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# Effect of Watering Frequency on Proximate Analysis of Pink Oyster Mushroom

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**ABSTRACT:** Supplemented sawdust with different times of watering has profound effect on chemical composition of Pink Oyster mushroom. Three times watering per days on mushroom had highest amount of carbohydrate (42.42%) and lipid (4.66%) whereas moisture (90.39%), dry matter (10.01%) and crude fiber (21.81%) was highest at watering frequency of four times. Protein content was highest (32.37%) at two times per days of watering. Mineral content of the fruiting body found to be significantly varied on watering frequency. Increasing watering frequency was negatively correlated with the decreasing one. Nitrogen, phosphorus, potassium and magnesium contents were highest when watering frequencies were one to two times per day. But Copper, Manganese and Zinc were obtained at highest levels for the three to four times of watering.

**KEYWORDS:** *Pleurotus djamor*, watering frequency, proximate composition.

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## INTRODUCTION

Mushrooms have a long history of use in traditional Chinese Medicine to promote good health and vitality and to increase adaptive abilities of the body. Specifically selected strains of dried mushrooms are used to produce mushroom capsules and extracts. Mushroom reduces serum cholesterol and high blood pressure.[1] Edible mushrooms have been treated as important tool in modern medicine for their medicinal values.[2] Anti-cancer medicine (Leutinan) is produced recently by some chemical companies from the extract (Polysaccharides) of Shitake mushroom.[1] Most of the people of Bangladesh have been suffering from malnutrition. Mushrooms could substantiate the suffering from malnutrition to some extent. For such a potential dish item, works on the nutritive analysis are not available in the country and there is no mushroom based balanced diet charts for the common people as well as for the patients. For this reason the proximate analysis for the Pink oyster mushroom (*Pleurotus djamor*) is necessary. Some of mushroom growers mention an ideal moist condition is favorable for oyster mushroom cultivation. Watering on mushroom spawn can create different moist condition per day at different frequencies. So this investigation was under taken to find out the approximate composition of Pink oyster mushroom (*P. djamor*) grown on different moist conditions which will help to select mushrooms as a food in balanced diet.

## MATERIALS AND METHODS

The experiment was carried out at the Biochemistry laboratory and Mushroom Culture House (MCH) of the Department of Biochemistry, Sher-e-Bangla Agricultural University, Dhaka during November 2011 to April 2012. Vegetative seed or spawn of Pink oyster mushroom was collected from Mushroom Development and Extension Center (MDEC), Saver, Dhaka. Pink oyster mushroom was grown on saw dust supplemented with wheat bran (30%) spwan packet. Moist condition was created by spraying water from one to six times per day.

The proximate analysis of the mushroom of total experiment was conducted with the determination of moisture, dry matter, crude fiber, total fat, total carbohydrate, total ash and determination of protein.

*Proximate analysis of the mushrooms*

*Moisture and dry matter:* Moisture and dry mater were determined by the following formulas –

Moisture (%) = (Initial weight - final weight) ×100/ Weight of sample

Dry matter (%) = 100 - % Moisture content

*Determination of crude fiber:* Crude fiber (g/l00g sample) = [100-(moisture + fat)] x (We-Wa)/ Weight of sample.[3]

*Total fat estimation:* Fat was estimated as crude ether extraction of the dry materials. The dried sample (about 5.0 g) was weighted into a conical flask and plugged with fat free cotton.

Fat contents (g) per 100g of dried sample =

$$\frac{\text{weigh of ether extract} \times \text{Percentage of dried sample}}{\text{Weigh of the dried sample taken}}$$

*Total lipid:* Total lipid was estimated by using the method described by Raghuramulu *et al.*[3]

$$\text{Lipid} = \frac{\text{Weight of the dried sample taken}}{\text{Weight of ether extract} \times \text{Percentage of dried sample}}$$

*Total carbohydrate estimation:* Carbohydrate (g/l00g sample) = 100 - [(Moisture + Fat + Protein + Ash + Crude Fiber) g/100g].[3]

*Determination of ash:* Ash (%) content = Weight of ash × 100 / Weight of sample taken.[3]

*Determination of total Nitrogen:* Total nitrogen was determined by using the standard Micro kjeldhal procedure of AOAC (1975)[4] and total crude protein was estimated by multiplying the nitrogen content by a factor of 6.25.

*Determination of Ca, Mg, K, Fe, Zn and P:* The content of Ca, Mg, K, Fe, and P was estimated by following standard procedure of AOAC (1985) using atomic absorption spectrophotometer.

*Statistical analysis*

The collected data were analyzed statistically following the analysis of variance (ANOVA) technique by SPSS computer package program. The mean differences among the treatments were compared by Least Significant Difference (LSD) test at 5% level of significance.[5] Analyses were performed as and where necessary.

## RESULTS AND DISCUSSION

### *Effects on proximate analysis*

*Effect on moisture and dry matter content*

The moisture content of the fruiting body shows no significant difference. The moisture percent ranged from 90.01 to 90.39. The highest moisture percent was observed in treatment $T_4$ (90.39) and the lowest was in $T_2$ (90.09) (Table 1). The present results corroborates with the study of Moni *et al.*[6] where they cultivated oyster mushroom on paddy straw, banana leaves, sugar cane bagasse and found moisture content varied from 88.15 to 91.64%. The dry matter content of the fruiting body shows no significant difference. The dry matter percent of fruiting body ranged from 9.197 to 10.01. The dry matter content of the present study matches with the findings of Kulsum *et. al.* who found that the dry matter of the fruiting bodies ranged from 9.40 to 9.98 when the oyster mushroom grown on saw dust supplemented with cow dung.[7]

*Effect on protein and lipid*

All the treatments contain a higher amount of protein. The protein content varied from 11.37-32.37 % (w/w) in the mushroom grown on different substrates. The highest content of protein was found in treatment $T_2$ (32.37 %) followed by $T_4$ (31.35 %) and the lowest protein was found in $T_5$ (11.37 %). The other treatments varied significantly over control in respect to protein content (Table 1). The results of the present study also corroborates with the study of Chang *et. al.* who reported that the fruiting bodies of oyster mushroom contained 26.6 – 34.1 % protein.[8] This wide variation in protein content of present findings may due to different cultural practice. The highest lipid percentage was counted under treatment $T_5$ (5.43) and the lowest lipid percentage was counted under $T_1$ (3.49). The rest of the treatments were statistically varied over control in respect to lipid content (Table 1). The results of the findings keep in with the findings of Alam *et. al.* who reported 4.30 to 4.41% lipid in oyster mushroom grown on different substrates.[9]

**Table 1.** Effect of watering frequency on chemical composition of pink oyster mushroom (*Pleurotus djamor*).

| Treatments | Moisture (%) | Dry Matter (%) | Protein (%) | Lipid (%) | Ash (%) | Carbohydrate (%) | Crude Fiber (%) |
|---|---|---|---|---|---|---|---|
| $T_1$ | 90.10a | 9.197a | 31.35b | 3.193d | 7.230c | 37.57bc | 20.18c |
| $T_2$ | 90.09a | 9.213a | 32.37a | 4.167b | 7.897a | 34.18c | 21.09b |
| $T_3$ | 90.21a | 9.310a | 29.75c | 4.667c | 7.403b | 42.42b | 21.41b |
| $T_4$ | 90.39a | 10.01a | 24.50d | 4.567b | 7.960c | 36.07bc | 21.81a |
| $T_5$ | 90.18a | 9.817a | 11.37e | 4.433a | 6.900d | 37.50a | 20.32c |
| $T_6$ | 90.13a | 9.417a | 11.38e | 4.413a | 6.700d | 35.50c | 20.31c |
| CV (%) | 0.25 | 2.34 | 1.03 | 2.07 | 0.62 | 6.12 | 0.92 |
| LSD $_{(0.05)}$ | 0.413 | 0.435 | 0.501 | 0.168 | 0.0842 | 4.879 | 0.362 |

Means followed by same letter significantly different at 1% or 5% level of significance.

$T_1$: watering in one time per day, $T_2$: watering in two times per day, $T_3$: watering in three times per day, $T_4$: watering in four times per day, $T_5$: watering in five times per day, $T_6$: watering in six times per day.

**Table 2.** Effect of watering frequency on mineral contents of pink oyster mushroom (*Pleurotus djamor*).

| Treatments | N (%) | P (%) | K (%) | Ca (%) | Mg (%) | Cu (ppm) | Mn (mg) | Zn (mg) |
|---|---|---|---|---|---|---|---|---|
| $T_1$ | 4.02b | 0.81c | 1.423a | 32.39a | 11.71c | 3.20d | 2.157c | 13.29c |
| $T_2$ | 4.18a | 0.85b | 1.340b | 32.44a | 11.44d | 3.51b | 2.167d | 13.83d |
| $T_3$ | 2.92d | 0.87a | 1.267d | 31.59b | 12.21b | 3.67a | 3.267b | 14.75b |
| $T_4$ | 3.76c | 0.76e | 1.283c | 31.68b | 12.75a | 3.29c | 3.453a | 15.11a |
| $T_5$ | 2.82e | 0.80d | 1.010e | 29.55c | 10.54e | 2.18e | 2.130e | 14.37e |
| $T_6$ | 2.62e | 0.78d | 1.110e | 28.35c | 11.34e | 2.21e | 2.931e | 13.17e |
| CV (%) | 1.02 | 1.35 | 0.58 | 0.21 | 0.68 | 5.39 | 0.14 | 1.29 |
| $LSD_{(0.05)}$ | 0.084 | 0.006 | 0.005 | 0.1331 | 0.157 | 0.005 | 0.103 | 0.059 |

Means followed by same letter significantly different at 5% level of significance.

$T_1$= watering in one time per day, $T_2$ = watering in two times per day, $T_3$ = watering in three times per day, $T_4$ = watering in four times per day, $T_5$ = watering in five times per day, $T_6$ = watering in six times per day.

*Effect on carbohydrate and crude fiber*

The highest percentage of carbohydrate was observed under treatment $T_3$ (42.42) and the lowest carbohydrate percentage was observed under $T_1$ (37.57). The rest of the treatments differed significantly over control in respect to percent carbohydrate content (Table 1). The findings of the present study were supported by the study Kulsum *et. al*. who found that carbohydrate content was ranged from 32.85 to 56.38 when the oyster mushroom grown on saw dust supplemented with cow dung.[7] The highest percentage of crude fiber was counted under treatment $T_3$ (21.41) and the lowest was observed under $T_1$ (20.18) followed by $T_6$ (20.31). The rest of the treatments were statistically similar but varied over control in respect to percent crud fiber content (Table 1). The present findings supported by the study of Alam *et. al*. who reported 22.87 to 23.29 g per 100g of crude fiber in *Pleurotus spp.*[9]

*Effect on ash*

The highest percentage of ash was observed in the treatment $T_2$ (7.89) followed by $T_3$ (7.40) and the lowest percentage of ash was in the treatment $T_5$ (6.60). The other treatments were statistically similar but differed significantly in terms of percentage ash content (Table 1). Similar results also reported by Alam *et. al.*[9]

***Effects on mineral content***

*Effect on Nitrogen, Phosphorus and Potassium*

The highest percentage of nitrogen was observed under treatment $T_2$ (4.18) followed by $T_1$ (4.02) and the lowest nitrogen percentage was observed under $T_5$ (2.82). The rest of the treatments were statistically different over control in respect to percent nitrogen content (Table 2). The highest percentage of phosphorus was observed under treatment $T_3$ (0.87) followed by $T_2$ (0.85) and the lowest phosphorus percentage was observed under $T_4$ (0.76). The rest of the treatments were statistically different in respect to percent phosphorus content (Table 4). The highest percentage of potassium was observed under treatment $T_1$ (1.423) and the lowest potassium percentage was observed under $T_5$ (1.010). The rest of the treatments were statistically different in respect to percent potassium content (Table 2). The findings of the present study supported by Moni *et. al.*, Sarker *et. al.* and Ali where they found 4.22 5.59 % nitrogen, 0.97% phosphorus 1.3% potassium in oyster mushroom respectively.[6,10,11]

*Effect on Calcium and Magnesium*

The highest percentage of calcium was observed under treatment $T_2$ (32.44) followed by $T_1$ (32.39) and the lowest calcium percentage was observed under $T_5$ (29.55). The rest of the treatments were statistically similar but differed over control in respect to percent calcium content (Table 2). The findings of the present study matches with the study of Alam *et. al*. who found 22.15 to 33.7 mg/100g of calcium in different oyster mushroom varieties.[9] Sarker *et. al*. found 2400ppm calcium in oyster mushroom grown on saw dust based substrates.[10] The highest percentage of magnesium was observed under treatment $T_4$ (12.75) and the lowest magnesium percentage was observed under $T_5$ (10.75). The rest of the treatments were statistically different over control in respect to percent magnesium content (Table 2). The result of the present study also supported by Alam *et. al*. who found 13.4 to 20.22 mg/100g of magnesium in different oyster mushroom varieties.[9]

*Effect on Copper, Iron and Manganese*

The highest content (ppm) of copper was observed under treatment $T_3$ (3.67 ppm) and the lowest copper concentration was observed under $T_5$ (2.18 ppm). The rest of the treatments were statistically different over control in respect to copper concentration (Table 2). The highest percentage of iron was obtained under treatment $T_4$ (41.5) and the lowest iron percentage was observed under $T_6$ (40.2). The rest of the treatments were statistically different over control in respect to percent iron content (Table 2). Alam *et. al*. reported the similar results who found 33.45 to 43.2 mg/100g iron in different oyster mushroom.[9] The highest amount (mg) of manganese was observed under

treatment $T_4$ (3.453) and the lowest amount was observed under $T_5$ (2.130). The rest of the treatments were statistically different over control in respect to manganese content (Table 2).

*Effect on Zinc*

The highest amount (mg) of zinc was observed under treatment $T_4$ (15.11 mg) and the lowest amount was observed under $T_6$ (13.17 mg). The rest of the treatments were statistically different over control in respect to zinc content (Table 2). The findings of the present study matches with the study of Alam *et. al*. who found that zinc content of different oyster mushroom varieties ranged from16 to 20.9 mg/100g.[9] The present results also supported by Sarker *et. al.*[10]

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