IJPS INTERNATIONAL JOURNAL OF PLANT SCIENCES
ISSN-0973-1547 Volume 17 | Issue 1 | January, 2022 | 8-11
DOI: 10.15740/HAS/IJPS/17.1/8-11
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RESEARCH ARTICLE

Physico-chemical characterstics of dehydrated oyster mushroom (*Pleurotus florida*)

■ **Parul Bora and A. Kawatra**

SUMMARY

The present investigation was conducted to study the physicochemical characteristics of oyster mushroom (*Pleurotus florida)* and effect of various pretreatment processs on the physico-chemical properties after dehydration. Dehydration was done using various methods i.e.oven drying at 40^{O}C, 60^{O}C and sun drying after giving pretreatments including blanching in water, blanching and steeping for 2 minutes in (NaCl + citric acid) solutions. Dehydration was found to be an effective method in extending shelf-life of mushroom. Rehydration time of different types of dehydrated samples ranged from 5:00 to 13:50 minutes. The untreated mushroom dried in sun showed the lowest rehydration time while the blanched (NaCl+Citric acid) sample oven dried at 60^{O}C had the highest value. It was observed that rehydration ratio of untreated mushroom oven dried at 40^{O}C had the highest value (5.07) and blanched sample oven dried at 60^{O}C had lowest value. Brittleness was found to be significantly higher in blanched samples in comparison with only steeped samples.

Key Words : Oyster mushroom, Nutritional evaluation, Processing, Dehydrated mushroom, Dry mushroom vegetable, Organoleptic acceptability

How to cite this article : Bora, Parul and Kawatra, A. (2022). Physico-chemical characterstics of dehydrated oyster mushroom (*Pleurotus florida*). *Internat. J. Plant Sci.*, **17** (1): 8-11, **DOI: 10.15740/HAS/IJPS/17.1/8-11,** Copyright@ 2022:Hind Agri-Horticultural Society.

Article chronicle : Received : 08.08.2021; **Revised :** 02.10.2021; **Accepted :** 01.11.2021

Mushroom is a macroscopic fungi having various shapes, sizes, appearance and edibility. They are used as a food since time immemorial due to their taste and other health beneficial functions. Mushrooms are popular food and commercially available in India. The food experts have also realized and increasingly appreciated the food value of mushroom because of the low calorific value and very high content of protein (20-40% on dry weight basis), vitamins and minerals. These are very low calorie food suited to those interested in cutting down the calorie intake, like obese persons. Being low in fat, devoid of cholesterol, these make an ideal diet for the heart patients. With very high fibre and alkaline elements, mushrooms are suited to those

MEMBERS OF THE RESEARCH FORUM

Author to be contacted :
Parul Bora, Department of Human Nutrition, Government P.G. College, **Ranikhet (Uttarakhand) India**
Email : parulbora@gmail.com

Address of the Co-authors:
A. Kawatra, Department of Foods and Nutrition, Chaudhary Charan Singh Haryana Agriculture University, **Hisar (Haryana) India**

suffering from hyperacidity and constipation, consumption of fibre has gained importance in general health maintenance. It has been reported that daily intake of 100-200 g (dry weight) of mushroom can provide nutritional balance in a normal human being.

Mushrooms being extremely perishable results in various physiological and morphological changes after harvest, which makes these mushrooms unacceptable for consumption. Therefore, application of best post harvest technique to enhance the shelf-life and to maintain quality of mushroom can play vital role in commercialization of mushroom. Scientific method of dehydration and storing will help in preservation of mushroom for long period.

Oyster mushroom are devoured by mankind for their characteristics aroma, texture and nutritional values. Production and consumption of button mushroom have registered tremendous increase in the recent past. However, in the peak periods of seasonal as well as commercial production, gluts and distress sales are becoming increasingly common due primarily to the poor shelf life of the mushroom –veil opening, browing, loss of moisture and texture which result in reduced market value and acceptability. Among various methods employed for preservation of mushroom, drying is the most commonly used technique but it involves limitations like browning, poor rehydration with irreversible loss of the typical texture. Dehydration enhanced the storage life of mushrooms which are extremely perishable. Like dehydrated vegetables, the dehydrated mushrooms can also be rehydrated in hot water and used further in various recipes. In addition dehydrated product, apart from increased shelf-life, offers the advantage of decreased weight, which has the potential for saving in the cost of packaging, handling and transporting the product to the distant places. The quality of rehydrated products is expressed in terms of rehydration ratio, texture, colour and flavour, since the human relation to food is defined by its appearance, feel in mouth, taste and odour. This study was conducted to generate information on suitability of drying methods, rehydration characteristics and effect of pretreatments on the physicochemical characterstics.

MATERIAL AND METHODS

The present study was carried out in the Department of Foods and Nutrition, I.C. College of Home Science, CCS Haryana Agricultural University, Hisar. The oyster mushrooms (*Pleurotus florida)* were procured from mushroom farm, Department of Plant Pathology, CCSHAU, Hisar. The fresh mushrooms were washed, cut into one inch square pieces and subjected to one of following pretreatments prior to drying The mushrooms were cut into pieces and were blanched for two minutes in boiling water (80^{O}C) and then dipped immediately in cold water and drained.

Another samples of Mushrooms were blanched for two minutes in boiling water (80^{O}C) containing 0.2% sodium chloride (NaCl) and 0.1% citric acid (CA) solution and then dipped immediately in cold water and drained. Mushrooms were steeped in 0.2% sodium chloride (NaCl) and 0.1% citric acid (CA) solution for two minutes and drained. All the types of pretreated as well as untreated (control) mushrooms were dried using sun drying till complete drying of mushroom samples and by oven drying. The pretreated mushroom pieces were kept in hot air oven at 40^{O}C and 60^{O}C till constant weight was obtained.

Physico-chemical characteristics of stored dehydrated oyster mushrooms:

Weight (*g*):

Weight of all the types of dehydrated mushroom was taken till attainment of constant weight.

Rehydration ratio and rehydration time:

Five gram of dried oyster mushroom samples placed in a 500 ml beaker with 100 ml of distilled water was covered with a watch glass. The beaker was kept over a heater and boiled for 5 minutes. The dried mushroom was rehydrated in water until, the maximum uptake of water took place and the time taken in rehydration was noted. The water present in beaker was drained out and the weight of the mushroom was recorded. The rehydration ratio was calculated as per the standard method (Rangana, 1994).

$$\text{Rehydration ratio} = \frac{\text{Weight of rehydrated sample in gram}}{\text{Weight of rehydrated sample in gram}}$$

Brittleness:

Brittleness of dried mushrooms are estimated using Texture analyzer (TAX) having five g load cell. The analyzer was linked to a computer that recorded the data using software. The mushroom was kept on the base of analyzer for testing and texture analysis was run immediately. The hemispherically plastic probe is provided to read the force to compress the mushroom samples in Newton (N).

Table 1: All the types of dehydrated oyster mushrooms were evaluated for rehydration ratio, rehydration time and brittleness

Parameters	Drying methods	Treatments				Overall mean	C.D.(P<0.05)
		Untreated (Control)	Blanched (water)	Blanched in (NaCl+Citric acid)	Steeped (NaCl+Citric acid)		
	Oven dried at 40°C	5.07±0.03	4.40±0.02	4.45±0.01	4.86±0.01	4.70±0.08	Method= 0.03
	Oven dried at 60°C	4.84±0.02	4.36±0.01	4.37±0.01	4.74±0.01	4.54±0.09	Treatment=0.07
Rehydration	Sun dried	4.97±0.03	4.38±0.01	4.40±0.02	5.0±0.01	4.44±0.07	MXT= 0.16
ratio	Overall mean	4.96±0.03	4.38±0.01	4.41±0.01	4.87±0.01		
	Oven dried at 40°C	5:25±0.01	11:00±0.01	13:00±0.01	8:01±0.03	9:31±0.88	Method= 0.48
Rehydration	Oven dried at 60°C	6:35±0.01	12:35±0.01	13:50±0.02	8:07±0.03	10:07±0.88	Treatment=0.66
time (minutes)	Sun dried	5:00±0.01	10:00±0.07	12.01±0.07	6.02±0.01	8.75±0.86	MXT= 0.52
	Overall mean	5.53±0.01	11.12±0.07	12.84±0.07	7.37±0.02		
Brittleness	Oven dried at 40°C	0.75±0.02	1.96±0.02	1.92±0.01	0.87±0.03	1.37±0.18	Method= 0.18
(Newton)	Oven dried at 60°C	0.89±0.02	2.07±0.03	2.08±0.02	0.98±0.01	1.50±0.18	Treatment=0.22
	Sun dried	0.62±0.02	1.85±0.01	1.88±0.01	0.72±0.01	1.27±0.18	MXT= 0.19
	Overall mean	0.75±0.02	1.96±0.02	1.96±0.01	0.86±0.02		

Values are mean ± SE of ten independent observations, NS= Non-significant, NaCl-Sodium chloride

RESULTS AND DISCUSSION

All the types of dehydrated oyster mushrooms were evaluated for rehydration ratio, rehydration time and brittleness. The results are presented in Table 1.

It was observed that rehydration ratio of untreated mushroom oven dried at 40°C had the highest value (5.07) and blanched sample oven dried at 60°C had lowest value. Significant differences were observed in the rehydration ratio of mushrooms dried using different drying methods and pretreatments. Rehydration ratio was minimum in all the types of mushroom dried after blanching irrespective of drying methods. On the other hand untreated mushroom *i.e.* mushroom dried without any pretreatment had the maximum value for rehydration ratio. Rehydration time of different types of dehydrated samples ranged from 5:00 to 13:50 minutes. The untreated mushroom dried in sun showed the lowest rehydration time followed by untreated sample oven dried at 40°C while the blanched (NaCl+Citric acid) sample oven dried at 60°C had the highest value. Rehydration time was minimum in all the types of dehydrated mushroom dried without any pretreatment irrespective of drying methods used, the value ranged from 5:00 to 6:35 minutes. On the other hand all the mushrooms which were dehydrated after blanching had highest value for rehydration time among each drying methods.

Data indicated that the value of brittleness ranged from 0.62 to 2.08 Newton in all the types of dehydrated mushroom after using different drying methods. Brittleness was maximum in dehydrated mushrooms dried after blanching and value ranged from 1.85 to 2.07 Newton in dehydrated mushroom dried after blanching in water and from 1.88 to 2.08 Newton in dehydrated mushroom dried after blanching in NaCl+Citric acid. Hence it can be concluded from the present study that rehydration quality of dehydrated mushroom was better after steeping as compared to blanching as it is responsible for hardening of mushroom thus increases the rehydration time. Physico-chemical characteristics of dehydrated mushroom was also studied. Untreated mushroom oven dried at 40°C had the highest value of rehydration ratio followed by steeped samples oven dried at 40°C while the blanched mushroom oven dried at 60°C had the lowest value. Rehydration time of different types of dehydrated mushroom showed that untreated samples oven dried at 40°C had the lowest value while blanched samples oven dried at 60°C had the highest value. Brittleness of dehydrated mushroom ranged from 0.62 to 2.08 Newton. The untreated mushroom sample sundried had the lowest value of brittleness followed by steeped sample while blanched samples oven dried at 60°C had significantly higher value for brittleness.

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