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Effect of Pretreatments on Dehydration of Oyster Mushroom

Y Prabhabati Devi*, Kumari Sunita and Deepak Singh*****

Krishi Vigyan Kendra, Chandel, ICAR-Manipur Centre

ABSTRACT

Oyster mushroom is highly perishable due to high moisture content, high respiration and transpiration rate. The shelf life of the mushroom can be extended by the process of dehydration. The main aim of the present study was to see the effect of pretreatment on dehydration of oyster mushroom in terms of quality and sensorial acceptability. The experiment was conducted with 5 samples and with 5 treatments. Samples of mushroom were sundried by giving various pretreatments *i.e.,* 0.05% Citric acid, 0.05% KMS, 0.05% Citric acid and 0.05% KMS and 0.1%Citric acid and 0.1% KMS. It took 5 d to get the desired final dried product of 6.66 per cent moisture content. From this study, it was found that T5 i.e. pretreatment with 0.1% Citric acid and 0.1% KMS gave the best result in terms of recovery percentage, low moisture content and sensorial score than other treatments. The drying characteristic of the products involving percentage of drying with days of drying were also studied.

Key Words: Dehydration, Sundried, Sensory, Moisture, Shelf life.

INTRODUCTION

Mushroom is a complete health food which have high medicinal and nutraceutical properties. Nowadays, the demand of mushroom keeps on increasing due to its excellent source of high quality protein, vitamin, mineral and contribute into formulation of balanced diet (Manzi *et al,* 2001; Mattila *et al,* 2001). Mushroom has been found to inhibit aromatase activity and suppress breast cancer cell proliferation (Grube *et al,* 2001). Mushroom is highly perishable which contain 90 to 95 per cent moisture and starts deteriorating after a few hours depending upon the storage conditions. The shelf life of mushroom varies from 1-2 d at the ambient temperature due to its high moisture content, delicate texture and unique physiology (Sexena and Rai, 1990). The undesirable post harvest changes are weight loss, change in colour, liquefaction, loss of moisture and texture reduced the market value and unacceptability of the consumer. The shelf life of mushroom can be extended by drying. Drying is the best and convenient processing technique where the moisture content is greatly lowered which helped to prevent microbial degradation (Fellows, 2009). In order to check discolouration during drying, pretreatment is very important. Pretreatment of mushroom is before drying in one form or other ie. washing in water, KMS, sugar, salt either alone or in combination help in checking enzymatic browning, stabilizing colour, enhancing flavour retension and maintaining textural properties (Singh *et al,* 2001). The problem of shelf life of fresh mushroom is higher in Manipur, hence it is necessary to develop a suitable post harvest technology to increase the shelf life and also to get more attractive colour with higher recovery percentage by drying in natural sunlight. Therefore, the present study was undertaken to prepare the dehydrated mushroom by employing different pretreatments to observe the quality of product and also to assess the overall acceptability of dehydrated mushroom by sensory evaluation.

Corresponding Author's Email: prabhayumnam@rediffmail.com

*Krishi Vigyan Kendra, Chandel, ICAR-Manipur Centre

**Krishi Vigyan Kendra Madhopur West Champaran

***Krishi Vigyan Kendra, Chandel, ICAR-Manipur Centre

Table1. Method of Selection of Sample with Different Treatments.

Sample	Treatment
Sample 1	Fresh oyster mushroom washed in plain water and dry in sunlight
Sample 2	Fresh oyster mushroom washed in plain water, pre treated with 0.05% Citric acid and dried in sunlight
Sample 3	Fresh oyster mushroom washed in plain water, pre treated with 0.05% KMS and dried in sunlight
Sample 4	Fresh oyster mushroom washed in plain water, pre treated with 0.05% Citric acid and 0.05 % KMS and dried in sunlight
Sample 5	Fresh oyster mushroom washed in plain water, pre treated with 0.1% Citric acid and 0.1% KMS and dried in sunlight

MATERIALS AND METHODS

Freshly harvested oyster mushrooms of uniform maturity were purchased from Imphal market. Fresh, disease free mushroom were cleaned, washed, cut in to 3cm size strip and keep ready for processing. The experiment was conducted by selecting 5 samples with 5 treatments at a temperature of 21-29.6°C with a relative humidity varied from 75-85 per cent. The weights of the samples were recorded twice a day in order to find out the constant weight for about five days. Method of selection of sample along with different treatments is shown in Table1.

Method of Dehydration of Oyster Mushroom

The method of dehydration of the oyster mushroom is given in Figure- 1. Select fresh, mature mushroom and wash thoroughly with plain water to remove dust and dirt. Then remove stalk and cut in to desire 3cm size strip. In case of first treatment it was washed with plain water and dried in sunlight without any treatment for 5 d. In case of second treatment oyster mushroom was washed in plain water, then pretreated with 0.05% citric acid for 5 min and dried in sunlight for 5d. In third treatment oyster mushroom was washed in plain water, pretreated with 0.05% KMS and dried in sunlight for 5 d. In case of fourth treatment oyster mushroom was washed in plain water and treated with 0.05% Citric acid and 0.05% KMS and dried in sunlight for 5 d. In case of fifth treatment oyster mushroom was washed in plain water and treated with 0.1% Citric acid and 0.1% KMS and dry in sunlight for 5d. The dehydrated mushroom were stored in sterialised airtight container.

Moisture Content

For the experiment,1kg of oyster mushroom were sundried at 21.1^{O}C to 29.6^{O}C for about 5 days till constant weight obtained. First the container was dried properly weighed and placed the sample and weighed again. The sample was dried by turning up side down twice a day till it achieved a constant weight. After that the dried mushroom was placed on the container and weighed again in order to see the losses of weight. The moisture content of different samples were calculated by using the following formula**:-**

$$\text{Moiture \%} = \frac{W2-W3}{W2-W1} \times 100$$

W1 =Wt of container

W2 =Wt of container and sample before drying

W3 = Weight of container and sample after drying

Dehydration Ratio

Dehydration ratio was calculated by taking the weight of sample before drying and the weight of sample after drying. The dehydration ratio was calculated by using the formula as following formula as follows;-

Table 2. Effect of Different Treatment on the Quantity of Sundried Oyster Mushroom.

Treatment	Final dried weight per kg of fresh mushroom (g)
T1 (Control)	51.50
T2(0.05% Citric acid)	60.30
T3 (0.05% KMS)	64.70
T4 (0.05% Citric acid and 0.05%KMS)	65.25
T5 (0.1% Citric acid and 0.1% KMS)	67.10

$$D.R = \frac{\text{Weight of sample before drying}}{\text{Weight of sample after drying}}$$

Sensory Evaluation

Sensory evaluation was conducted on the basis of colour, flavour, texture, taste and overall acceptability. The hedonic rating test was used to determine the acceptability of dehydrated oyster mushroom. The scale was arranged such that 9 = liked extremely, 8 = liked very much, 7 = liked moderately, 6 = liked slightly, 5 = neither like nor dislike, 4 = Disliked slightly, 3 = Disliked moderately, 2 = Disliked very much, 1 = Disliked extremely.

Fig 1. Flow Chart for the Dehydration of Oyster Mushroom

TREATMENT – 5

Select fresh and healthy oyster mushroom

↓

Remove stalk and wash to remove dust

↓

Cut in to 3 cm pieces and keep ready for pre treatment

↓

Treated with 0.1% Citric acid and 0.1% KMS

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Strained water and drying in sunlight

↓

Packaging in air tight bottle

↓

Dehydrated mushroom

↓

Seal and store in cool dry place

RESULTS AND DISCUSSION

It was found that the final dry weight of oyster mushroom varied between 51.5g to 67.1g (5.15 to 6.71%). The highest amount of final dried weight was obtained from treatment T5, *i.e.,* pretreatment with 0.1% citric acid and 0.1% KMS for 5 min and dried for 5d The minimum final product was obtained from the treatment T1, i.e. washing with plain water and dried for 5 days. Oyster mushroom sample dried after treating 0.1% citric acid and 0.1% KMS showed best colour and appearance out of the 5 treatments which was due to sulphiting process which helps to prevent the enzyme catalysed oxidative changes which inhibit the growth of micro organism and also facilitate to drying by the process of plasmolysis of cell. Further, it was found that treatment T5 gave high product recovery and T1 gave lowest product recovery.

Moisture content of the pre-treated oyster mushroom ranged from 94.85 to 93.29per cent. The percentage of moisture content was highest in T1 with mean value of 94.85% and lowest in T5 with mean value of 93.29 per cent. The dehydration ratio of dried mushroom ranged between from 19.4 to 14.9 per cent.

The drying characteristic of sun dried oyster mushroom revealed that it took 5 d to get a constant weight for complete drying with 94.1 per cent moisture content. A steep declining falling rate of drying was observed up to 3d later on a steady rate of drying was observed for the remaining days to reach the final drying rate after 5d of drying.

Sensory attribute is one of the important factors govern the consumers acceptance of food products and their purchase intent. The overall quality of any

Table 3. Effect of Different Treatment on Moisture Content and Dehydration Ratio of Sundried Mushroom.

Treatment	Moisture Content (%)	Dehydration Ratio
T1 (Control)	94.85	19.41
T2(.05% Citric acid)	93.95	16.58
T3 (.05% KMS)	93.53	15.45
T4 (0.05% Citric acid and 0.05% KMS)	93.47	15.32
T5 (0.1%Citric acid and 0.1% KMS)	93.29	14.90

food product is related to several sensory attribute like appearance, texture and flavor. Sensory evaluation of the pre-treated sun dried oyster mushroom was done by 30 panelists from women entrepreneurs group from Imphal. They were asked to give score for characteristic colour, flavour, texture, taste and overall acceptability of the dehydrated mushroom. The mean score of 9 point hedonic scale is shown in Table 4. It was seen that T_5 secured the highest score: 8.58 for colour, 7.90 for flavour, 8.38 for texture, for taste 8.32 and 8.35 for overall acceptability and was ranked 8 (like very much). It also showed that T_1 got the lowest value than the other sample.T5 got the highest value in terms of color, flavour texture, taste and it is more acceptable than the others. The mean score of overall acceptability of different treatments of dehydrated mushroom is graphically presented by bar chart in figure-3.From the figure it was found that the overall acceptability iwas highest in T5 i.e. 8.35 and lowest in T1 *i.e.,* 6.92.

CONCLUSION

Mushroom is highly perishable, so dehydration after pretreatment increased the shelf life and also reduced the enzymatic browning which give better colour, retension of flavour and texture. From this study it was found that treatment T5 i. e pretreatment with 0.1% Citric acid and 0.1% KMS and dried in sunlight for 5 days gives better recovery percentage, low moisture content and high sensorial score. The panelists also tested the product and gave the score for color, flavour, texture, taste and overall acceptability. The score of panel test indicated that among the five treatments, T5 got higher sensorial score and overall acceptability than other treatment and found to be the best treatment for getting good quality dehydrated mushroom. This technology can be adopted on large scale in order to attract customer, to generate income and also for sustaining livelihood of farm women.

Table 4. Mean Score of Sensory Evaluation of Sundried Mushroom

Sample Code	Sensory attributes				
	Colour	Flavour	Texture	Taste	Overall acceptability
S1	7.03	6.91	6. 82	6.78	6.92
S2	8.24	7.25	7.83	7.75	8.02
S3	8.32	7.65	8.14	8.03	8.15
S4	8.42	7.82	8.25	8.15	8.27
S5	8.58	7.90	8.38	8.32	8.35

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