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Effect of Drying Method on Composition of Oyester Mushroom

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Abstract

The experiment entitled "Physiochemical analysis of oyster mushroom" was conducted at the Nuclear Institute for Food and agriculture (NIFA), Peshawar during the month of March, 2014. The objective was to compare the composition of fresh and dried oyster mushroom. The maximum (19.33mg/100g) vitamin c, (0.75%) crude fat and (2.83%) fibre content was noted in oven dried mushroom, while maximum (77.66%) moister content and (7.06%) protein content was observed in fresh mushroom. Ash was high in room dried mushroom. Hence oven dried mushroom is recommended for high production of vitamin C, Fats and Fiber content while for high production of moister content and protein content fresh mushroom is recommended.

Keyword: Fresh Mushroom, oven dried, room dried, sun dried.

INTRODUCTION

Mushrooms mainly found in damp places and forests all around the country [1] appears to be the rich source of medicinal and balance diet compounds for humans. There appears to be a reference to Muslims in a saying of Holy Prophet Muhammad (SAW) that mushrooms was a part of mun-o-salwa (food given to the followers of Prophet Moses) [2]. Mushroom is also a good source of proteins and crude fiber. In the matter of fact it contains low calories, low fats and a significant source of vitamins with a lot of medicinal properties [3].

The chemical composition of mushrooms along with it nutritive values is studied and reported by different scientists revealing that it is readily digestible and becoming popular day by day in many developing countries like Pakistan especially in KP (Khyber pakhtunkhwa). Exhibiting hematological, antiviral, antitumor, antibiotic, antibacterial, hypocholesterolic and immunomodulation activities [4]. Mushroom is also been acts to be the supplement of vegetables and some other dietary sources like eggs and meat [5].

Mushroom is becoming popular due not only because of its nutritional values but also due to its easy and economical cultivation. That's why its farming is increasing day by day in more than 100 countries of the world leading to its better production and yield (7% per annum) [5].

Mushrooms are extremely perishable and deteriorate after a single day of harvest [6]. In association with other horticultural commodities mushrooms have high rate respiration and have very delicate epidermis [7]. Since mushrooms are fast respiring and highly perishable, prolonging post-harvest storage period while preserving their quality would benefit the mushroom industry as well as consumers. And therefore some methods like drying techniques are discovered to preserve the nutritional value of oyster mushroom.

Keeping in view the significance and nutritional value of oyster mushroom the present research work is conducted to study the nutritional value of oyster mushroom dried by various drying techniques and to find out that which technique is more suitable for the oyster mushroom to be preserved with less or no loss in its nutritive value.

MATERIALS AND METHODS

The experiment entitled "effect of drying method on composition of Oyester mushroom" was conducted at the Nuclear Institute for Food and Agriculture (NIFA), Peshawar during the month of February to May, 2014. The samples were collected from Food Science Division, Nuclear Institute for Food and Agriculture (NIFA) Peshawar. It were cleaned of impurities and then grounded in stainless steel grinder to pass through a standard 40 mesh screen. The grounded samples were kept in air light bottle, placed in a desiccator and stored at 4°C from which the required quantities were taken for chemical determinations.

Final samples were taken and denoted as T_0, T_1, T_2, and T3.

Where,

T_0 =Sun dried Mushroom
T_1=Fresh Mushroom
T_2 =Oven dried Mushroom
T_3 =Room dried Mushroom

Physiochemical Analysis for the samples were analyzed for following Parameters:

Moisture Content (%)

Moisture content (%) of the samples were determined according to AOAC of 1990 Standard Method.

Procedure

An empty flat silver dish was weight and the sample is placed in it. Now the dish is placed in an oven at 100°C or in vacuumed oven at 70°C. After 4 hours the dish is cooled in a desiccator and weigh again. Then the dish is placed again in the oven for 2 hours and weigh again and it is repeated till constant reading is obtained. For the calculation of moisture content (%) the following formula is used;

$$\textit{Moisture Contents (\%)} = \frac{\textit{loss in weight of sample} \times 100}{\textit{Weight of the sample}}$$

Ash Contents (%)

All Samples were analyzed according to AOAC 1990 Standard Method.

Procedure

The china dish is washed and dried in an oven at 100°C and its weight is taken. Now 1 g of sample is taken in the china dish and weigh it again. The sample is cleared gently over flame and putted in the muffle furnace set at 550°C until white ash is obtained. The ash contents (%) is calculated by the following formula;

$$\textit{Ash contents (\%)} = \frac{\textit{weight of ash} \times 100}{\textit{Weight of sample}}$$

Crude Fiber (%)

All samples were analyzed for crude fiber according to AOAC 2000 standard method.

Procedure

Sulphuric acid solution (7ml/L) is added and boiled for half an hour and removed the solution from the system. After this the samples were washed with warm water 2-3 times. Potassium hydroxide (12.5g/L) is added to the system and boiled for half an hour and then the samples were removed from the system washing again with warm water. Now the samples were kept in the oven for 4-6 hours at 105°C. The samples were weigh again after drying and placed in muffle furnace (55 °C). Finally the crude fiber (%) was calculated with the formula;

$$\textit{Crude fiber (\%)} = \frac{\textit{Weight of sample after drying} - \textit{Weight of sample after ashing} \times 100}{\textit{Weight of sample}}$$

Fats Contents (%)

Crude Fats in sample was determined according to the standard procedure of AOAC of 1990.

Procedure

A dried sample of 1g is taken and wrapped in filter paper and then placed in the thumble. The thumble is then putted in extraction tubes. Petroleum ether (100ml) is added in flask and connected to apparatus and heated for the extraction of fat. After 6 siphoning the flask disconnected the flask and evaporated the ether on water bath.

$$\text{Crude fat (\%)} = \frac{\text{Weight of ether extract X 100}}{\text{Weight of sample}}$$

Ascorbic acid (Vitamin C)

Ascorbic acid was determined by the titration against 2, 6- dichlorophenolendophenol as reported AOAC (1990).

Procedure

10ml of the sample juice was taken and diluted in 0.4% oxalic acid solution and volume was raised up to 100 ml in volumetric flask. Diluted sample of 10 ml was taken in a conical flask and tritated against the dye till light pink color appeared and persisted for 15 seconds. The titration is stopped and noted the reading on burette. Ascorbic acid content was calculated by following formula**.**

$$\text{Ascorbic acid} = \frac{\text{Dye factor X dye solution (ml) used from burette X 100 X 100}}{\text{Diluted sample (ml) for titration X Sample juice (g) for dilution}}$$

Crude Protein (%)

All samples were analyzed according to standard procedure as reported in AOAC 1990.

Procedure

Digestion

The sample was weighed (0.3 to 0.5g) on a filter paper and then put it in the digestion tube. Then 2-3 g of digestion mixture and 7 ml of concentration H_2SO_4 was added to each digestion tube. The samples were put in the Tecator digestion system at an initial temperature of 100 C for about one and a half hour. The temperature was increased to 150, 200, 250, 300 and 350 °C at regular intervals of 30-45 minutes until the digested samples became clear.

Distillation

After digestion, process of distillation was started. In which 4% boric acid and 40% NaOH are used. The sample was poured into the upper flask of distillation apparatus and some distilled water was added. NaOH 40 % was added into the upper flask to make the medium alkaline. The distillate was received in a conical flask containing 75 ml of 4% boric acid solution. The sample was distilled until the volume of the distillate in the flask reached to 120-125ml. The contents of this flask were titerated against standard H_2SO_4 solution i.e. (0.01 N), until the original colour of boric acid reappeared. Calculation for Nitrogen content of sample (%) is done by the formula;

$$\text{Nitrogen content of sample (\%)} = \frac{\text{Acid (ml) X Normality of standard acid X 0.014 X 100}}{\text{Weight of the sample}}$$

Now the crude protein (%) was calculated using the formula;

$$\text{Crude Protein (\%)} = \text{Nitrogen contents X 63}$$

Statistical Analysis

All data analyzed statistically by using MSTAT-C Program using CRD test for all the data collected at LSD 5% value.

RESULTS AND DISCUSSION

The Analysis of variance (ANOVA) shows a significant effects of all the treatments for Vitamin C having the grand mean (13.37), moister contents having the grand mean (52.83), proteins having the grand mean (5.45), crude fat having the grand mean (0.550), fiber contents having the grand mean (2.350) and Ash contents having the grand mean (2.033) and is presented in table-1.

The mean data revealed that the maximum (19.33) vitamin C was noted in oven dried mushroom, maximum (77.66) moister content was recorded in fresh mushroom, maximum (7.06) protein content was observed in fresh mushroom, maximum (0.75) crude fat was recorded in oven dried mushroom, which is not significantly different from (0.65) in sun dried mushroom, maximum (2.83) fiber content was noted in sun dried mushroom which is not significantly different from (2.73) in oven dried mushroom, maximum (3.23) ash content was noted in oven dried mushroom.

While the minimum (7.50) vitamin c was recorded in fresh mushroom, minimum (24) moister content was recorded in oven dried mushroom, the minimum (3.23) protein content was recorded in oven dried mushroom, minimum (0.30) crude fat was recorded in fresh mushroom, the minimum (1.70) fiber content was recorded in fresh mushroom, minimum (1.10) ash content was recorded in fresh mushroom.

The results were analyzed statistically for all the physiochemical parameters to find out it qualitative attributes. The results are highly in lined with previously reported literature. Tewari [8] demonstrated some physiochemical analysis of Oyster mushroom like proteins, carbohydrates, moisture, minerals and vitamins. Oyster mushroom is the only one among mushrooms, which is called as "meat of the forest" due to its meat like taste and texture. It is consumed by local population and meets the requirements concerning the flavour and taste. Only a few species of this mushroom have been cultivated commercially. Mushrooms are liked all over the world due to their taste, flavour and health giving properties as a balanced food. Oyster mushrooms also contain considerable amountt of phosphorus, potassium, copper and iron but low level of calcium. The results are also in accordance with the Dundar *et al.*, [9] mentioned the effect of *Gunodermalucidium* on the diabetes, ulcers, liver and lungs maladies and that of Khan *et al*., [2] and Khana and Islam *et al.*, [10] who proposed the medicinal and healthy nature of Oyster mushroom appears to be very much beneficial for human health.

Table-1: Physiochemical analysis of Oyster Mushroom for qualitative attributes like Vitamin C contents, Moisture contents, Protein (%), Crude fat (%), Fiber contents (%) and Ash contents (%)

Treatments	Vit. C	Moisture Contents	Protein	Crude Fat	Fiber content	Ash Contents
T_0	11.33 c	47.33 c	5.33 c	0.65 a	2.83 a	61.73 c
T_1	7.50 d	77.66 a	7.06 a	0.30 c	1.70 c	1.10 d
T_2	19.33 a	24 d	3.23 d	0.75 a	2.73 a	2.06 b
T_3	15.33 b	62.33 b	6.20 b	0.50 b	2.13 b	3.23 a
Grand mean	13.375	52.833	5.45	0.55	2.35	2.0333
LSD	1.7	6.4	0.59	0.14	0.16	0.26
CV	7.1	6.49	5.79	1	8.51	6.9

All the physiochemical analysis of Oyster Mushroom for qualitative attributes like Vitamin C contents, Moisture contents, Protein (%), Crude fat (%), Fiber contents (%) and Ash contents (%) is presented graphically in Fig-1.

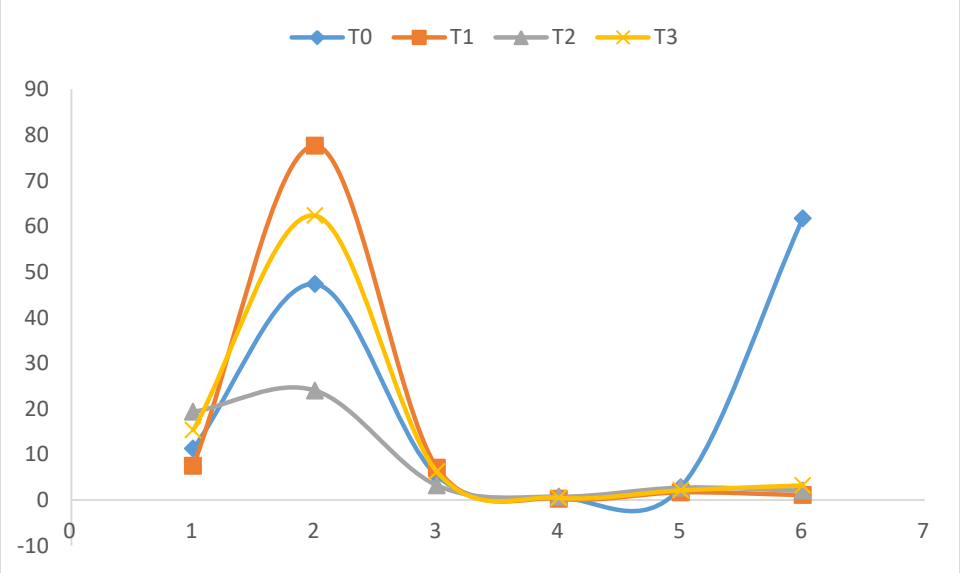

Fig-1: Graphical representation of physiochemical parameter in tratments

CONCLUSION

Oven dried mushroom contain maximum vitamin c, crude fat, fiber content, while moister content and protein was maximum recorded in fresh mushroom.

Recommendations

On the basis of concluded results from the experiment it is generalized that oven dried mushroom can be used for high production of vitamin c, crude fat, fiber content. While for high production of moister content and protein fresh mushroom can be used.

REFERENCES

1. Zoberi, M. H. (1985). The Nigeria field, 38, 81-89.
2. Khan, S. M., Kau, A. G., & Ali, M. A. 1980. Temperature requirement of the oyster mushroom (*Pleurotusostreatus)*. Mush Newsletter for, (2):11-13.
3. Buswell, J. A., Cai, Y. J., Chang, S. T., Peberdy, J. F., Fu, S. Y., & Yu, H. S. (1996). Lignocellulolytic enzyme profiles of edible mushroom fungi. *World Journal of Microbiology and Biotechnology*, *12*(5), 537-542.
4. Cohen, R., Persky, L., & Hadar, Y. (2002). Biotechnological applications and potential of wood-degrading mushrooms of the genus Pleurotus. *Applied microbiology and biotechnology*, *58*(5), 582-594.
5. Menaga, D., Mahalingam, P. U., Rajakumar, S., & Ayyasamy, P. M. (2012). Evaluation of phytochemical characteristics and antimicrobial activity of Pleurotus florida mushroom. *Asian Journal of Pharmaceutical and Clinical Research*, *5*(4), 102-106.
6. Antmann, G., Ares, G., Lema, P., & Lareo, C. (2008). Influence of modified atmosphere packaging on sensory quality of shiitake mushrooms. *Postharvest biology and technology*, *49*(1), 164-170.
7. Kim, K. M., Ko, J. A., Lee, J. S., Park, H. J., & Hanna, M. A. (2006). Effect of modified atmosphere packaging on the shelf-life of coated, whole and sliced mushrooms. *LWT-Food Science and Technology*, *39*(4), 365-372.
8. Tewari, R. P. (1986). Mushroom cultivation. Extension Bulletin. Indian Institute of Horticulture Research, Banglore, India, 8: 36
9. Dundar, A., Acay, H., & Yildiz, A. (2008). Yield performances and nutritional contents of three oyster mushroom species cultivated on wheat stalk. *African Journal of Biotechnology*, *7*(19), 3497-3501.
10. Islam, M. Z., Rahman, M. H., & Hafiz, F. (2009). Cultivation of oyster mushroom (Pleurotus flabellatus) on different substrates. *Int. J. Sustain. Crop Prod*, *4*(1), 45-48.