

Effect Of Natural Light Regime And Air Flow on *Pleurotus pulmonarius* Mycelium During Incubation Period In Sawdust Substrate

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ABSTRACT: Environment factors, light and air flow are believed to effect mycelium growth during incubation period or colonization. Most studies focussed on environment factors for yield production and less intention is given during colonization. The experimental variables were light exposure at natural regime and in the dark together with more air flow and less air flow by using different types of cap. The mycelium growth was observed on 10th, 20th and 30th day of incubation. The highest mean 19.5±.5 cm mycelium was completed within 20 cm total length in light and paper cap incubation method on 30th day with the growth rate was 3.91 cm/day. The lowest 2.2±2.3 cm was found in complete dark and plastic cap incubation method. Hence, this study found the better mycelium growth in paper cap than plastic cap and also in partial light than totally dark.

Keywords: Mycelium colonization, Light, Air flow,

1. INTRODUCTION

Mushroom cultivation is getting important due to it's outstanding nutritional and medicinal properties which are 100% vegetarian food and is good for the patient of diabetes, hypertension, heart diseases and joint pains [1]. The demand of mushrooms especially the grey oyster mushroom (*Pleurotus pulmonarius*) is greater than their production. Mycelium growth is an important factor for a good yield of mushroom [2]. Mycelium growth can be influenced by environmental factors and also by substrate composition [3], [4]. The faster mycelium growth of *P. ostreatus* and *P. pulmonarius* were found at 30°C temperature on sawdust substrate [3]. Fresh air and low level of carbon di-oxide increases the growth rate of mycelium and *P. ostreatus* observed higher mycelium growth in 0.1% CO₂ concentration [5]. Datta and Chakraborty (2002) [6] found that darkness favored the spawn run in *P. sajor-caju*. The best mycelium growth of *P. citrinopilearus* was found in absence of lighted conditions and the least mycelial growth was found in 40-60 lux condition [7].

Therefore, an observation on mycelium growth during colonization was carried out aiming to study the effect of light and air flow.

2. MATERIALS AND METHOD

2.1 Preparation of Substrate Bags

Substrate bags for mushroom were formulated by the mixture of saw dust, rice bran and agricultural lime with the ratio of 100:10:1. A total of 400 substrate bags were prepared. After that, the bags were sterilized at 21 psi pressure and 121°C temperatures for 30 minutes to kill the spore of bacteria, fungi and other microorganisms [8]. After sterilization, they were cooled to room temperature and injected with *P. pulmonarius* spawn that prepared through tissue culture technique.

2.2 The Incubation Study of Substrate Bags

Spawn injected bags were divided by two groups; in first group, the plastic cap was replaced by paper with rubber band and in second group, the plastic cap was maintained. A hundred bags with paper cap and 100 bags with plastic cap were placed vertically in a dark room and another 100 bags with paper cap and 100 bags with plastic cap were placed in outdoor that can get light 3-5 lux during a day. Humidity and temperature were optimized at 70-80% and 25-30°C respectively [7].

A humidifier unit was placed both in light (outdoor) and dark (indoor) incubation rooms at certain distance to ensure the optimized humidity and to avoid contamination from humidification [9]. The humidifier was configured for 15 minutes running by every 45 minutes interval both in day and night for indoor and only in day for outdoor incubation.

2.3 Data Collection

The mushroom substrate bags were incubated for 30 days and the growth of mycelium was measured on 10th day, 20th days and 30th day of incubation. The whole experiment was repeated three times and the data was collected as the length of mycelium that covered inside the substrate bags. Finally the mycelium growth rate was calculated by the equation -1

$$= \frac{\text{Percentage of completed mycellium}}{\text{Total number of days}} \dots \dots \dots 1$$

2. RESULTS

The results show that within the first 10th day of incubation, sufficient light and air flow is crucial to trigger the mycelium growth. Light is mostly mentioned important for mushroom fruting [10], however this study proved that light also important during colonization. During growth, oxygen is needed at certain concentration and over concentrated of carbon dioxide that led to anaerobic respiration also had inhibited the growth [11].

The highest growth rate 3.91 cm/day was found on 20th days of observation in light condition with paper cap incubation method (Figure 1). The growth rate on 20th days was found maximum in all incubation methods; it means that the mycelium was grown up faster between 11-20 days than 0-10 days and also than 21-30 days. The lowest growth rate was found in the dark with plastic cap incubation method.

It was found that the first 20th day is the most active cell proliferation for the mycelium that brought to the fastest growth rate. This can be seen in all incubation treatments and therefore the presence of light and air flow within this period is very important.

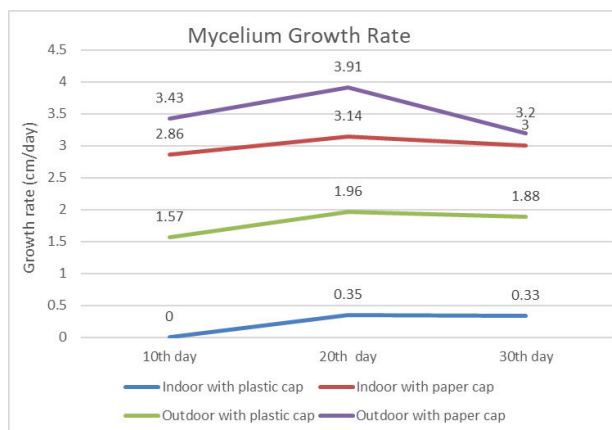


Figure 1: Mycelium growth rate in different incubation methods on 10, 20 and 30 day.

3. CONCLUSION

It is concluded that incubation in partial light condition with paper cap is favoured in good mycelium colonization.

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