FACTORS INFLUENCES ON GROWTH OF *Pleurotus mushroom.*

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ABSTRACT:

Experiment was conducted to study the effect of temperature on spawn run period and yield of mushroom fruiting bodies of *P. ostreatus.* Maximum yield of mushroom fruiting bodies was 790 gm/kg dry straw with 79.00 % B.E. and 18 to 19 days spawn run period at 25 ^{0}C was recorded. Minimum yield of mushroom fruiting bodies was 361 gm/kg dry straw with 36.10 % B.E. and 25 to 28 days spawn run period at 15 ^{0}C was found. From this study it was found that, with increase in temperature from 15to 25 ^{0}C the yield of mushroom fruiting bodies increased progressively and spawn run period decreased.

Key words: *P. ostreatus*, Temperature, incubation, B.E. (Biological efficiency), mycelium, yield.

INTRODUCTION:

Mushrooms are the reproductive structure of fleshy macro fungi and rich with protein, vitamin and minerals. Many species of edible mushrooms are known, out of which only few species have been cultivated commercially. Among the various edible mushroom types, *Pleurotus* species have become more popular and widely cultivated throughout the world as they have simple and low cost production technology, shows higher bioefficiency. *Pleurotus* species commonly called as oyster mushroom, due to its oyster like shape. *Pleurotus* species are rich source of vitamin C, B-complex (thiamin, riboflavin, folic acid and niacin), minerals (Ca, P, Fe,K and Na) and protein (Sturion and Otterer,1995; Justo et al. 1998; Manzi, et al.1999 Caglarirmak, 2007). *Pleurotus* species content high potassium: sodium ratio, which makes mushrooms an ideal food for patients suffering from hyper tention and heart diseases. The cultivation of edible mushroom offers one of the most feasible and economic method for the bioconversion of agro-lignocellulosic wastes Bano et al. 1993; Cohen et al, 2002).
Oyster mushrooms can grow well at pH 5-7 and the conditions too acidic or too alkaline will inhibit the growth. The optimal temperatures for the development of *Pleurotus* fruiting bodies can vary among the different species. Bano and Rajarathram (1982) reported the minimum spawn run period in 12 - 14 days at 22 – 36^0 C and maximum spawn run period *22- 24 days at 15 – 25 ^{0}C in P. sajor-caju.* Previous studies of Oei (1991) reported with increase in temperature up to 30^{0}C shortened the spawn run period in *Pleurotus* species. Oei also reported the temperature requirement for formation of mushroom fruiting bodies from 18 to 30^0 C for *P. sajor-caju.* Uddin et al.,(2011) suggested the cultivation of *P. sajor-caju* in temperature zone 14 -27 ^{0} C. Temperature also affect the color of caps in fruiting bodies, at low temperature color of the caps becomes light brown and they turn pale with increase in temperature.

The objective of this work was to study the effect of temperature on spawn run period and yield of *P. ostreatus* fruiting bodies.

MATERIAL AND METHODS:

Culture and cultivation:
The pure culture of *Pleurotus ostreatus* was obtained from National Collection of Industrial Microorganisms (NCIM) National chemical laboratory (NCL), Pune, India. The cultures were maintained on 2% malt extract agar slants at 4 ºC. Sub culturing were done after every 15 days.

Spawn Preparation :
Spawn was prepared in polythene packets. Sorghum whole grains were boiled in water bath for 10 to 15 min. at the ratio of 1:1 (sorghum grain: water) and mixed with 4% (w/w) CaCo3 and 2 % (w/w) CaSo4. Sorghum grains then packed (250g) in polythene bags (200 x 300mm. size and sterilized in an autoclave at 121 ºC for 30 min. After sterilization, the bags were inoculated with actively growing mycelium of the *Pleurotus ostreatus* from the malt extract slants and incubated for mycelial growth.

Cultivation:
The agro waste , soybean straw collected from local farms and used as cultivation substrate, following the method prepared by Bano and Shrivastava (1962) with slight modifications. The substrates were chopped to 2-3 cm. pieces and soaked in water over night to moisten it and excess water was drained off. After soaking, the substrate was steam sterilized at 121 ºC for 20 min. in an autoclave. The polythene bags of the size 35 x 45 cm were filled with sterilized substrates and multi layered technique was adopted for spawning. Each bag was filled with 1 kg dry substrate and the spawn was added at the rate of 2% of the wet weight basis of substrate. After inoculation, the bags were kept for incubation where the temperature and humidity were maintained as per experiment with sufficient light and ventilation. The polythene bags were tear-off following the spawn run. Formation of fruit bodies was evident within 3-5 days after removal of poly bags. The beds were maintained up to the harvest of the third flush after spawning. A small layer of substrate was scrapped off from all the side of the beds after each harvest. Each of the treatment was replicated three times.

Yield and Biological efficiency:
Total weight of all the fruiting bodies harvested from all the three pickings were measured as total yield of mushroom. The biological efficiency (yield of mushroom per kg substrate on dry wt. basis) was calculated by the following formula Chang *et al.* (1981)

$$\boldsymbol{B.E.}\% = \frac{Fresh\ weight\ of\ mushroom}{dry\ weight\ of\ substrate} \times 100$$

RESULT AND DISCUSSION:

Table 1 clearly indicated that, variation in temperature during incubation influences the spawn run period of *Pleurotus ostreatus* mushroom. At 15 ℃ temperature, the mycelium of mushroom grows slowly, due to which the spawn run period increased up to 25-28 days. Spawn run period was slightly reduced from 22-24 days at temperature 20℃. At temperature 25℃ the spawn run period was completed within 18- 19 days because of fast growth of mushroom mycelium. At 30℃ the spawn run period was slightly increased from 21 - 25 days. Earlier several studies also reported that increase in temperature results in reduction of spawn run period of *Pleurotus* mushroom species. Bano and Rajarathram (1982) recorded spawn run period in *Pleurotus sajor-caju* within 12-14 days at 22-36 ℃ , 18-20 days at 20 -26℃ and 22-24 days at 15 -25 ℃. Farlan et.al,(1997) also reported the slow growth of mushroom mycelium at low temperature, 20℃ and growth of mycelium became fast with increase in temperature upto 25, 30℃ in case of *P. ostreatus.* Bugarski et al. (1997) also studied the influence of temperature on mycelial growth of *P. ostreatus* NS 77 strain. Zervakis et al., (2001) compared the effect of different temperature on spawn run period of *Pleurotus ostreatus.*
Data for yield and biological efficiency of mushroom fruiting bodies presented in Table 2. Highest yield of mushroom was recorded (790.00 gm/kg dry straw) at 25℃ with 79.00 % B.E. Superiority of 25℃ temperature for rapid growth of fruiting bodied of *Pleurotus sajor-caju* was reported earlier (Anonymous, 2007). Rangad and Jandaik (1977) reported that *P.ostreatus* produce best yield at 25℃ temperature. Kong (2004) found the optimum growth of *P.sajor-caju, P.ostreatus* and *P. florida at* 25℃. Effect of temperature on the growth of *Pleurotus* species was also studied by Negi and Gupta (1995). At 30 ℃ the yield of mushroom fruiting bodies was 490.66 gm/kg dry straw with 49.06 % B.E. which was followed by yield of mushroom (638.33gm/kg dry straw) with 63.83 % B.E. at 20℃. The minimum yield of mushroom fruiting bodies (361.00gm/ kg dry straw) was recorded at 15 ℃ with 36 % B.E. Oei (1991) also reported the temperatures for mushroom varied from 18 - 30 ℃ for *P.sajor-caju* and from *15 -25* ℃ for *P. sapidus*. Kocyigit and Gunay (1984), Marino et al., (2003) also studied the effect of variation in temperature on the growth and yield of *Pleurotus species.*

Table 1: Effect of Temperature on Spawn run period of *P. ostreatus*.

Spawn run Period of P. *ostreatus* at different temperatures.			
15℃	**20** ℃	**25**℃	**30**℃
25-28 days	**22-24 days**	**18- 19 days**	**21-25 days**

Table 2: Effect of temperature on yield of *P. ostreatus* fruiting bodies.

Yield of *P. ostreatus* fruiting bodies in gm/ kg dry straw.		
Temperature (℃)	**Yield (gm/kg dry straw)**	**B.E. (٪)**
15 ℃	**361.00**	**36.10**
20 ℃	**638.33**	**63.83**
25 ℃	**790.00**	**79.00**
30 ℃	**490.66**	**49.06**

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