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EFFECT OF WATERING INTERVALS ON THE YIELD AND YIELD CONTRIBUTING CHARACTERS OF OYSTER MUSHROOM (*Pleurotus florida*)

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ABSTRACT

The study was conducted to determine the effect of watering intervals on the yield and yield contributing characters of oyster mushroom (*Pleurotus florida*) during March to June 2007 at Mushroom culture house, SAU. Water was sprayed on spawn packet at 24, 12, 8 and 6 hours interval with a control (no watering). The lowest duration (8.020 days) from stimulation to harvest was recorded in watering at 6 hours interval. The highest number of fruiting body (57.54 per packet) was obtained from watering at 6 hours interval. Fresh weight of fruiting body (4.53g) was also the highest under watering at 6 hours interval. The lowest length (2.25 cm) and highest diameter (0.90 cm) of stalk; the highest diameter (5.89 cm) and thickness (0.79 cm) of pileus were obtained from watering at 8 hours interval. The highest biological yield (265.4g), economic yield (254.5g) and dry yield (25.51g) were counted under watering at 6 hours interval. The highest biological efficiency of 91.52% was recorded in watering at 6 hours interval. A significant positive correlation among watering interval and dry yield, and watering interval and biological efficiency were observed. It was found that 62.21% of dry yield and 63% of biological efficiency were attributed to the watering interval..

Key words: Oyster mushroom, watering interval, biological and economic yield, biological efficiency

INTRODUCTION

Oyster mushrooms are large reproductive structures of edible fungi belong to genus *Pleurotus* under the order Agaricales, the family Tricholomataceae and the class Basidiomycetes. The vegetative parts of the mushrooms mainly consist of threadlike long thin mycelium which under suitable condition forms fruiting bodies or sporocarps. The macrofungi have fruiting bodies large enough to be seen with the naked eye and to be picked up by hand (Chang and Miles, 1992). Mushroom could substantiate the suffering from malnutrition to same extent because it produces in large quantities in a short duration and provides more protein per unit area compared to any other crop (Gupta, 1986). In nature, the mushroom mycelium lies under the soil or in the substratum. When conditions are favorable, it forms the reproductive structure, the mushrooms. This stage requires favorable conditions, which are specific for each mushroom species in the production house. By maintaining suitable environment, maximum production of mushrooms can be obtained. Temperature and relative humidity, both are the most important preconditions for better growth and quality mushroom production. Mushroom scientists identified different favorable temperature and relative humidity for different mushroom species for the development of fruiting body in the production house. A temperature range of 20 - 26°C (24±1°C) and relative humidity of 70 - 90% were ideal for *Pleurotus sajor-caju* and a good production can be obtained up to 30°C (Bano and Rajarathnam, 1982). Zadrazil and Schneidereit (1972) observed that the development of *Pleurotus* is greatly dependent on temperature and humidity, which also varied from species to species. Maximum growth of *Pleurotus ostreatus* was recorded

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at 25°C by Rangad and Jandaik (1977), whereas *Pleurotus florida* gave highest yield at 30°C. *Pleurotus flabellatus* also have a similar temperature requirement (Block *et al.*, 1958; Srivastava and Bano, 1970). *Pleurotus eous* prefers a temperature of 21 - 35°C and a humidity of 65 - 100%, but *Pleurotus fossulatus* prefers 20±1°C temperature for fruiting body development (Puri *et al.*, 1981). In our country farmers don't have suitable infrastructure for the control of temperature and moisture in the mushroom production house. Here, farmers grow mushrooms in houses mostly in open air. But for getting a good production, the microclimate of mushroom house should be satisfactory for its growth and reproduction. For maintaining suitable relative humidity and temperature levels in the mushroom production houses, spraying of water with regular intervals could be an alternative method. Watering is necessary for maintaining the microclimate of the production house satisfactory. Therefore, the present study was undertaken to determine the effect of watering intervals for maintaining suitable humidity on oyster mushroom (*Pleurotus florida*) production.

MATERIALS AND METHODS

The experiment was carried out during March to June 2007 at Mushroom culture house, SAU. Spawn packets were collected from Mushroom Culture Center (MCC), Saver, Dhaka. The mushroom house was provided with well ventilation for easy flow of natural air. Watering was done on the spawn packet placed on the shelves of the mushroom house. The treatments used in the experiment were T_1 = No watering (control), T_2 = Watering at 24 hours interval, T_3 = Watering at 12 hours interval, T_4 = Watering at 8 hours interval, T_5 = Watering at 6 hours interval. Data were recorded after each harvesting on the following parameters:

Number of fruiting body: Number of well-developed fruiting body was recorded. Dry and pinheaded fruiting bodies were discarded but tiny fruiting bodies were included in counting.

Weight of fruiting body (g): Average weight of individual fruiting body was calculated by dividing the total weight of fruiting body per packet by the total number of fruiting body per packet.

Dimension of fruiting body (pileus and stalk): Thickness of the pileus of three randomly selected fruiting bodies was measured using a slide calipers. Diameter of pileus, length and diameter of stalk were also measured.

Biological yield (g): Biological yield per 500 g packet was measured by weighing the whole cluster of fruiting body without removing the lower hard and dirty portion.

Economic yield: Economic yield in per 500g packet was recorded by weighing all the fruiting bodies in a packet after removing the lower hard and dirty portion.

Dry yield: About 50g of randomly selected mushroom sample was taken in a paper envelop and was weighed correctly. The mushroom was oven dried at 72°C temperature for 24 hours and weighed again. The weight of blank envelop was subtracted from both the weight. The dry yield was calculated using the following formula:

$$\text{Dry yield (g/500g packet)} = \text{Economic yield} \times \frac{\text{Oven dry weight of sample (g)}}{\text{Fresh weight of sample (g)}}$$

Biological efficiency: Biological efficiency was determined by the following formula:

$$\text{Biological efficiency} = \frac{\text{Total biological weight (g)}}{\text{Total weight substrate usesd (g)}} \times 100.$$

The data were analyzed with computer package program MStat-C. The means were therefore compared using Duncan's Multiple Range Test (DMRT). Correlations among watering interval and biological yield and biological efficiency were also determined.

RESULTS AND DISCUSSION

Duration from stimulation to harvest

The duration from primordia initiation to harvest varied significantly in respect to watering intervals over control. The lowest duration from stimulation to harvest (8.020 days) was recorded in T_5 (Watering at 6 hour interval) followed by T_4 (8.753 days) and the highest duration from stimulation to harvest (14.08 days) was recorded in T_1 (No watering) followed by T_2 (9.91 days)(Table 1). The findings of the present study corroborates with the result of Sarker (2004). He found 6.25 days for primordia initiation from stimulation in case of watering at 6 hours interval for oyster mushroom (*Pleurotus ostreatus*).

Table 1. Effect of different watering intervals on duration from stimulation to harvest, number of fruiting body formed and weight of individual fruiting body of oyster mushroom

Treatments			Duration from stimulation to harvest (days)	Number of fruiting body/packet	Weight of individual fruiting body (gm)
T_1	=	No watering	14.08a	34.05d	3.130d
T_2	=	Watering at 24 hours interval	12.13b	51.34c	3.613c
T_3	=	Watering at 12 hours interval	9.910c	54.60b	4.137b
T_4	=	Watering at 8 hours interval	8.753d	55.2b	4.513a
T_5	=	Watering at 6 hours interval	8.020e	57.54a	4.537a
LSD (0.05)			0.1191	0.6815	0.1191
CV %			0.63	0.72	1.63

Means within the same column having a common letter(s) do not differ significantly (P=0.05)

Number and weight of fruiting body

The highest number of fruiting body per packet (57.54) was obtained from the treatment T_5 (Watering at 6 hr interval) followed by T_4 (55.2) and T_3 (54.6). The lowest number of fruiting body per packet was found under T_1 (34.05) where no watering was done. All the treatments varied significantly over control (Table 1). The highest fresh weight of fruiting body was recorded in T_5 (4.53 gm) followed by T_4 (4.51 gm) and the lowest weight of fruiting body was harvested from T_1 (3.13 gm) that varied significantly from T_2 (3.613 gm) and T_3(4.137 gm) (Table 1). The result of the present study is supported by Zadrazil and Schneidereit (1972). They observed that the development of *Pleurotus* is greatly dependent on temperature and humidity.

Dimension of fruiting body

Length and diameter of stalk, diameter and thickness of pileus under different treatments showed significant difference over control. The lowest length of stalk was obtained in T_4 (2.25 cm) followed by T_5 (2.30 cm), and the highest length was found in T_2 (2.50 cm). The highest diameter of stalk was obtained in T_4 (0.90 cm) followed by T_3 (0.84 cm) and the lowest diameter was in T_1 (0.75 cm). The highest diameter of pileus was obtained in T_4 (5.89 cm) followed by T_5 (5.84 cm) and the lowest diameter was in T_1 (4.71 cm). The highest thickness of pileus was obtained in T_4 (0.79 cm) followed by T_3 (0.74 cm) and the lowest thickness was in T_1 (0.61 cm) (Table 2). Sarker (2004) did not found any significant difference among the dimension of the fruiting body, but in the present study a significant difference is found. This might be due to the seasonal difference.

Table 2. Effect of different watering intervals on dimension of fruiting body of oyster mushroom

Treatments	Length of stalk (cm)	Diameter of stalk (cm)	Diameter of pileus (cm)	Thickness of pileus (cm)
T_1=No watering	2.497a	0.7533e	4.710c	0.6167c
T_2=Watering at 24 hours interval	2.503a	0.7633d	5.223b	0.6367c
T_3=Watering at 12 hours interval	2.337b	0.8467b	5.267b	0.7400ab
T_4=Watering at 8 hours interval	2.250c	0.9000a	5.890a	0.7900a
T_5=Watering at 6 hours interval	2.307bc	0.8133c	5.847a	0.7100b
LSD (0.05)	0.05954	0.005954	0.08420	0.05954
CV %	1.11	2.66	0.82	4.25

Means within the same column having a common letter(s) do not differ significantly (P=0.05)

Yield

The highest biological yield was recorded T_5 (265.4 g) followed by T_4 (261.00 g) and the lowest biological yield was in T_1 (150.1 g). The rest of the treatments differed significantly compared to control (Table 3). The highest economic yield was recorded in T_5 (254.5 g) followed by T_4 (250.7 g) and the lowest economic yield was in T_1 (138.7 g). The economic yield of the rest of the treatments differed statistically compared to control (Table 3). The maximum dry yield of mushroom was recorded T_5 (25.51 g) followed by T_4 (25.40 g) and T_3 (25.10 g). The maximum dry yield was recorded in T_1 (14.90 g) (Table 3). This fining corroborates with the report of He (1989). He suggested that the highest yield of the mushroom can be obtained by timely watering.

Table 3. Effect of different watering intervals on yield and biological efficiency of oyster mushroom

Treatments	Biological yield (g)	Economic Yield (g)	Dry yield (g)	Biological Efficiency (%)
T_1 = No watering	150.1d	138.7d	14.90c	51.76d
T_2 = Watering at 24 hours interval	248.3c	237.2c	23.89b	85.63c
T_3 = Watering at 12 hours interval	255.5b	244.6b	25.10a	88.08b
T_4 = Watering at 8 hours interval	261.0a	250.7a	25.40a	89.98a
T_5 = Watering at 6 hours interval	265.4a	254.5a	25.51a	91.52a
LSD (0.05)	5.020	4.871	0.4168	1.734
CV %	1.13	1.15	0.97	1.13

Means within the same column having a common letter(s) do not differ significantly (P=0.05)

Biological efficiency

The highest biological efficiency (91.52%) was recorded in T_5 followed by T_4 (89.98%) and the lowest biological efficiency (51.76%) was recorded in T_1. The rest of the treatments varied significantly over control (Table 3). The result corroborates with the findings of Patrabansh and Madan (1997). They found more or less the similar result in growing *Pleurotus sajor-caju.*

Relationship between watering intervals and yield attributes of mushroom

A significant and positive correlation R^2 = 0.6235 between watering intervals and dry yield was observed (Fig. 1). The R^2 value indicated that 62.21% of dry yield of oyster mushroom (*Pleurotus* *florida*) was attributed to the watering interval. This result is well supported by the study of Sarker, 2004. In a study with *Pleurotus ostreatus*, he found significant and positive correlation among watering frequency and dry yield of mushroom.

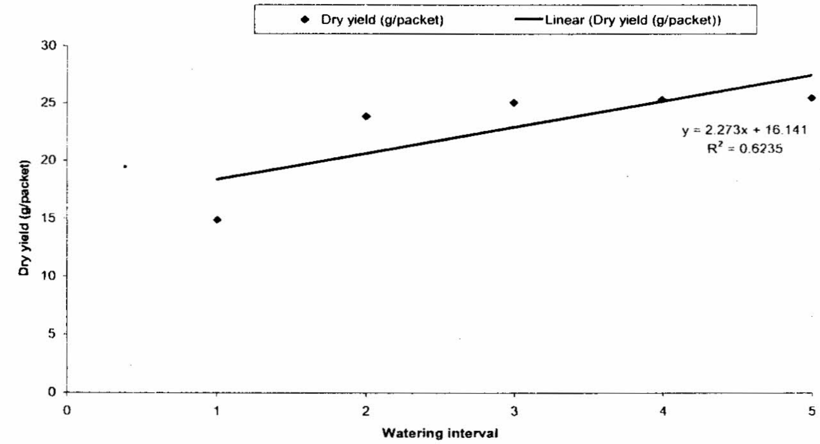

Fig 1. Relationship between watering interval and dry weight of oyster mushroom (*Pleurotus florida*)

There was also a significant correlation $R^2 = 0.6$ between frequency of watering and biological efficiency (Fig. 2).

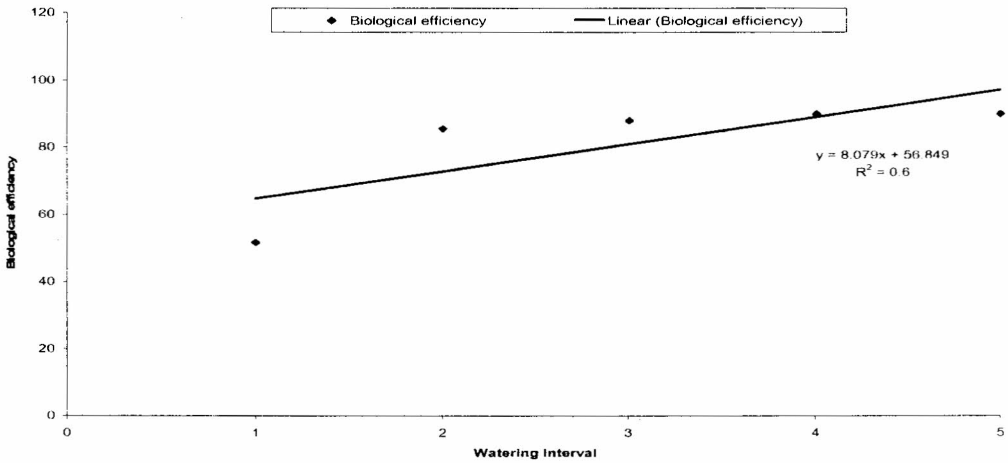

Fig 2. Relationship between watering interval and biological effeciency of oyster mushroom (*Pleurotus florida*)

The R^2 value indicated that 63% of biological efficiency of oyster mushroom (*Pleurotus florida*) was attributed to the watering interval. This finding corroborates with the findings of Sarker, 2004. He also found significant positive correlation among watering frequency and biological yield of mushroom.

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