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POST HARVEST (STORAGE) STUDIES FOR DRIED OYSTER MUSHROOM (*PLEUROTUS FLORIDA*)

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ABSTRACT

A storage study was undertaken on dried oyster mushroom (*Pleurotus florida*) at the Department of Agricultural Engineering, UAS, GKVK, Bangalore. The dried mushrooms were packed in 75 microns (300) gauge polyethylene bags. Storage studies were carried out by adopting two methods of storage, namely ordinary heat seal storage (control) and vacuum storage. During the storage period of three months, the biochemical changes and organoleptic characters were determined at monthly intervals and the results showed that there was a reduction in protein and rehydration ratios with a progressive increase in moisture content in both the methods of storage. The reduction of protein, rehydration ratio and the increase in moisture content was comparatively higher in ordinary heat sealed storage (control) against vacuum storage method. From the organoleptic study, it was found that the shelf life of dried mushroom could be increased to more than three months in vacuum storage method compared to two months in ordinary heat sealed method.

INTRODUCTION

Fresh mushrooms have very short shelf-life under normal ambient conditions of temperature and humidity and hence, they are dried/dehydrated for further use so as the shelf-life is increased. Dried products also deteriorate when they are exposed to open atmosphere with high moisture content. This deterioration can be avoided by different methods of package and storage. The main aim of packaging is to ensure that the product reach the consumer in a sound condition. The present study was under taken in view to increase the shelf-life of dried mushroom samples by packing in polyethylene bags and storing under different condition.

MATERIAL AND METHODS

Mushrooms were dried to bring the moisture content of 8-8.5 per cent (wb), in a cabinet tray drier at 60°C and were subjected to storage studies. Ten grams of dried mushroom samples from each treatment were packed in 75micron (300) gauge polyethylene (LDPE) bags and adopting two methods of storage namely, ordinary heat seal and vacuum storage carried out storage studies by keeping in ambient conditions for three months.

1. **Ordinary heat sealed storage (control):** Dried samples were packed in LDPE bags and then heat sealed. During the three months storage period, the physico-chemical changes were observed at monthly interval (Kumar and Sreenarayanam, 2000).

2. **Vacuum storage:** The dried mushroom samples were packed in polyethylene bags by using automatic heat sealing machine. Vacuum was created and immediately heat-sealed. The vacuum pump pressure was kept constant at 300 mm, Hg. After vacuumaziation the bags were completely adhere around the dried mushroom samples (Kumar and Sreenarayanam, 2000).

Rehydration ratio (ratio of sample weight after maximum rehydration, when immersed in boiling water to weight of sample taken for rehydration) was determined as per the method describe by Pruthi *et al.* (1978).

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Protein was estimated by Micro-Kjeldahl method (Sadasivam and Manickam, 1992). The moisture content was determined as per the procedure suggested in AOAC standards (1995) and the organoleptic evaluation of the mushroom sample was done by a panel of five judges for colour, texture and flavour. The rating assigned by the trained judges was numerical and scores rating from 0 (very poor) to 5 (extremely good) points as proposed by Amerine *et al.* (1965).

Pretreatment: Pretreatment is necessary to check the disclouration during processing of mushrooms (Pruthi *et al.*, 1978 and 1984). Two types of pretreatments done.

Chemical Pretreatment: Pretreatments were given for 200g of fresh mushroom samples before drying in all the three methods of drying (Solar cabinet, microwave-oven and Cabinet tray drying). 1) Control (No-Pretreatment), 2) Blanching (3-4 min), 3) Soaking in 0.5% Potassium metabisulphite (KMS) solution for 15 min, 4) Soaking in 1% Potassium metabisulphite(KMS) solution for 15 min, 5) Soaking in 1.5% Potassium metabisulphite(KMS) solution for 15 min.

Osmotic Pretreatment: Osmotic Pretreatment was selected to determine the quality of the mushrooms by drying the osmosed mushroom using Solar Cabinet drying and microwave-oven drying methods among with chemical treatments as mentioned above. The following Osmotic Pretreatments were given for 200g of fresh mushroom samples. 1) Control (No- Pretreatment), 2) Blanching (3-4 min), 3) Soaking in 5% brine Solution (NaCl) for 1 hour, 4) Soaking in 10% brine Solution (NaCl) for 1 hour, 5) Soaking in 15% brine Solution (NaCl) for 1 hour.

RESULTS AND DISCUSSION

Table 1 clearly showed that the moisture content increased marginally in both the methods of storage at ambient conditions. This may be due to the higher relative humidity and moderate water vapour transmission rate of the polyethylene film. The protein content of untreated sample was comparatively little more than the potassium metabisulphite (KMS) treated samples. Blanched samples retained lesser protein than other samples after drying. This may be attributed to the denaturation/ leaching due to heat treatment during blanching. Similar results were observed by Rama and Jacob (2000) and Suguna *et al.* (1995)

The decrease of protein content at the end of 90 days was more in untreated sample (2.40%, Table 1) packed under ordinary heat sealed method and among KMS treated samples, least decrease was found 1.0 per cent in KMS treated (0.75%) samples. However, under vacuum packaging method the decrease in protein content was comparatively less may be due to the vacuum in the package, the activity of proteinase may be less (Kumar and Sreenarayanam, 2000). The reduction of protein content in KMS treated sample was less during storage, this may be due to the reason that the KMS not only reduces the activity of proteinase, but acts as a preservative (Suguna *et al.*, 1995).

It was also observed that from the Table 1, the reduction in rehydration ratio from the starting day to 90 days of storage, for untreated, blanches and KMS treated samples were 3.98 to 2.25, 3.76 to 1.94 and 5.01 to 3.12 respectively, packed in ordinary heat sealed method, and were 3.98 to 2.95, 3.76 to 2.99 and 5.01 to 4.12 in vacuum packaging method.

The reduction in rehydrating capacity of the mushroom samples increased with increase in storage period. However, the reduction was less for those samples packed in vacuum packaging method as compared to ordinary heat sealed packs. This might be attributed to the reduction of water binding

Table 1. Effect of storage methods on quality of mushroom during storage

Mean scores of five judges

Storage days	Storage method	Treatment	Final MC (% wb)	Protein (%)	Rehydration ratio	Organoleptic evaluation		
						Colour	Texture	Flavour
0		Control	8.37	25.60	3.98	3.2	2.6	2.6
		Blanching	8.26	19.52	3.76	2.6	2.0	2.8
		0.5% KMS	8.35	22.90	4.90	3.6	3.6	3.4
		1.0% KMS	8.41	22.85	4.93	4.0	3.8	4.0
		1.5% KMS	8.46	23.62	5.21	3.4	3.4	3.6
30		Control	8.55	24.45	3.17	3.0	2.4	2.2
		Blanching	8.37	18.92	3.30	2.6	1.8	2.2
	C	0.5% KMS	8.50	22.30	4.37	3.4	3.4	3.2
		1.0% KMS	8.58	22.45	4.42	3.8	3.8	3.6
		1.5% KMS	8.60	22.52	4.69	3.0	3.2	3.2
		Control	8.45	25.20	3.82	3.0	2.4	2.6
		Blanching	8.29	19.22	3.69	2.6	2.0	2.6
	V	0.5% KMS	8.41	22.70	4.81	3.6	3.6	3.2
		1.0% KMS	8.48	22.71	4.86	4.0	3.8	4.0
		1.5% KMS	8.51	23.32	5.07	3.2	3.4	3.2
60		Control	8.64	23.72	3.07	2.2	2.0	2.2
		Blanching	8.46	18.22	2.68	2.0	1.6	2.0
	C	0.5% KMS	8.62	22.10	3.71	2.6	3.0	2.6
		1.0% KMS	8.62	22.25	3.77	3.0	3.6	3.4
		1.5% KMS	8.72	22.22	4.02	2.8	3.2	3.0
		Control	8.56	24.90	3.43	2.8	2.2	2.4
		Blanching	8.42	19.02	3.39	2.2	2.0	2.4
	V	0.5% KMS	8.52	22.54	4.48	3.2	3.2	3.0
		1.0% KMS	8.56	22.62	4.50	3.6	3.8	3.6
		1.5% KMS	8.64	23.03	4.66	3.0	3.2	3.2
90		Control	8.83	23.20	2.25	1.4	1.2	1.2
		Blanching	8.66	17.72	1.94	1.6	1.2	1.4
	C	0.5% KMS	8.80	21.90	2.99	2.4	2.0	2.2
		1.0% KMS	8.83	22.10	3.06	2.8	2.4	2.6
		1.5%KMS	8.89	22.02	3.30	2.4	2.2	2.0
		Control	8.71	24.60	2.95	2.2	2.0	1.4
		Blanching	8.58	18.82	2.99	2.0	1.6	2.2
	V	0.5% KMS	8.69	22.40	4.05	3.2	2.8	3.0
		1.0% KMS	8.72	22.55	4.11	3.6	3.2	3.6
		1.5% KMS	8.79	22.82	4.20	3.0	3.0	2.8

C = Control (Ordinary heat sealed storage);
V = Vacuum storage.

sites, due to chemical and structural changes in cells of the mushroom samples. Similar results were observed by Kumar and Sreenarayanam (2000) and Deshpande and Tamhane (1981).

Further Table 1, also indicated that, there was decrease in organoleptic mean scores for colour, texture and flavour. At the end of 90 days of storage, it was found that the colour of the untreated sample was distinctly very dark and had a slightly off-flavour compared to the KMS treated and blanched samples, stored in ordinary heat sealed packaging (Kumar *et al.*, 1980). Among the different KMS concentrations, the samples treated with 1.0 per cent KMS stored in vacuum packaging scored highest in terms of colour (3.6), texture (3.2) and flavour (3.6) out of 5.0 compared to

ordinary heat sealed samples. In this method also, the control sample was unacceptable in quality. Generally, KMS treated samples had maximum scores organoleptically. During the entire storage period, it was also observed that the blanched samples were leathery or rubbery in texture compared to KMS treated samples.

From the organoleptic evaluation it was found that potassium metabisulphite (KMS) was a best inhibitor of browning and also a preservator of colour, texture and flavour. The superiority of KMS was supported by Pruthi *et al.* (1978) and Dang and Singh (1978).

CONCLUSION

The results of the storage studies revealed that the shelf-life of dried mushroom, packed in75 micron (300 gauge) polyethylene bags by ordinary heat sealed method, stored under normal atmospheric condition could be up to two months, where as the dried samples packed in vacuum packaging method under the same atmospheric conditions could be increased to more than three months.

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