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Short Communication

Effect of variable light intensities on the mycelial growth of *Pleurotus ostreatus*

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Abstract

Experiments were conducted to observe the influence of variable light intensities on the mycelial growth of *Pleurotus ostreatus* on both solid and liquid media. Light intensity of 100, 200 and 300 lux along with complete light and darkness were evaluated. 200 lux supported the best mycelial growth i.e., 8.26 cm and 10.11 g/ml respectively in solid and liquid media followed by 100 lux (8.17cm and 6.92 g/ml) and complete darkness (7.94 cm and 6.29g/ml). After 200 lux the growth was observed to decline. The minimum mycelial growth was recorded on complete light with 6.87 cm of mycelial diameter in solid medium and 4.08 g/ml of mycelial mat in liquid medium. Results signify that *P. ostreatus* prefer diffused light for its growth instead of complete darkness and full light conditions.

Key words: Light intensity, culture media, mycelial growth, *Pleurotus ostreatus*

Edible *Pleurotus* species refers to Oyster mushroom or *Dhingri* which are excellent nutritional food that have a beneficial impact on metabolism. They have been treasured as food and medicine for thousands of years across the world. Mushroom farming is an important agribusiness, and oyster mushrooms, which have a delicious flavour, are one of the best possibilities for entrepreneurs (Shah *et al*. 2004).The demand for mushrooms has increased over time and mushroom farming has emerged as a highly effective way to recycle agricultural waste and produce nutritious food (Nguyen and Ranamukhaarachchi 2020).Considering its potential value as a source of cheap protein and a boost to agricultural productivity, the necessity for commercial production of edible mushrooms cannot be overstated (Sud 2008). The cultivation of mushrooms on a variety of waste materials from industrial, forestry and agricultural sectors effectively utilises these wastes, minimizing the risks to the environment and human health from their haphazard waste (Nwokoye *et al*. 2010).In order to standardise production methods and increase productivity, an experiment was conducted to study the impact of darkness and light conditions on the growth of the test fungus (*Pleurotus ostreatus*) under laboratory conditions.

Series of experiments were conducted to ascertain the effect of different light intensities such as complete darkness, 100 lux, 200 lux, 300 lux and complete light on the mycelial biomass of the test fungus under laboratory condition. Yeast Malt Agar (YMA) and Potato Dextrose Yeast Broth (PDYB) were used as solid and liquid media for the growth of fungal mycelium. Petri dishes each containing 20 ml of YMA medium were inoculated with a mycelial disc of 5 mm cut with the help of cork borer and placed in centre of the dish. These plates were incubated at 25±2°C at variable light intensities and growth of the fungus was recorded in terms of colony diameter (cm) after 6^{th} and 9^{th} day. 50 ml PDY broth was poured in 150 ml conical flasks and sterilized in autoclave. These were inoculated with the 5 mm disc of test fungus and were

incubated at 25±2°C in BOD incubator at different light intensities. The growth was recorded after 14 days. Different light intensities *viz*., Darkness, 100 lux, 200 lux, 300 lux and complete light was measured by luxmeter. At the end of the experimentation period, the mycelial mats were filtered from the conical flask with the help of filter paper and the collected mycelial mats along with the filter paper were put into hot air oven at 60ºC for 8 hours for complete drying and dry weight was recorded using formula:

$$\text{Dry weight} = \frac{\text{Initial weight (with filter paper (g)} - \text{Final weight (with filter paper (g)}}{\text{Weight of filter paper (g)}}$$

Data in Table 1. depict the effect of various light intensities on mycelial growth of *Pleurotus ostreatus* on solid medium (Yeast Malt Agar). The observations recorded on various light intensities after 6th day of incubation revealed that the light intensity of 200 lux supported the maximum mycelial growth of 8.26 cm followed by 100 lux where 8.17 cm growth was observed and these were statistically on par with each other. However, the growth was moderate in complete darkness (7.94 cm). After 9th day of incubation light intensity of 200 lux, 100 lux and complete darkness were statistically on par with each other. However, minimum mycelial growth (6.87 cm) was recorded in complete light.

Table 1. Effect of various light intensities on mycelial growth of *Pleurotus ostreatus* on solid medium (Yeast Malt Agar)

Light intensity	Mycelial growth (cm)	
	6th Day	9th Day
Complete darkness	7.94	9.00
Complete light	4.91	6.87
100 lux	8.17	9.00
200 lux	8.26	9.00
300 lux	6.68	8.58
CD (P=0.05)	0.172	0.061

Similarly, data presented in Table 2 revealed that the maximum mycelial mat formed at 200 lux light intensity and exhibited best growth of 10. 11 g/ml on fresh weight basis and 0.43g on dry weight basis, it was statistically different from the growth observed in complete darkness and at 100 lux light intensities (6.29g/ml and 6.92g/ml). However, growth on 100 lux and complete darkness were statistically on par with each other. Minimum growth was observed in complete light (4.08g/ml) and was statistically on par with growth observed at 300 lux (5.41gm/ml).

Table 2. Effect of various light intensities on mycelial growth of *Pleurotus ostreatus* on liquid medium (Potato Dextrose Yeast Broth) after 14 days of incubation

Light Intensity	Fresh weight of mycelia (g/ml)	Weight of Dry mycelia (g)
Complete darkness	6.29	0.12
Cmplete light	4.08	0.08
100 lux	6.92	0.13
200 lux	10.11	0.43
300 lux	5.41	0.07
CD (P=0.05)	0.198	0.040

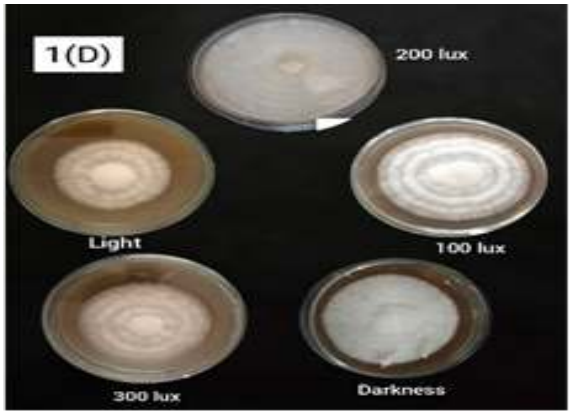

Fig 1. Effect of different light intensities on mycelial growth of *Pleurotus ostreatus* on solid medium (YMA)

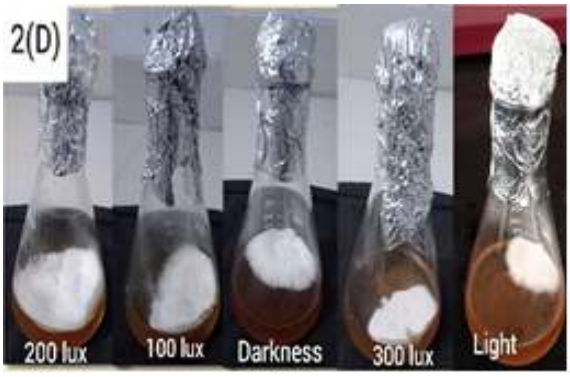

Fig 2. Effect of different light intensities on mycelial growth of *Pleurotus ostreatus* on liquid medium (PDYB)

These results were in conformity with Rout *et al*. (2015) who revealed that the light intensity of 200 lux produced significantly maximum linear mycelial growth of all the test species of *Pleurotus* (63.92-78.89 cm). Similar results were also reported by Jatav *et al*. (2012) that the mushroom prefers total dark (no light) followed by natural diffused light . However, Hussain and Hussain (2004) observed that the growth of *Pleurotus ostreatus* was maximum at 25°C in dark condition. Similar results were also reported by Amita and Atri (2017) they reported that in both solid and liquid medium, mycelial development of *Pleurotus cystidiosus* was much better in the dark condition.

Conclusion

Among different light conditions tested, light intensity of 200 lux favoured the maximum growth of mycelia compared to those grown under complete light condition. However, the growth was moderate in complete darkness. This signifies that *P. ostreatus* prefer diffused light for its growth instead of complete darkness and full light.

Conflict of interest: None of the writers have any competing interests.

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