



Research Article

STUDY THE UTILIZATION OF MUSHROOMS IN VARIOUS TRADITIONAL FOOD PREPARATIONS. (*Pleurotus sajor caju*)

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Received: April 19, 2017; Revised: July 14, 2017; Accepted: September 05, 2017; Published: September 12, 2017

Abstract- Utilization points of view, dried mushroom powder used in the formulation of mushroom mixed maize, jowar and rice soups showed that upto the level of 25% could be fortified without changing sensory quality characteristics. Maize soup gave better consumer preference and nutritionally had higher amount of ash and fibres. In vermicelli, mushroom powder could be supplemented upto the level of 10% in refined wheat flour for enhancing the nutritional quality of the product. At higher percentage, product was poor due to changes in textural quality. Cooking time was also decreased on supplementation of mushroom powder. The utilization of fresh mushroom in *warri* and pickles showed that *warri* could be made with good sensory quality characteristics by using 30 per cent blackgram, 20% per cent fresh mushroom and 50 per cent ash gourd. The product contained good amount of all the nutrients specially ash and fibre. These products could be well stored both in plastic jars and polypropylene bags upto 6 to 8 months without any deleterious effect. Mushroom pickles with lemon juice could be stored for 10 months in comparison to pickle prepared in oil. All the sensory quality characteristic was also good in pickles with lemon juice.

Keywords- Mushroom soup, Warri, Pickles nutritional quality, Storage, Sensory quality.

Citation: Gour Shashi, et al., (2017) Study the Utilization of Mushrooms in Various Traditional Food Preparations. (*Pleurotus sajor caju*). International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 9, Issue 42, pp.-4683-4688.

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Academic Editor / Reviewer: Vikas Kumar, Adarsh M Kalla, Riar Charanjit S, Prerna Gupta, Abhimanyu Thakur

Introduction

Cereals like rice, wheat, maize, jowar and millets are staple food grains for majority of population around the world. These are rich sources of carbohydrates and supply calories and other nutrients to the consumers. In the developed countries many convenience, quality, cost efficiency and scope for increasing the nutritional value. The preparation of Indian sweetmeat, savoury snack products and other delicacies have been associated and deeply entwined with social customs. Wari a partially fermented legume based product, is manufactured on cottage scale. Generally, wari is prepared from split blackgram or greengram along with ingredients like ash gourd, mushroom, little quantity of coriander, asafetida, nutmeg and cinnamon. Pickling of food items has been a practice since long, as a means of preservation and flavour to the food.

Materials & Methods

Product development from mushroom powder

Mushroom Soup

Three type of mushroom in-rich soups were made from Maize, Jowar and Rice, soups using 10 per cents dried mushrooms powder and subjected to sensory evaluation by the panelist using 9 points hedonic scale. The Soup from the cereals was made after boiling the 100gm of any cereal in 200ml of water. On cooking it was filtered by muslin cloth and used for sensory evaluation after mixing with salt (by taste) black piper and mushrooms powder 10 % before serving [1].

Mushroom Vermicelli

Four type of vermicelli were made for mushrooms powder and maida in different combination and use for sensory analysis. The various combinations were [2]

1. 5% mushroom powder + 95% maida
2. 10% mushroom powder + 90% maida
3. 15% mushroom powder + 85% maida
4. 20% mushroom powder + 80% maida
5. 100% maida used as Control

The various blends were made and mixed with 40% water to make a very stiff dough. It was extruded through traditional vermicelli extruder (hand operated) in to thin strands of vermicelli. The extruded vermicelli was shade dried for two days and stored at air-tight containers. For sensory evaluation, it was cooked with milk and sugar till it become soft and served to the members of panellist.

Use of fresh mushroom in various food preparations

In the Present research work *warri* and pickles were made from fresh mushroom and used for sensory evaluation as well as storage studies

Mushroom warri

Four types of mushrooms *warri* were made from black gram dhal, ash guard and fresh mushroom in different combination by the traditional method [3].

1. 40% black gram dhal +10% fresh mushroom + 50 % ash gourd
2. 30% black gram dhal +20% fresh mushroom + 50 % ash gourd
3. 20% black gram dhal +30% fresh mushroom + 50 % ash gourd
4. 10% black gram dhal +40% fresh mushroom + 50 % ash gourd
5. 50% black gram dhal + 50 % ash gourd used as control

Split black gram dhal soaked in ample amount of water for overnight. Removed the drained dal and ground in wet grinder with small addition of water till it's become a paste. The Paste was whisked well until it become light and fluffy due

to incorporation of air. The resultant paste is mixed with crushed ash gourd and small pieces of mushroom and required quantity of spices. In general, for preparation of *warri* included required quantity of black gram dhal, ash gourd, mushroom, little quantity of coriander, asafetida, nutmeg and cinnamon. The resultant fluffy batter was then taken in hand and divided into small lumps, kept over a wooden frame maintaining a distance of 1-2 inches between lumps and sundried for 4-6 days depending upon condition of weather. They are turned over by hand after 2-3 days.

Storage studies of mushroom *warri*

Storage studies of mushroom *warri* were conducted at room temperature (28 to 40°C and relative humidity of 35 to 87). About 200g of *warri* packed in low density polyethylene (100 gauge), polyethylene (120 gauge) bags of 25x20 cm and plastic Jar (500g capacity) and stored for 8 months. The changes in moisture contents were recorded at regular intervals during storage period.

Mushroom pickles

Two types of pickles were prepared by mushroom and used for sensory evaluation as well as storage studies these pickles were [4].

(1) Pickle with oil

(2) Pickle with lemon juice

Preparation of Pickle with oil

Materials require:

Fresh mushroom	1 kg
Red chilli powder	2 table spoons
Turmeric powder	2 table spoons
Ginger	50 g
Fenugreek seed	4 table spoons
Cardamom	10 Nos
Rye	2 table spoons
Oil	200 ml
Salt	By Taste

Fresh mushroom was washed in running tap water and cut into pieces, blanched in boiling water for 5 minutes and then drained the water. Ground all the spices to make powder in a pestle mortar and fried with oil in a frying pan. In this fried spice, fresh mushroom was added with salt and cooked until complete evaporation of water and then removed and kept in glass container. Four tablespoons of acetic acid were added and used for further investigations.

Mushroom pickle with lemon juice –

Materials require:

Fresh mushroom	1 kg
Red chilli powder	2 table spoons
Turmeric powder	2 table spoons
Ginger	50 g
Fenugreek seed	4 table spoons
Cardamom	10 Nos
Rye	2 table spoons
Lemon Juice	200 ml
Salt	By Taste

Fresh mushroom was cut into pieces and blanched in boiling water for 5 min. Removed mixed with fried spices and add 200 ml of lemon juice and kept in sun-shine for 3-4 days. Further, they were used for sensory evaluation as well as storage studies

Sensory evaluation of products-

The developed products as well as control recipes were put up before a panel of experts for evaluation on a 9-point hedonic scale based on various quality attributes like appearance, colour, taste, flavour, texture and overall acceptability according to the procedure as described by Donnelly (1991). The panel member was supplied with score card and asked to evaluate the food products and

assigned the marks.

Results & Discussion

Product development from mushroom powder

Soups

Soups in combination with mushroom powder were developed from locally available food grains viz; maize jowar and rice, which have low nutritional quality and commonly available at low cost. Soups developed from these food grains may be useful for the malnourished children suffering from protein deficiency.

Sensory evaluation of soup

[Table-1] represents the sensory quality characteristics of the soups made from maize, jowar and rice in combination with mushroom powder. The results show that the mean score value for appearance were 8.9, 7.9 and 6.9 with respect to maize, jowar and rice, respectively. Maize mixed soup was in good appearance than the jowar and rice. There was a significant difference between all three types of soups. The mean score values for taste were 8.24, 8.12 and 7.12 with respect to maize, jowar and rice, respectively. The maize soup rated higher value and good in taste as compared to other soups. The mean score values for flavour were 8.53, 7.92 and 6.25 for maize, jowar and rice soups. However, values for overall acceptability were 8.01, 7.37 and 6.11 for maize, jowar and rice soups respectively. There was a significant difference between all the three soups. Thus, based on the above findings maize soup was good in appearance, taste, flavour and overall acceptability and could be considered as best and recommended specially for malnourished children.

Table-1 Mean score values for various sensory quality attributes of soups made from maize, jowar and rice in combination with mushroom powder

Products developed from food grains and mushroom powder	Sensory attributes			
	Appearance	Taste	Flavour	Over all acceptability
Maize soup	8.9	8.24	8.53	8.01
Jowar soup	7.9	8.12	7.92	7.37
Rice soup	6.9	7.12	6.25	6.11
SEm ±	0.07	0.53	0.54	0.53
CD5%	0.20	NS	1.56	NS

The cost of the product was also cheap at house-hold level. The data of other investigators well supported the above results.

Nutritional composition of mushroom fortified soups

[Table-2] shows that different nutrients viz; protein, fat, carbohydrates, fibre and ash varied in the range of 4.37 to 5.78; 0.31 to 1.27; 24.93 to 28.77; 0.91 to 1.66 and 0.76 to 1.03, respectively for the soups made from maize, jowar and rice. All the above nutrients were present in higher quantity in maize soup except

Table-2 Nutrients in ready-to-eat soups made from various food grains and mushroom powder

Nutrients	Maize mixed soup	Jowar mixed soup	Rice mixed soup
Protein	5.78	5.57	4.37
Fat	1.27	0.76	0.31
Carbohydrate	24.93	26.85	28.77
Fibre	1.66	1.33	0.91
Ash	1.0	1.03	0.76
Caloric	134	136	135

Made from 30g cereal flour + 10 g of mushroom powder and 70ml of water. Carbohydrates, which was maximum in rice soup. The total calorific values of all the soups were more or less same. From nutritional and sensory points of view, maize soup was considered as good in taste.

Vermicelli

Cereals like rice, wheat, maize, and millets are staple food grains for majority of population around the world. These are rich sources of carbohydrates and supply calories and other nutrients to the consumers. Apart from value addition by processing to traditional products from these food grains, development of newer products offers variety, convenience, quality, cost efficiency and scope for increasing the nutritional value. In the developed, countries many convenience foods are prepared by extrusion process using forming extruder, as it offers many desired characteristics to be incorporated in the product. Vermicelli are one of the many convenience foods prepared through this system and have been considered to symbolise long life and good luck in Asian culture. It is mainly prepared from wheat as well as rice and from other sources. They have become major products of the cereal food industry and are popular because their sensory appeal, low cost, ease of preparation at home-scale level, storage stability and the increased consumer interest in ethnic foods. Vermicelli is one of the convenience product made mainly from wheat and is popular because their sensory appeal, low cost, ease of preparation, storage stability and the increased consumer interest in ethnic foods. It is easily available under many brand names and they are also easy to cook with least effort and time. Since the commercially available vermicelli is made from only refined wheat flour, the calorific value as well as protein content and quality rank equally with any other cereal. Mutual supplementation of mushroom powder with cereal would be a positive approach to improve the protein quality as well other nutrients. In the present investigations, vermicelli prepared from refined wheat flour was modified replacing 5 to 20% refined wheat flour with dried mushroom powder to make it more nutritious, these products were evaluated for various physico-chemical and sensory quality characteristics. The physical characteristics like water uptake, time taken for cooking and increase in weight after cooking were studied. The moisture content of vermicelli at different stages of preparation have been presented in [Table-3].

Table-3 Physical characteristics of Vermicelli made from refined wheat flour and mushroom powder in different proportion

Parameters	Type of Vermicelli				
	Maida	Maida+ mushroom			
	100:00	95:05	90:10	85:15	80:20
Water added while making dough (ml)	40	40	35	30	25
Moisture content of dough (g%)	38.5	36.5	33.3	28.6	25.2
Freshly extruded Vermicelli	35.8	33.2	31.5	27.0	24.0
Dried Vermicelli	10.2	9.9	9.6	8.7	8.2
Weight of Sample before cooking (g)	50	50	50	50	50
Water used for boiling (ml)	200	200	200	200	200
Time taken for cooking (min)	4	4	3	3	2
Water uptake (ml)	100	95	90	85	80
Weight of sample after cooking, (gm)	140	130	130	120	110

The results showed that while making the dough of mushroom blended vermicelli took lower amount of water than refined wheat flour alone. It was decreased on gradual increase in the level of mushroom powder used for blending. Moisture content of the dough, freshly prepared vermicelli (estimated) was comparatively low than the quantity of water added as shown in the above table. This indicates that this decrease in moisture could be due to evaporation during preparation. The mushroom powder blended vermicelli took less time for cooking, less water uptake and less weight gain after cooking. The results showed that minimum blended mushroom powder in vermicelli absorbed maximum water and increased weight gain, which could be due to the presence of higher amount of gluten protein present in wheat flour.

Table-4 sensory quality characteristics of vermicelli made from different proportions of refined wheat flour and mushroom powder (Values are average of 10 individuals)

Quality attributes	Proportion of refined wheat flour and mushroom powder				
	100 :	95:05	90:10	85:15	80:20
Appearance	7.5	7.4	7.2	6.8	5.8
Colour					
Taste	8.0	7.8	7.9	6.4	5.2
Texture	7.9	7.5	7.3	6.2	5.8
Flavour	7.9	7.8	8.1	6.9	6.9
Overall acceptability	7.9	7.8	8.2	6.8	6.4

The organoleptic evaluation revealed that all the sensory quality attributes like appearance, colour, taste, texture, flavor and overall acceptability were varied in the range of 5.2 to 8.2. These values were more or less same in the products blended up to the level of 10 percent supplementation of mushroom powder. However, on increased the level of mushroom powder, the values for sensory quality attributes were decreased due to changes in the textural properties.

Table-5 Nutrient composition of Vermicelli made from refined wheat flour and dried mushroom powder

Nutrients %	Vermicelli	
	Traditional*	Improved **
Moisture	10.25	9.33
Protein	10.01	12.35 (+)
Fat	0.90	1.02
Carbohydrate	69.41	67.53
Ash	0.60	1.09 (+)
Crude fibre	0.30	1.12
Total calorific value (kcal)	341	338

*Traditional Vermicelli made from 100 per cent refined wheat flour.

**Improved vermicelli made from refined wheat flour and mushroom made with ratio of 90:10.

The nutritional composition of acceptable mushroom blended vermicelli (up the level of 10%) as shown in [Table-5] revealed that protein content enhanced in mushroom blended vermicelli (12.35%) than the vermicelli made of only refined wheat flour (10.01%). The fat content was slightly higher in mushroom blended vermicelli. The carbohydrate content was slightly reduced in mushroom blended vermicelli and there were no significant differences among the products in total calorific values. However, ash and crude fiber contents were comparatively very high in mushroom blended vermicelli. Thus, based on the above results, it was concluded that vermicelli made of cereals blended with mushroom had an added advantage of easy digestibility and quality/quantity of protein is suitable choice of preparing geriatric foods. They were also rich in minerals and fibres. Similar work has also been done on vermicelli made from wheat flour-pulse blends [5]. These findings were well supported by Sowbhagya *et. al.* 2000; and Sowbhagya and Ali, 2001.

Use of fresh mushroom in various food preparations

Mushroom warri

India has innumerable sects of human population and the diversity of food habits has resulted in many traditional fermented foods. Many of these remain highly secretive in their preparation being passed on from generation to generation and tend to be regionalized with many of them being made only on home scale [6]. Warri somewhat like Japanese miso, [7] belong to a very famous group of legume based fermented foods of Northern India. These are spicy, hollow, brittle, friable balls, very popular in district of Punjab state and used as a condiment in cooking with vegetables, legumes, or rice. These are manufactured

according to the traditional methods and are produced on cottage industry scale using natural microflora from the staples and the surroundings. Generally, *Warri* is prepared from split blackgram or greengram along with ingredients like dried fenugreek leaves, coriander powder, cumin seed, red chilli powder and black pepper. There is no regular statistics available on production of these products used as adjuncts in curry preparation. In the present investigations, mushroom enriched black gram *warris* were prepared in different fixed amount of proportions of blackgram dhal and fresh mushroom with ash gourd, the obtained results on technological data for *warri* preparations, sensory and nutritional quality characteristics and storage studies in different packaging materials have been discussed hereunder.

Technological data for *warri* preparation

The technological data recorded for preparation and drying of mushroom supplemented *warri* have been presented in [Table-6] the results revealed that the initial moisture content of split black gram dhal ranged from 10 to 11% and the initial moisture contents of the resultant paste after wet grinding with chopped mushroom ranged from 65 to 80 per cent. The paste when subjected to whisking incorporated air into batter which not only provided porous texture but also gave a shine to dried *warri*. Whisking of batter also resulted in the formation of fine air cells, which got fixed upon drying.

Table-6 Technological data for preparation of *warris* from blackgram fresh mushroom and ash gourd in different proportions.

Particulars	Proportions of blackgram fresh mushroom and ash gourd				
	40:10:50	30:20:50	20:30:50	10:40:50	50:00:50
Moisture in pulse%	10.0-11.0	10.0-11.0	10.0-11.0	10.0-11.0	10.0-11.0
Moisture in paste % With mushroom	70.0	72.0	75.0	80.0	65.0
Whisking time min.	10min	10min	10min	10min	10min
Drying ratio	3:0:10	2:8:10	2:5:10	2:0:10	3:5:10
Time taken for sun drying days	3-4	2-3	2-1	1.0	4-6days
Weight of <i>warri</i> (gm)	5.0	4.0	2.0	2.0	5.0
Warring Average	1.0	1.0	1.0	1.0	1.0
Moisture in dried product (%)	6-7	5-6	4.5	3.4	8-9
Colour of finished product	Light + gray	Light gray	Light gray	Light gray	Light yellow

The total sun drying time required was about 1 to 6 days to attain the moisture level of 3 to 9% for the dried products made from different proportions of blackgram, fresh mushroom and ash gourd. The drying ratio was found to vary in the range of 2:10 to 3.5:10 for all types of *warris* made during this investigation. The above findings were like the previous observations of other workers [8-10].

Sensory quality characteristics of mushroom *warri*

The sensory quality characteristics of mushroom supplemented *warri* have been described here under.

Appearance

The mean score values for appearance of mushroom *warri* ranged between 7.2 to 8.8 with the highest value in *warri* having 20 % of mushroom. The statistical analysis shows the better results in 20 % level of fortification.

Taste

The mean values for taste of the mushrooms *warri* ranged from 8.2 to 8.5 with the highest value in products having 20% level of mushroom fortification.

Texture

The mean score values for texture of the mushroom *warri* ranged from 6.9 to 7.5 with the highest value in the product having 20% of mushroom.

Flavour

The mean score values for flavour of the mushroom *warri* ranged from 7.2 to 8.9 with the highest value in product having 20% of mushroom.

Table-7 Mean score values for various sensory quality attributes for *warris* made from different proportions of blackgram, fresh mushroom and ash gourd

S. No	Proportion (blackgram: Fresh mushroom : ash gourd)	Sensory attributes				
		Appearance	Taste	Texture	Flavour	Overall acceptability
I	40:10:50	8.2	8.8	7.2	8.1	7.2
II	30:20:50	8.8	8.2	7.5	7.2	8.6
III	20:30:50	8.1	8.5	7.3	8.8	8.9
IV	10:40:50	7.2	8.4	7.0	8.2	7.2
V	50:00:50	7.5	8.2	6.9	7.5	6.8
	SE _u ±	0.28	0.20	0.19	0.28	0.16
	CD 5%	0.88	0.65	NS	0.88	0.49

Overall acceptability

The mean score value for overall acceptability of the mushroom *warri* ranged from 7.2 to 8.9 with the highest value in the product having 20% of mushroom. From the above findings, it was concluded that mushroom fortified *warri* could be well prepared with 20 per cent level of mushroom fortification. The *warris* were good in all the sensory quality characteristics. Similar results were also recorded by other workers [11].

Nutritional quality of mushroom *warris*

The nutritional composition of mushroom supplemented *warri* had more or less same level of all the nutrients except ash and fibre which were present in higher amount in mushroom fortified *warri* AOAC(1984)[12]

Table-8 Nutritional composition of acceptable mushroom fortified *warris* made from blackgram, fresh mushroom and ash gourd (on dry weight basis)

Nutrients	Warris	
	50:00 :50	30:20:50
Protein	23.76	23.20
Fat	1.50	1.57
Carbohydrates	59.01	57.59
Ash	3.56	4.02
Fibre	2.15	3.60

Shelf- life of *warri*

The storage studies on mushroom *warri* were carried out in three containers viz; low density polyethylene (100gauge), polypropylene (120gauge) and plastic jars for the period of 8 months at room temperature (28-40°C) with 35-87% relative humidity. The changes in moisture content were recorded in every two months of storage of the product. Moisture content decreased upto 2 months of storage and then increased gradually.

This may be due to the variations in atmospheric relative humidity (35-87%) during the storage period. The greater fluctuations in moisture loss or gain were recorded in low-density polyethylene bags as compared to other packaging materials used during these investigations. Thus, it is concluded that polypropylene and plastic jars were considered to be superior to low density polyethylene bags with respect to the extent of loss in moisture content during storage of 8 months. All packaging materials except low density polyethylene bags were free from insect infestation up to six months of storage. Thus, polypropylene bags could be best from storage point of view. Other investigators well supported these findings [3,10,11].

Mushroom pickles

[Table-8] shows the sensory quality characteristics of two types of mushroom pickles made with oil and with lemon juice stored for the period of 10 months.

Table-8 Changes in moisture content (%) of freshly prepared warris during different periods of storage at room temperature (28-40°C) relative humidity (35-87%)

Package in material gauge	Storage Period months									
	0		2		4		6		8	
40:10:50										
100 gauge	9.5		8.8		12.2		13.9		14.1	
120 gauge	9.5		9.4		9.6		9.9		10.9	
Plastic Jar (PET)	9.5		9.2		9.5		9.6		9.6	
30:20:50										
100 gauge	9.6		9.2		7.87		13.8		13.9	
120 gauge	9.6		9.1		9.2		9.4		10.0	
Plastic Jar (PET)	9.6		9.1		8.9		9.0		9.2	
20:30:50										
100 gauge	9.2		8.2		9.0		9.1		10.2	
120 gauge	9.2		8.1		9.2		9.9		9.2	
Plastic Jar (PET)	9.2		8.1		9.1		9.1		9.8	
Storage CD 5%	0.07	0.19	0.07	0.023	0.48	1.39	0.25	0.72	0.18	0.52
	Sem ±	CD 5%	Sem ±	CD 5%	Sem ±	CD 5%	Sem ±	CD 5%	Sem ±	CD 5%
Packaging	0.05	NS	0.06	NS	0.37	NS	0.19	0.56	0.14	0.40
Storage x Packaging	0.11	NS	0.04	NS	0.83	NS	0.43	1.26	0.31	0.90

Effect of storage on appearance of pickles

The mean score values for appearance of mushroom pickles were 6.8, 6.8, 6.7, 6.2, 6.0, and 5.0 for oil pickle and 6.8, 6.8, 6.7, 6.2, 6.0 and 5.5 for lemon juice pickle at different time intervals of 2,4,6,8 and 10 month of storage periods. The statistical data shows that better results were in lemon juice pickle. The appearance of product decreased after 8 months of storage.

Effect of storage on flavour of pickles

The mean score values for flavour of mushroom pickle with oil were 8.5, 8.5, 8.4, 8.4, 8.3 and 8.2 and with lemon juice 8.9, 8.9, 8.8, 8.8, 8.5 and 8.4 at

different time intervals of 2,4,6,8 and 10 months of storage periods. There was a significant difference between storage period and treatments.

Effect of storage on texture of pickles

The mean score values for texture of mushroom pickles with oil were 8.8, 8.7, 8.5, 8.4, 8.3 and 8.2 and with lemon juice 8.8, 8.8, 8.6, 8.5, 8.4 and 8.4 at different time intervals of 2,4,6,8 and 10 months of storage periods. The statistical data shows that there were no significant differences between storage time. However, treatment shows that lemon juice had good texture.

Table-9 The mean score values of sensory attributes of mushroom pickles with oil and with lemon juice.

Storage Month	Sensory parameters														
	Flavour			Texture			Sourness/ Saltiness			Appearance			Over all acceptability		
	With oil	With lemon Juice	Mean	With oil	With lemon Juice	Mean	With oil	With lemon Juice	Mean	With oil	With lemon Juice	Mean	With oil	With lemon Juice	Mean
0	8.5	8.9	8.7	8.8	8.8	8.8	3.8	4.2	4.0	6.8	6.9	6.85	3.2	3.5	3.35
2	8.5	8.9	8.7	8.7	8.8	8.75	4.5	4.20	6.8	6.8	6.9	6.85	3.2	3.6	3.40
4	8.4	8.8	8.6	8.5	8.6	8.55	4.6	4.25	6.7	6.7	6.7	6.70	6.5	6.8	6.65
6	8.4	8.8	8.6	8.4	8.5	8.45	5.20	5.00	6.2	6.2	6.3	6.25	6.90	7.00	6.95
8	8.3	8.5	8.4	8.3	8.4	8.35	5.53	5.21	6.0	6.0	6.1	6.05	8.00	8.9	8.45
10	8.2	8.4	8.3	8.2	8.4	8.30	6.80	5.85	5.00	5.00	6.10	5.55	8.00	8.9	8.45
Mean	8.38	8.71		8.48	8.58		4.37	5.14		6.25	6.50		5.97	6.45	
	T	S	TXS	T	S	TXS	T	S	TXS	T	S	TS	T	S	TXS
SEm±	0.07	0.04	0.10	0.08	0.05	0.12	0.17	0.10	0.25	0.08	0.05	0.12	0.11	0.06	0.16
CD	0.21	0.12	NS	0.25	NS	NS	0.51	0.29	0.72	0.25	0.14	0.36	0.33	0.19	NS

*T Treatment

*S Storage

Effect of storage on saltiness /sourness of pickles

The mean score values for saltiness /sourness of mushroom pickles with oil were 3.8, 4.5, 4.6, 5.2, 5.5 and 6.8 and with lemon juice 4.2, 4.2, 4.2, 5.0, 5.2 and 5.8 at different time intervals of 2,4,6,8 and 10 months of storage period.

Effect of storage on overall acceptability of pickles

The mean score values for overall acceptability of mushroom pickles with oil were 3.2, 3.2, 6.5, 5.9, 8.0 and 8.0 and with lemon juice 3.5, 3.6, 6.8, 7.0, 8.9, and 8.9 at different time intervals of 2,4,6,8 and 10 months of storage periods. Statistical data shows that there was a significant difference between treatments and storage periods. From the above other results, it was concluded that lemon pickle was better accepted in comparison to oil pickle and could be stored for the period of 8 months without any deleterious effect. These findings were well agreed with the results of other investigators [13,14].

Acknowledgement / Funding: Authors are thankful to ICAR ATTARI ZONE VII

Author Contributions: All author equally contributed

Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

Conflict of Interest: None declared

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