

ARTICLE

Utilization of Local Agro-Residues as Sustainable Culture Media for primary culture Production in Iraqi *Pleurotus* Strains

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ABSTRACT

This study investigated the utilization of local agro-residues as sustainable alternatives to commercial culture media for pure culture production of Iraqi *Pleurotus* strains. The research aimed to develop two indigenous oyster mushroom strains *Pleurotus ostreatus* and *Pleurotus eryngii* on locally-derived culture media, comparing their performance against established reference strains. Culture media were formulated from diverse agricultural byproducts including powdered potato peels, oat flour, barley flour, wheat bran, wheat flour, pine tree leaves, rice sphagnum, and wheat straw and maize cobs. Potato Dextrose Agar at concentrations of 10-40 g/L served as a control medium. The effects of temperature and pH on mycelial growth rates were systematically evaluated. Results demonstrated that local isolates significantly outperformed commercial media on potato peel substrate at concentrations of 10% and 20%, achieving growth rates of 1.06 cm/day for *P. ostreatus* and 0.77 cm/day for *P. eryngii* within the optimal pH range of 5.5–6.5, with no statistically significant differences across this range. The optimal temperature for *P. ostreatus* was 30-35 °C, yielding a maximum growth rate of 1.21 cm/day, whereas *P. eryngii* exhibited maximal growth at 20 °C with 0.94 cm/day. Notably, highest biomass accumulation for both strains was achieved using potato peel liquid medium, yielding 0.40 g and 0.49 g respectively. These findings substantiate that local agro-residues constitute economically viable and sustainable alternatives to commercial culture media for pure culture production of Iraqi *Pleurotus* strains, presenting significant implications for cost-effective mycological research and cultivation practices.

Keywords: local Agro-residues; local strains; *Pleurotus*; Pure Culture

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INTRODUCTION

Fungi have excellent nutritional and medicinal importance, so it gains an important place in the food chain. It has recently led to a significant development of the global fungus market, with an annual sales volume reaching 35 billion US dollars in 2015 and exceeding 59 billion US dollars in 2021 (Sabri *et al.*, 2019).

Edible mushrooms are increasingly important due to their rapid growth, short production cycle, and the possibility of year-round cultivation under controlled conditions. They are also valued for their good nutritional density, as they provide a useful source of protein and contain essential amino acids in notable amounts, in addition to being rich in several B-group

vitamins. Furthermore, mushrooms contain a variety of bioactive compounds associated with potential health and medicinal benefits, including antioxidant, anti-inflammatory, and immunomodulatory properties (Agarwal and Fulgoni, 2021).

Oyster mushroom (*Pleurotus ostreatus*) occupies an intermediate nutritional position between vegetables and animal-derived protein foods such as lamb, beef, fish, and chicken. In addition to containing adequate levels of magnesium, potassium, and phosphorus, it also provides fats, dietary fiber, and carbohydrates. Calcium, iron, sodium, manganese, zinc, and copper are likewise present in appreciable, although relatively small, amounts. Accordingly, oyster mushroom has been described in several studies as a nutritious food with a well-balanced nutritional profile (Tiupova *et al.*, 2025 ; Łysakowska *et al.*, 2023).

Furthermore, medicinal mushrooms are important in medicine because they contain numerous biologically active compounds, including polysaccharides, β -glucans, triterpenoids, and phenolic compounds. Recent studies suggest that these compounds may exert anticancer, antitumor, antioxidant, immunomodulatory, and potentially anti-aging effects. Some evidence also indicates possible supportive benefits in cardiometabolic health, including blood pressure regulation, and as adjunctive support in certain chronic conditions such as HIV/AIDS. In addition, certain mushroom species have shown preliminary potential in improving mood and neurocognitive function; however, current evidence remains limited, and these effects should be considered complementary rather than established standalone treatments (Dimopoulou *et al.*, 2025; Sadowska *et al.*, 2026).

Despite the great diversity of cultured types of fungi, the first positions were given to three main types: *Agaricus bisporus*, which comes in first place in production quantity. Secondly, there are different types of oyster mushrooms *Pleurotus* spp. Finally, *Lentinula edodes* comes in the third place, the species belongs to these three genera constitute approximately three-quarters of the quantities produced from mushrooms grown worldwide (Aso-Campos and Zolla, 2025; De Cianni *et al.*, 2023).

On the one hand, *Pleurotus* spp. are characterized by relatively easy cultivation and comparatively low production costs, largely because they can be grown on a wide variety of inexpensive agricultural residues and usually require less complex cultivation conditions than some other commercial mushrooms (Jarial *et al.*, 2024; Ghafoor and Niazi, 2025; Gupta *et al.*, 2026).

These advantages have contributed to their widespread production in many countries, especially in Asia, which remains the principal hub for oyster mushroom production and consumption; however, while Asia clearly dominates the global *Pleurotus* sector, the specific estimate of 99% of total global production is not consistently verified in the most recent literature (Oke *et al.*, 2025). The natural environment is the primary source of cultured strains, and these strains are adopted after purification and activation, and hybridization processes are sometimes carried out on them. They are registered with the competent organizations to preserve them after establishing their genetic map. Recently, and due to the environmental diversity in Iraq, attention has been directed towards collecting and approving isolates of local food fungi. Indeed, several studies have been conducted about *Ganoderma lucidum* and *Pleurotus* spp. first, these fungi are naturally well-suited to Iraq's environmental conditions, and second, they are readily available locally. Additionally, ongoing research efforts aim to preserve and stabilize the genetic traits of these species using molecular classification techniques (Khorshed & Ahmed, 2023). These two types are characterized by a high ability to grow and form colonies in different natural environments, within specific environmental conditions in clean laboratories equipped with the necessary equipment that guarantees the production of pure Spawn seeds of good quality and free from pollutants and ensures high production with good quality (Borah *et al.*, 2020).

These fungi come from commercially well-known local strains in Iraq. Because the ready-made pure culture growth

media are expensive, production is done on a research scale. To lower the production costs of this kind of agriculture, this research was considered, with the goal of improving local natural growing media that are suitable in content for growth of mycelium of the local and recently discovered strains in Iraq and examining their impact on the quality of mycelium.

MATERIALS AND METHODS

Search Implementation location

The research was conducted in the Fleshy Fungi Laboratory of the Medicinal and Aromatic Plants Unit/College of Agricultural Engineering Sciences/ University of Baghdad.

Sources of used strains belonging to the genus *Pleurotus* spp.

The research includes used two local strains of food fungi from the oyster genus obtained from the Iraqi environment - Baghdad Governorate. It belongs to the heat-tolerant *Pleurotus ostreatus* and the *Pleurotus eryngii* (Figure1 A and B). In addition to the two standard strains of the same species for comparison purposes, which were obtained from the Ministry of Agriculture/Agricultural Protection Department/National Center for Organic Agriculture and sourced from (Fujian University/People's Republic of China), University of Fujian Agriculture and Forestry/JUNCAO Research Institute.

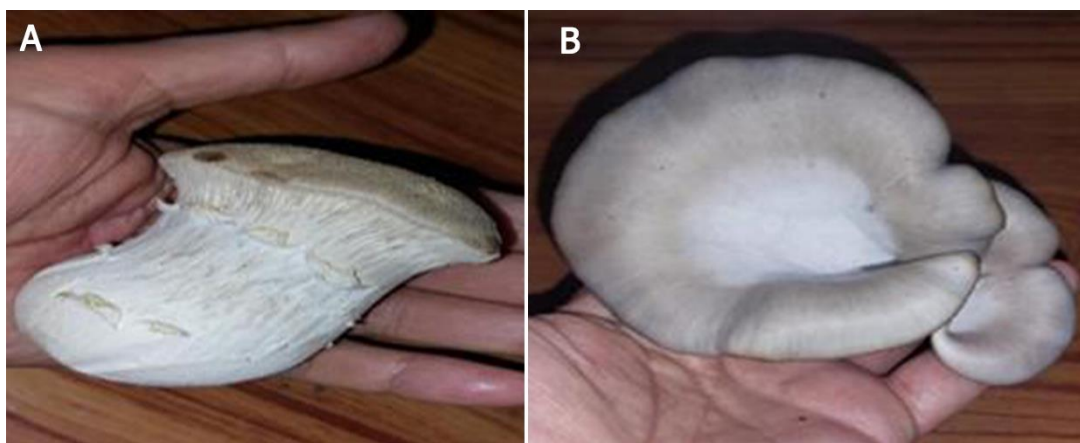


Figure (1) shows pictures of local strains of the oyster mushroom. (A) *Pleurotus ostreatus*, (B) *Pleurotus eryngii*

Preserving isolates of the oyster fungi *Pleurotus* spp. under study

The pure Isolates were preserved by growing it on Potato Dextrose Agar (PDA) in a slant form and then stored at refrigerator temperature. The isolates were later used for study during the research period and were reactivated whenever required.

Studying optimal conditions for growing fungal stock culture of *Pleurotus* spp. isolates

Effect of different concentrations of agricultural waste used as natural media on the daily growth

The study used several natural materials as well as agricultural and industrial wastes, represented by (wheat flour, barley flour, rice hulls, oat flour, wheat bran, potato peels, wheat straw, corn cobs, and leaves of the pumper tree). In order to prepare solid media specific to the amount of *Pleurotus* fungal strains in the pure culture and compare it with the usual commercial medium PDA, they were purchased from local stores.

The waste was thoroughly dried, pulverized, stored in nylon bags, sealed, and kept in the refrigerator until it was

used. It was then dried in an oven set at 60 °C, at concentrations of 10, 20, 30, and 40 g/L of distilled water, the previously indicated natural media have been made at a 15 g/L concentration, agar has been added to the natural media, after thoroughly mixing of the media components, a pH meter and a solution of NaOH or HCl with a concentration of 0.10 M were used to adjust the pH to 6.5. In addition to the commercial PDA medium, a set of natural media (agar potato peel medium, barley flour medium, agar oat flour medium, agar wheat flour medium, agar wheat bran medium, Agar rice husk medium, Agar pamper tree leaves medium, Agar corn cops medium, and agar wheat straw medium) denoted by the numbers (1, 2, 3, 4, 5, 6, 7, 8, 9) should be available.

It was distributed in 8.5 cm-diameter Petri plates after being autoclaved for 20 min at 121 °C and cooled to roughly 55 °C. Notably, all of such procedures were performed in sterile conditions within an inoculation cabin that was incubated. The natural medium were after that inoculated with a piece of mycelium on PDA medium by positioning that piece in the center of the dish, sealing the dishes with parafilm tape, and placing each of the three dishes in a nylon bag. Mycelium was observed until it had finished growing in the dish, which was kept at a temperature of 25 °C. The following formula was used to get the growth rate (Bellettini *et al.*, 2019; Vilas *et al.*, 2020).

$$\text{Growth rate (cm/day)} = \frac{X}{Y}$$

Where: **X**: represents the diameter of the dish of 8.5 cm

Y: is the time required for fungal growth to the edge of the dish or to fill it with growth

Effect of pH on the daily growth rate in several growth media

Agar has been added to the media at a concentration of 15g/L of sterilized water, and the impact of pH values (5, 5.50, 6, 6.50, and 7) on the growth rate of the fungi under investigation was examined. Because the tested media pH function varied, the pH numbers of the media have been corrected to the values indicated using a 0.1 standard HCl or NaOH solution, as indicated in Table (1). After being sterilized for 20 min at 121 °C in an autoclave, they were cooled to roughly 55 °C. They were distributed among 8.5 cm-diameter Petri dishes. A part of freshly generated culture was used to inoculate the plates, and the mycelial growth was tracked based on the growth rate variation until the plate was full.

Table (1) pH of the natural media used to prepare the pure culture

No	Medium	Symbol	pH
1	Potato dextrose agar medium	PDA	5.15
2	Wheat flour agar medium	WFA	5.70
3	Barley flour agar medium	BFA	5.85
4	Oat flour agar medium	OFA	5.61
5	Wheat bran agar medium	WBA	5.9
6	Potato peels agar medium	PPA	6.30
7	Bamber tree leaves agar medium	BTLA	7.69

Effect of different temperatures on the daily growth rate

With the use of a commercial PDA medium as a reference, the impact of temperatures of 20°, 25°, 30°, and 35 °C on the rate of fungal growth in the produced media was investigated. Agar at a concentration of 15 g/L of sterilized

distilled was added to the aforementioned natural media after they had been prepared at a concentration of 20 g/L, after setting the pH of the natural media to 6.5. It was distributed in 8.5 cm-diameter Petri plates after being autoclave sterilized for 15 min at 121 °C and cooled to roughly 55 °C the plates have been inoculated and incubated at the specified temperatures. Mycelial growth was monitored until the plate was full, and the equation from the previous section was used to determine the variation in the daily growth rate.

Effect of liquid growing media on the biomass weight

To measure the biomass of the tested oyster fungi, the natural media mentioned previously in Table 2 were used. The media prepared without adding any agar and includes (liquid potato dextrose medium, liquid potato peeling medium, liquid barley flour medium, liquid oat flour medium, liquid wheat flour medium, liquid wheat bran medium, liquid wheat straw medium) by placing 50 g of the ground of each medium in 1000 mL glass jars separately.

Glucose has been added at a rate of 20 g/L, left to boil for 15 minutes, then filtered, and the volume was added to a full liter by adding sterilized distilled . It was distributed in 8.5 cm-diameter Petri plates after being autoclave sterilized for 20 min at 121 °C and cooled to roughly 55 °C. Then, the media was inoculated with five pieces with a diameter of 4 mm for each beaker of mycelium. The fungi were incubated at 25 °C for 14 days.

The media were compared to the standard medium represented by liquid potato dextrose broth medium, prepared by boiling 200 g of peeled and cut potatoes in a liter of sterilized distilled. It was then filtered, the volume was brought to a full liter, and glucose was added at 20 g/L. The biomass was separated from each medium separately, and the dry weight was obtained by drying the biomass at room temperature by placing it on dry filter paper that its weight is known, and the weight of the biomass was calculated from the following equation ([Nguyen and Ranamukhaarachchi, 2020](#); [Mahmud et al., 2021](#)).

$$\text{Biomass} = (\text{Filter paper weight} + \text{Mycelium weight}) - \text{Filter paper weight}.$$

RESULTS AND DISCUSSION

Impact of different concentrations of agricultural waste used as natural media on the daily growth rate of isolates of the fungi *Pleurotus* spp. under laboratory conditions

The results of (Figures 2 and 3) showed a variance in the daily growth rates of the tested local isolates compared to the foreign isolates of oyster fungus. The tested species also showed a difference in growth rates due to the type and concentration of the medium used. It was found that the behavior of the two strains in terms of growth rates was very similar in being affected by the medium and concentration of rests when comparing the local isolate (PoL) of *P. ostreatus* with the foreign one (PoC), and the same was true for the local isolate of the fungus (PeL) *P. eryngii* and the foreign (PeC), as well. Both (PoC) and (PoL) achieved the highest growth rate in Wheat flour agar medium (WFAM), reaching 1.06 cm/day for both at concentrations of 10% and 20%, without a difference between them. The two fungi achieved the same value when growing in an OFAM medium but at a concentration of 40%. It was also found that the Oyster mushroom *P. eryngii* recorded growth rates somewhat lower than the fungus *P. ostreatus*. PeC and PeL recorded the highest growth rate of 0.77 cm/day in (PPAM) at a concentration of 10% and 20%, and no difference was recorded. Media 3 and 4 were at a concentration of 40% of the medium.

The local isolate and the foreign strain PoL and PoC achieved the lowest growth rate of 0.60 cm/day in medium eight at 10 and 20% concentrations. The local isolate PoL did not record a significant difference in the same growth value in media No. 6 and 7 at 10 and 20% concentrations.

In comparison, the local isolate of the fungus PeL had recorded the lowest daily growth rate of 0.47 cm/day in medium 7 at a concentration of 10% without any difference from the foreign strain PeC, as they both achieved the same growth rate on the same medium and concentration. From the results in Figure 2 it is noted that the daily growth rate achieved for both local isolates and the two foreign strains increased proportionally with the concentration of the base material in the medium.

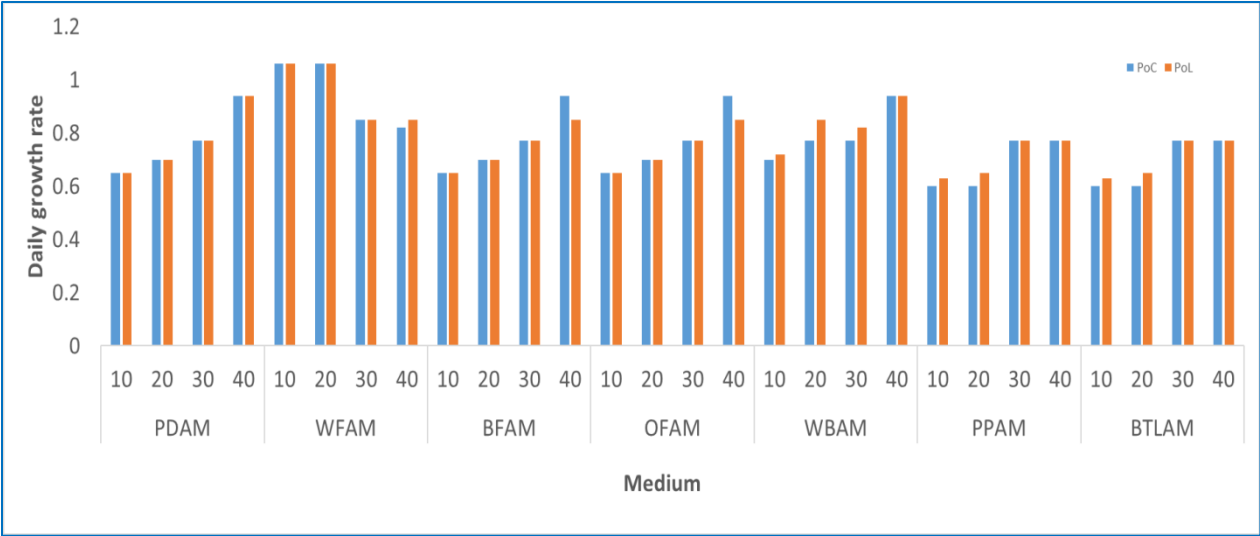


Figure (2) Effects of different concentration levels of agricultural waste used as natural media on the daily growth rate of oyster mushroom isolate *Pleurotus ostreatus*.

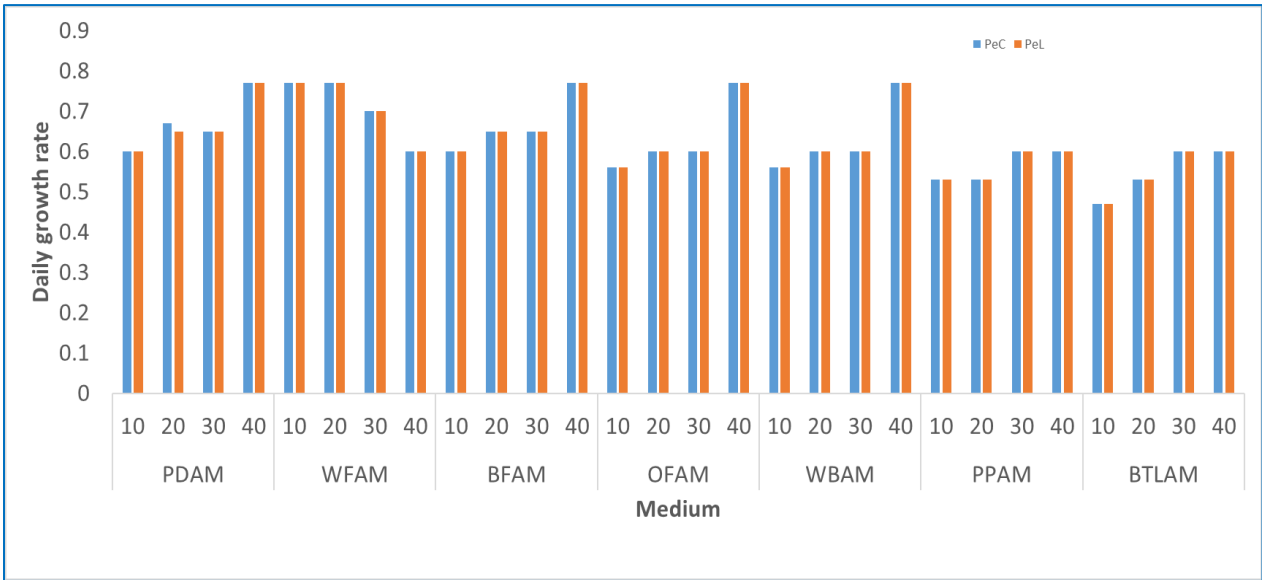


Figure (3) Effects of different concentration levels of agricultural waste used as natural media on the daily growth rate of oyster mushroom isolate *Pleurotus eryngii*.

However, the potato peel agar medium was an exception to this condition, although it achieved the highest growth rate at its lowest concentrations in the medium. The difference is due to the effect of the media on the fungal daily growth rate in the study, which was due to their different contents of nutrients. On the other hand, the media differed in the ratio of carbon to nitrogen (C/N), one of the factors closely related to influencing the growth rates of fungi

according to their different genus.

For this reason, the media was strengthened by adding growth promoters to the mycelium, such as grain bran medium or urea medium (Kumla *et al.*, 2020). The difference in the growth rate of the strains, especially between different species, may be the difference in their ability to secrete enzymes that decompose lignocellulolytic enzymes, and thus affect their ability to decompose these media and use the decomposition products as nutrients for growth, as indicated by (Ismail *et al.*, 2019).

From observing the result, the daily growth rate is inversely proportional to the increase in the concentration of the potato peel agar (PPAM) compared to the rest of the media. We believe that the reason may be due to the potato preservatives that are used, especially in imported quantities that are widespread in the markets, or the presence and concentration of solanine near the peel in the Potatoes' tubers when exposed to sunlight in the fields (Sultana *et al.*, 2018). This may be due to the heavy use of fungicides for this crop due to its exposure to a wide range of pesticides, which is confirmed by the low growth rate in the PDA medium compared to the rest of the media.

Impact of (pH) on the daily growth rate of the mycelium *Pleurotus* spp. in several growth media

The results of (Figures 4 and 5) showed the changes in the daily growth rate due to the effect of the pH of the natural media used in growing the studied oyster mushroom species at a specific incubation temperature of 25 °C and in the absence of light. It was noted that the growth rates of the tested isolates were superior in the range of 5.5 - 6.5, and the growth rate decreased at 5.0 and 7.0 in all tested media.

The local isolate *Pleurotus ostreatus* (PoL) recorded the highest growth rates of its mycelium, reaching 1.06 cm/day at pH (5.5, 6, and 6.5) in media 2, without a difference from the fungus PoC, which recorded the same growth rate in both media.

The PoL mushroom did not differ from the PoC at pH (5.5, 6, and 6.5) in achieving a daily growth rate of 0.94 cm/day in media 6 and 7, as well as PDAM (comparison medium), but the growth rate of the local fungus was lowered from that of the foreign strain in media 3 and 5. It recorded 0.85 cm/day.

On the other hand, the behavior of the Oyster mushroom, *Pleurotus eryngii*, with its two local PeL and foreign isolates, PeC, did not differ from the previous two types, as the Pe1 isolate recorded its highest growth rates in the pH range of 5.5 - 6.5, reaching 0.77 cm/day in media No. (1, 2, 3, 4, and 5). The PeC strain did not differ from it in achieving the best growth rates at the same pH but decreased in the rest of the media numbers (6, and 7) to record 0.60 cm/day.

The oyster fungal species *Pleurotus* spp. varies in its daily growth rate with changes in the pH of the medium due to genetic differences. The growth rate of the mycelium decreases because of the effect of the pH of the medium on the enzymatic activity of the mycelium (Ibekwe *et al.*, 2008). It is considered an important factor because of its effect on hydrolytic and oxidative enzymes, which it relies on in analyzing organic materials found in agricultural waste (Zadrazil, 1978). These results are consistent with what was reported (Ibekwe *et al.*, 2008). When growing two types of oyster fungus, *P. ostreatus* and *P. sajor-caju*, that achieved the best mycelial growth at pH 5, 6, and 6.4. This result was reinforced by (Ibekwe *et al.*, 2008). When it was found that the two fungi, *P. eryngii* and *P. florida*, are growth-inhibited at pH 4.

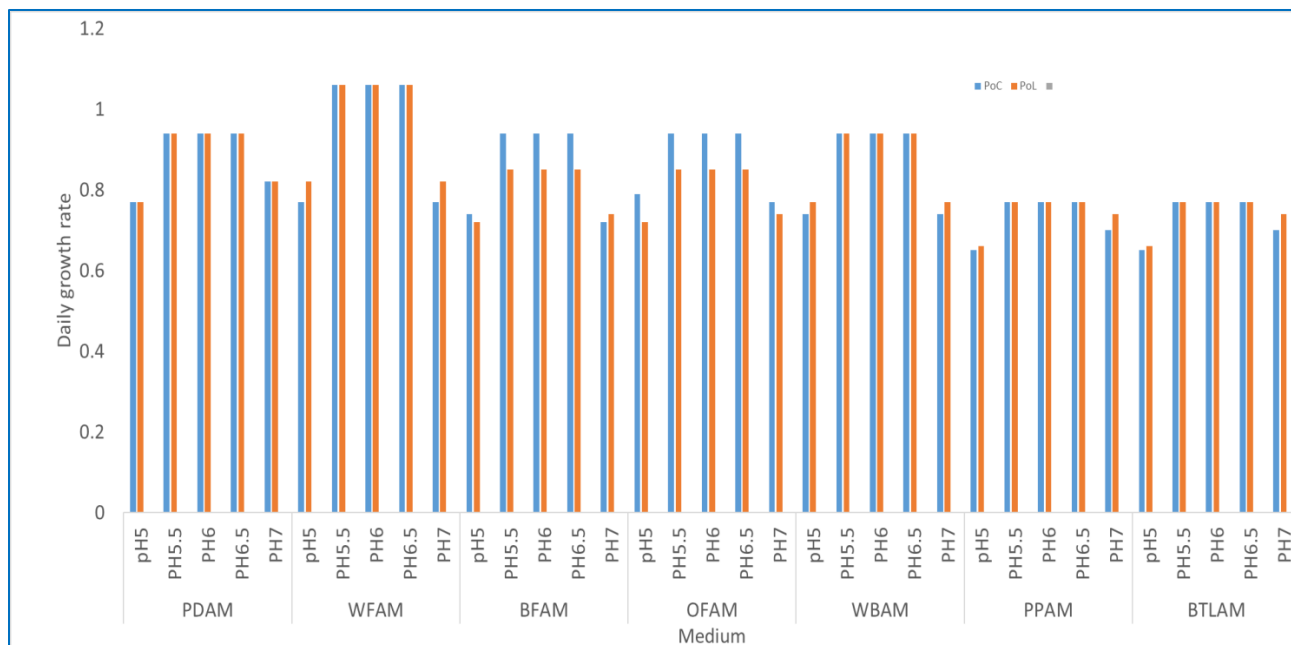


Figure (4) Effects of pH on the daily growth rate of Mycelium of *Pleurotus ostreatus* isolate in several growth media

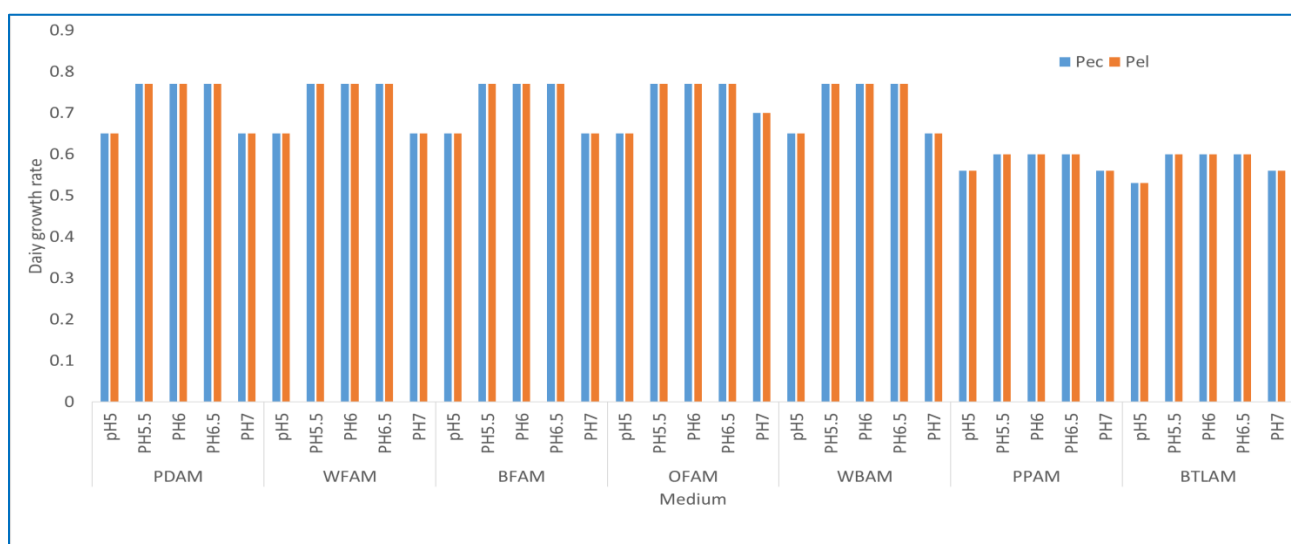


Figure (5) Effects of pH on the daily growth rate of mycelium of *Pleurotus eryngii*. isolate in several growth media

Impact of different temperatures on the daily growth rate of mycelium of *Pleurotus* spp.

Setting the pH of the media at 6.5, the results demonstrated that the temperature differential had a noticeable impact on the daily growth rates of mycelium for all strains of the oyster fungus *Pleurotus* under investigation at temperatures between 20 and 25 °C, the fungus PoC grew at its fastest pace, reaching 1.06 cm per day. The growth rates of the two classes in each of the mediums (2, and 4) did not differ, while the growth rates of mediums 1, 3, 4 and 5 were clearly superior (as they reached 0.94 cm/day). It should be noted that the findings support the information in (Figures 6 and 7). Mediations 9 and 10 recorded a 0.77 cm/day rate.

It was also noted that the growth rate of this fungus formed an inverse relationship. The fungus PoL showed a different behavior by increasing its daily growth rate with increasing temperatures, recording the highest growth rate in

medium 2, reaching 1.21 cm/day at 30 and 35 °C, without any difference between the two temperatures on the same medium.

A daily growth rate was also recorded, which amounted to 0.94 cm/day in both commercial medium PDA and mediations No. 3 and 6, with superiority to the growth rate in mediation 7, which reached 0.91 cm/day. On the other hand, the isolate PeL and the foreign strain PeC did not record a difference between the daily growth rate at 20 °C, which achieved the highest daily growth rate of 0.94 cm/day in both the commercial medium (PDA) and the media numbered (2, 3, 4, 5, 6, and 7). It is worth saying that, at the same temperature, no differences were recorded in daily growth rates, which reached 0.70 cm/day but decreased in circles (6 and 7).

In contrast, to isolate PoL, daily growth rates were inversely proportional to increasing temperatures for both PeL and PeC, recording the lowest daily growth rate in medium nine at 35 °C, which was 0.53 cm/day.

Knowing the ideal temperatures for species, which directly affect enzymatic activities, is extremely important because they are linked to mycelium growth rates, which negatively or positively impacts the economic aspect, as these species are productive. The time factor is important in reducing growth costs (Rai *et al.*, 2015), as specified. This test determines the growth temperature range beyond which it may inhibit mycelial growth (Rai *et al.*, 2015). From observing the results of the growth nature of the species PoC, PeL, and PeC of oyster fungi at different temperatures, we found their effect was similar, achieving the best growth rate at 20 and 25 °C. This is similar to the results obtained by (Gorai and Sharma, 2018).

When growing several types of oyster fungus. Including *Pleurotus ostreatus* on PDA medium and at four temperatures, 25 °C was the optimum temperature for most oyster mushrooms. The local isolation of the fungus Po1 is different from that of the other species. The higher the temperature, reaching 35 °C the higher the daily growth rate, because some strains grow and active at high temperatures, and their tolerance to high temperatures is attributed to their growth environment, which is the local Iraqi environment. The optimal temperature for growth indicates that the local isolate can grow best at the beginning of summer and autumn; which provides the possibility of cultivation in subtropical regions.

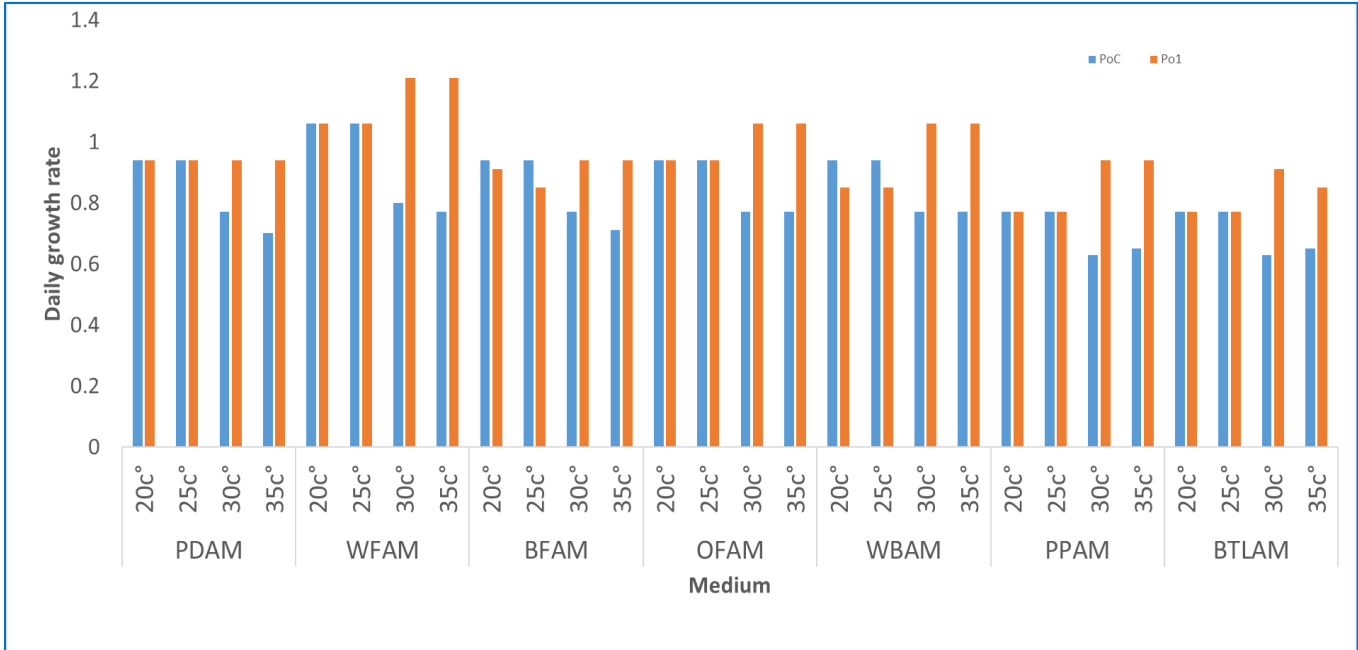


Figure (6) Effects of different temperatures on the daily growth rate of laboratory isolates of the fungus *Pleurotus ostreatus*

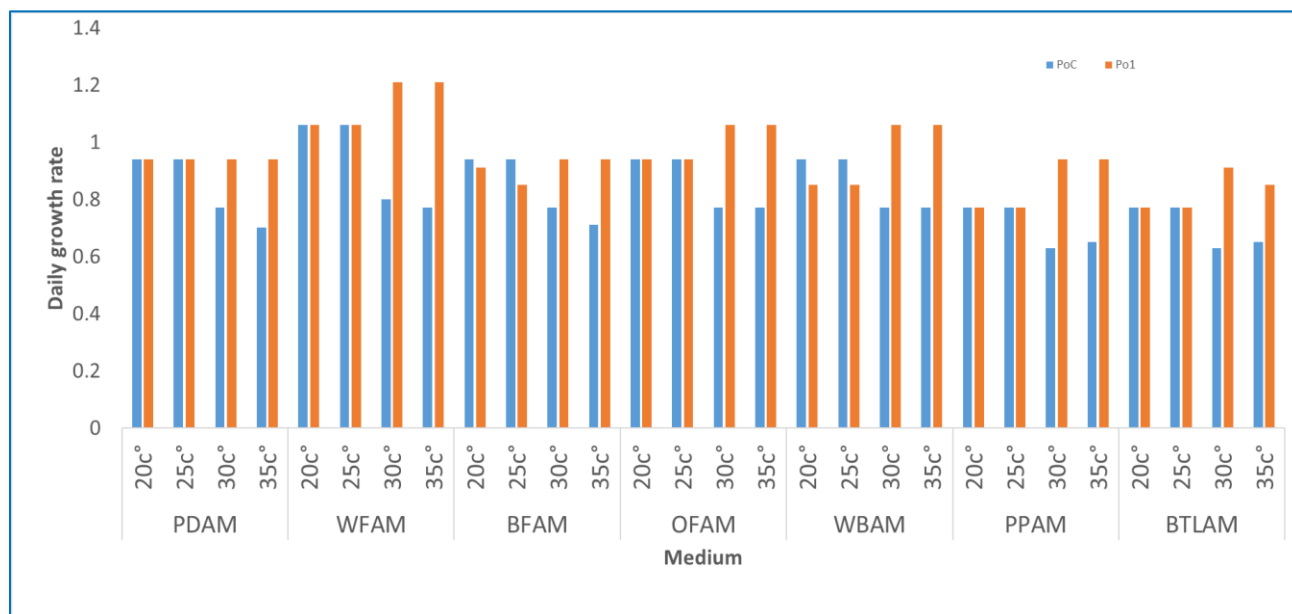


Figure (7) Effects of different temperatures on the daily growth rate of laboratory isolates of the fungus *Pleurotus eryngii*

Impact of liquid growing media on the biomass weight of *Pleurotus* spp.

Figure 8 shows the effect of liquid media on biomass weight after 14 days of incubation for the oyster fungi under study. The results show differences in the general average biomass weight due to the strain type. The local isolate PoL recorded a lower biomass weight of 0.22 g than the strain PoC, which recorded 0.27 g.

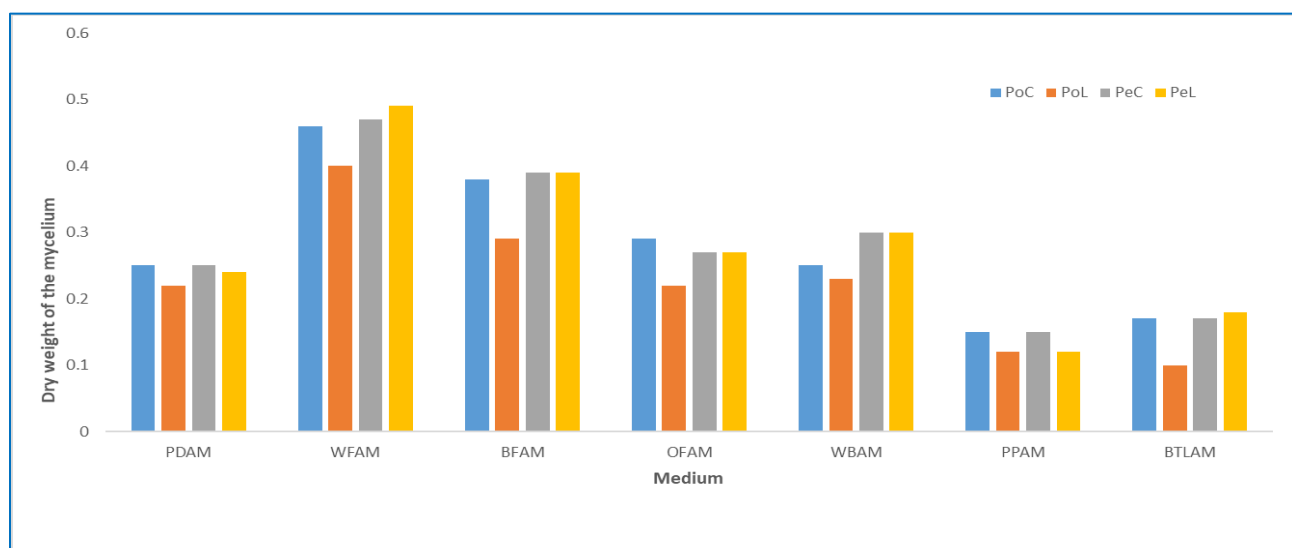


Figure (8) Growth of isolates of the oyster mushroom *Pleurotus* spp. on natural liquid media and their effect on the dry weight of the mycelium

The media affected the weight of biomass. Isolate PoL achieved the highest rate of biomass in the liquid potato peel medium and the liquid oat flour medium, which amounted to 0.40 grams. The liquid barley flour medium did not record a difference from the liquid wheat bran medium and the liquid wheat flour medium, which recorded 0.23 and

0.29, and 0.22 g, respectively. While the PoC strain on the growth medium, liquid potato peels, showed the highest biomass weight of 0.46 and 0.42 g for the OFL medium.

As for the local isolate of the oyster fungus PeL, no difference was recorded in the weight of biomass for commercial media, media number 6 and number 7 that recorded (0.24, 0.12, and 0.18 g), respectively, while the foreign strain of *Pleurotus eryngii* achieved the highest biomass rate of (0.47, 0.43, and 0.39 g) for the media (liquid potato peels, liquid oat flour, and liquid barley flour), respectively, with a difference from the commercial medium that was recorded of 0.25 g (Figures 9 and 10).

The effect of the quality of the medium on the weight of mycelium biomass is attributed to the ability of the enzymes of the high oyster fungi to decompose the cellulosic and lignocellulosic materials that make up the agricultural waste media, as they are white rot fungi. This property's efficiency is increased by consuming the nutrients in the liquid media, as they are dissolved in the media (Mahmud *et al.*, 2021). The results were consistent with what was found by (Petre and Teodorescu, 2011).

Regarding the difference in the biomass weight of two species of fungi when grown under the influence of the liquid medium, the wheat bran medium had the greatest effect in obtaining the largest mass of mycelium by 40-35% of the weight of the fungal biomass, followed by the extract Barley by 30-25%.

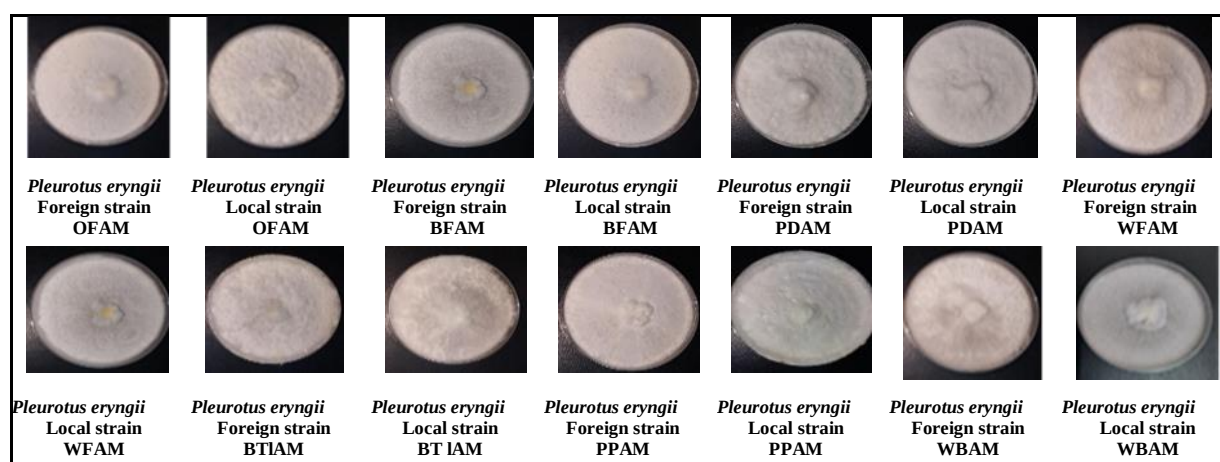


Figure (9) Mother culture of local and foreign strains of the oyster mushroom *Pleurotus eryngii* on different natural media

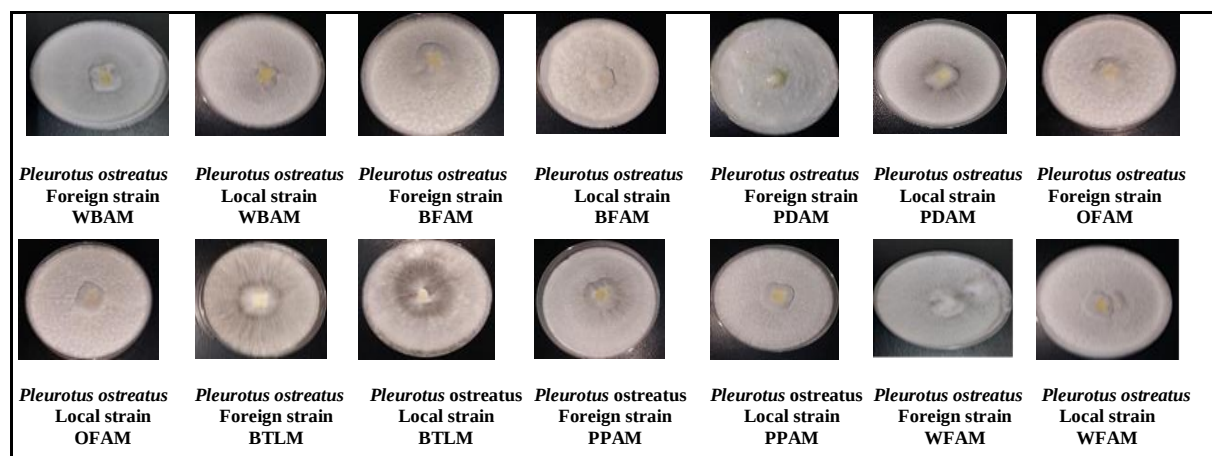


Figure (10) Mother culture of local and foreign strains of the oyster mushroom *Pleurotus ostreatus* on different natural media

CONCLUSIONS

This study demonstrated that local culture media prepared from agricultural wastes and natural materials can effectively support the growth and propagation of Iraqi oyster mushroom strains *Pleurotus ostreatus* and *Pleurotus eryngii*, providing a practical alternative to the commercial medium Potato Dextrose Agar. The results showed that potato peel agar and other locally available substrates were capable of supporting rapid mycelial growth and biomass production, particularly at concentrations of 10–20%. Environmental factors also played an important role in fungal development. The optimal pH for both isolates ranged between 5.5 and 6.5, while temperature significantly influenced growth rates. The isolate of *P. ostreatus* achieved the highest daily growth at 30–35 °C, whereas *P. eryngii* showed optimal growth at 20 °C. In addition, the highest biomass production for both isolates was obtained in the potato peel-based medium. Overall, the findings indicate that agricultural by-products such as potato peels and cereal derivatives can be successfully utilized as low-cost culture media for oyster mushroom cultivation. This approach can reduce dependence on imported laboratory media and supports sustainable utilization of local resources for mushroom production and research in Iraq.

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Conflict of interest: The authors declare that they have no relevant financial or non-financial interest to disclose.

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