

EFFECT OF TEMPERATURE AND pH ON MYCELIAL GROWTH OF OYSTER MUSHROOM (*PLEUROTUS SPECIES*)

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ABSTRACT

All the three species of *Pleurotus* i.e. *P. citrinopileatus*, *P. eryngii* and *P. ostreatus* showed maximum radial growth of mycelium at 30°C on all the three substrates followed by 25°C and 20°C at both the pH 6 as well as 6.5. Minimum mycelial growth was recorded at 35°C. *P. eryngii* failed to grow at 35°C on all the three substrates. Wheat straw supported better and faster growth of *P. ostreatus* than other two species while, sugarcane bagasse supported better growth of *P. eryngii* than other two species. From pH study, it was seen that pH 6 supported optimum mycelial growth of all the three species on all the substrates than at pH 6.5.

Key word: Growth, Mycelial, pH, temperature, *Pleurotus species*.

INTRODUCTION

Oyster mushrooms are botanically the species of *Pleurotus*, which grow naturally in the temperate or tropical forests on dead and decaying wooden logs or sometimes on outer bark of living trees. The fruit bodies of this mushroom are distinctly shelly or oyster shaped with different shades of white, cream, grey, yellow, pink or light brown depending on species (Singh, 1997). Most of the known species of *Pleurotus* are edible and several have been successfully brought under artificial culture (Singh & Kaushal, 2001). The oyster mushroom confers advantages over other mushrooms for its ability to grow on low nitrogen, non-fermented organic wastes and produce in turn fruit bodies with higher nitrogen content (Zadrazil, 1980). Tolerance of wide range of temperature from 18 to 30°C and fast mycelial growth coupled with rapid colonization of substrates are the other characteristics features of this species (Rajarathnam & Bano, 1987). Hence, there is vast potential for the cultivation of oyster mushroom on various lignocellulosic wastes, which are available in plenty.

Temperature is one of the most important physical factors affecting the growth and development of oyster mushroom. The temperature extreme (maximum and minimum) determines the mycelial growth as well as fruit bodies production. The optimum temperature

for growth and production are more frequently of interest of experimental investigators. Like temperature pH is important to the growth and development. Keeping these objectives in view present investigation was taken up.

MATERIALS AND METHODS

In the present work three lignocellulosic substrates viz. wheat straw (*Triticum aestivum*), sugarcane bagasse (*Saccharum officinarum*), brassica haulms (*Brassica campestris*) along with the oyster mushroom - *Pleurotus citrinopileatus*, *P. eryngii* and *P. ostreatus* were selected. Experiment was conducted on solid media to study the effect of temperature and pH on the mycelial growth of *Pleurotus* species. The mushrooms were grown on three lignocellulosic substrates at different temperature (20°C, 25°C, 30°C and 35°C) and pH (6 and 6.5) in solid medium.

Solid medium was prepared using 2% agar- agar and 0.3 % lignocellulosic substrate in distilled water. The medium was warmed till the agar was dissolved in the distilled water and then autoclaved at 121°C and 15 psi pressure for 20 minutes. The pH of the medium was adjusted at 6.0 and 6.5 and 10 ml medium was poured in each petri plate (9cm diameter) under *in vitro* condition. The medium was allowed to solidify in petriplates. After solidification 5mm plug of 10 days old culture was inoculated. The inoculum was cut out with the help of cork borer, which was fully sterilized. The growth of *Pleurotus* species mycelium was measured in term of radial distance at three days interval till the petriplates were completely covered. The experiments were conducted at the temperature of 20°C, 25°C, 30°C and 35°C and at the pH 6 and 6.5.

RESULT AND DISCUSSION

The effect of temperature on the mycelial growth of *Pleurotus* species at pH 6.0 is presented in table- 1. At 20°C all the three species of *Pleurotus* i.e. *Pleurotus ostreatus*, *Pleurotus citrinopileatus* and *Pleurotus eryngii* showed relatively slow growth on all the three solid media which have different substrates i.e. wheat straw, sugarcane bagasse, and brassica haulms with agar. The petri plates were completely filled by mycelial growth of three species either in 15 days or before 15 days on all the three substrate. Among the three species *Pleurotus citrinopileatus* showed better growth than other two species. Sugarcane bagasse supported faster growth than other two substrates.

At 25°C all the three species of *Pleurotus* showed faster growth than 20°C. The petriplates were completely filled by mycelial growth in 12 days except in case of *P. ostreatus* on sugarcane

bagasse and *P. eryngii* on brassica haulms where petriplates were filled in 15 days.

Maximum mycelial growth of *Pleurotus* species was recorded at 30°C. petriplates were completely filled by mycelial growth of *P. ostreatus* on wheat straw, *P. citrinopileatus* and *P. eryngii* on sugarcane bagasse on 9 days. However, petriplates were filled by mycelium of *P. citrinopileatus* and *P. eryngii* on wheat straw and *P. ostreatus* on brassica haulms in 12 days. In other cases it took 15 days.

At 35°C very slow and thin mycelial growth was recorded. *P. eryngii* failed to grow at 35°C on all the three substrates i.e. wheat straw, sugarcane bagasse, and brassica haulms.

Table 2 shows the effect of temperature on the mycelial growth of *Pleurotus* species at pH 6.5. There was not appreciable difference in the mycelial growth of three *Pleurotus* species on the three substrates at pH 6.0 and 6.5. However dense mycelial growth was recorded at pH 6.0 as compared to 6.5.

Sohi and Upadhyay (1989) reported that the desired temperature 20-30°C is also prevalent in large area. In the result of Sohi more species of *Pleurotus* showed maximum growth at 30°C. Singh (1997) observed that *Pleurotus* species failed to grow at pH 4.0 and 8.0. They found maximum mycelial growth at pH 6.0 and 30°C.

In present work *Pleurotus ostreatus* and *P. citrinopileatus* on wheat straw and *P. citrinopileatus* and *P. eryngii* on sugarcane bagasse showed maximum mycelial growth at 30°C and pH 6.0. The observations on the effect of temperature on mycelial growth of three species of *Pleurotus* are in conformity with the findings of Block *et.al.* (1959), Zadrazil (1976, 1978), Quimio (1977) in case of *P. ostreatus*, and Sohi and Upadhyay (1989) in case of *P. florida*, *P. ostreatus* and *P. sajor-caju*. These authors reported maximum mycelial growth at 30°C. However contrasting results have been reported by various workers regarding temperature requirement of different species. Rangad and Jandaik (1977) reported maximum mycelial growth of *P. ostreatus* (Grey) at 25°C where as *P. ostreatus* (Florida) exhibited highest growth at 30°C. However during the present investigation all the three species of *Pleurotus* i.e. *Pleurotus ostreatus*, *Pleurotus citrinopileatus*, *Pleurotus eryngii*, showed maximum growth at 30°C.

It has been observed from pH studies that the three species of *Pleurotus* i.e. *P. ostreatus*, *P. citrinopileatus* and *P. eryngii*, grow well in the pH range of 5-7 and pH 6.0 supported the maximum growth of different species.

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