per medium to ensure statistical reliability. Growth measurements were averaged, and standard deviations were calculated to assess variability.

Results and Discussion

The mycelial growth of *Pleurotus djamor* varied significantly across the different agar media.

The results are summarized in Table 1.

Discussion

The data clearly indicate that Wheat Bran Agar

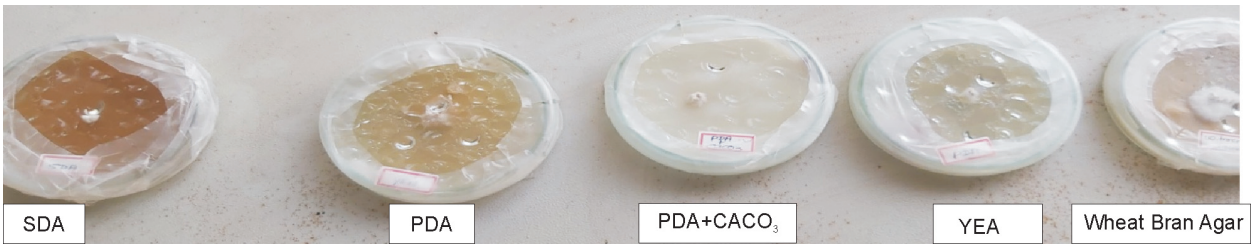

Fig. 1. Mushrooms growth observed on different agar media.

Table 1. Mycelial Growth of *Pleurotus djamor* on Different Agar Media

Agar Medium	Time to Full Growth (Days)	Mycelial Diameter (cm) on Day 5	Colony Morphology
Wheat Bran Agar	6	8.5	Dense, cottony, vigorous
Potato Dextrose Agar	8	7.3	Thick, uniform, good growth
PDA + CaCO3	9	6.8	Moderate, slightly fragmented
Sabouraud Dextrose Agar	11	5.3	Sparse, weak growth
Yeast Extract Agar	12	4.9	Sparse, weak growth

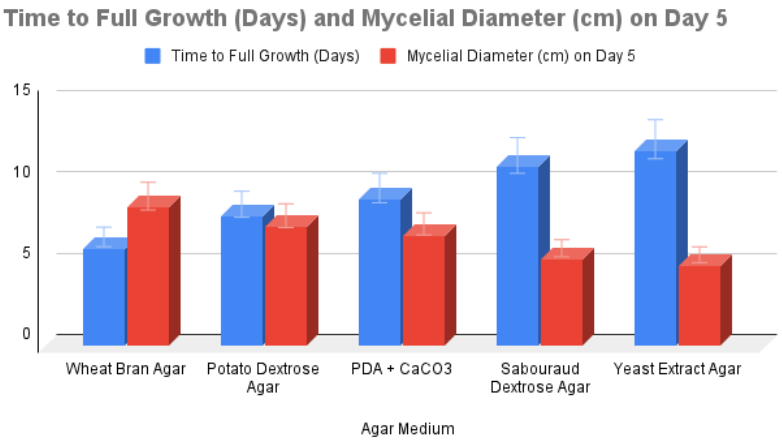

Fig. 2. Compare the growth of *Plurotus djamor* on different agar media.

(WBA) is the most effective medium for promoting the mycelial growth of *Pleurotus djamor*. This is likely due to the rich nutrient content of wheat bran, which provides an optimal mix of carbohydrates, proteins, and other growth factors. PDA, while traditionally used for fungal cultivation, was less effective than WBA, suggesting that *P. djamor* benefits from the additional nutrients provided by wheat bran.

The addition of $CaCO_3$ to PDA resulted in moderate growth, indicating that pH buffering alone is not sufficient to enhance mycelial development significantly. SDA and YEA, typically used for other fungi, were the least effective in supporting P. djamor growth, likely due to their nutrient profiles not aligning with the specific needs of this species.

Conclusion

Wheat Bran Agar is the most suitable medium for cultivating Pleurotus djamor, offering enhanced mycelial growth compared to traditional media like PDA and SDA. This study underscores the importance of selecting an appropriate growth medium tailored to the specific nutritional requirements of the fungal species, which is crucial for optimizing cultivation practices.

Conflict of Interest -None

References

Bach, Fabiane 2017. Edible Mushrooms: A Potential Source of Essential Amino Acids, Glucans and Minerals. *International Journal of Food Science and Technology*. https://doi.org/10.1111/ijfs.13522.

Gutarowska, Beata and Ma³gorzata Piotrowska, 2007. Methods of Mycological Analysis in Buildings. *Building and Environment.* 42(4): 1843-1850. https://linkinghub.elsevier.com/retrieve/pii/S036013230600062X.

Ýnci, Þule, Sevda Kirbag, and Mehmet Akyüz, 2024. Valorization of Local Agro-Residues for the Cultivation of *Pleurotus djamor* (Rumph. Ex Fr.) Boedijn and Their Effects on Nutritional Value. *Biomass Conversion and Biorefinery*. https://link.springer.com/10.1007/s13399-024-05515-3.

Liu, Fei, 2018. Culture Conditions and Nutrition Requirements for the Mycelial Growth of *Isaria farinosa* (Hypocreales: Cordycipitaceae) and the Altitude Effect on its Growth and Metabolome. *Scientific Reports.* 8(1): 15623. https://www.nature.com/articles/s41598-018-33965-z.

M. Sathiyaseelan 2024. Cultivation Potential of Oyster Mushroom (*Pleurotus ostreatus*) using Agricultural Wastes as Substrates. *Indian Journal of Horticulture* 81(02): 196-199. https://journal.iahs.org.in/index.php/ijh/article/view/2514.

Das, M., Mousumi and Sabu Abdulhameed, 2020. Agro-Processing Residues for the Production of Fungal Bio-Control Agents. 107-126. http://link.springer.com/10.1007/978-3-030-39208-6_5.

Magday Jr., J.C. 2014. Optimization of Mycelial Growth and Cultivation of Fruiting Body of Philippine Wild Strain of *Ganoderma lucidum*. *Current Research in Environmental & Applied Mycology.* 4(2): 162-172. http://www.creamjournal.org/pdf/Cream_4_2_4.pdf.

Pan, Jing, 2024. Optimizing Mycelial Protein Yield in Pleurotus Djamor via ARTP Mutagenesis and Hybridization Strategies. *Journal of Biotechnology.* 386: 64-71. https://linkinghub.elsevier.com/retrieve/pii/S0168165624000786.

Siti-Nuramira, J. 2022. Impact of Drying Methods on the Quality of Grey (*Pleurotus sajor* Caju) and Pink (*Pleurotus djamor*) Oyster Mushrooms. *Journal of Food Measurement and Characterization*. https://doi.org/10.1007/s11694-022-01435-w.

Süfer, Özge, 2022. Influences of Some Aromatic Plants on Volatile Compounds and Bioactivity of Cultivated *Pleurotus Citrinopileatus* and *Pleurotus Djamor*. *Chemistry & Biodiversity*. https://pubmed.ncbi.nlm.nih.gov/36322054.