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Original Research Article

Effect of Packaging Materials and Storage on Nutritional Qualities of Dehydrated Spine Gourd Slices

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Solar drying, Packaging materials, Storage, Nutritional value

A B S T R A C T

Spine gourd (*Momordica dioca* L.) slices were dried in solar drier at 60˚C upto 6% moisture level and packed in 200 gauge polyethylene bags, 300 gauge polyethylene bags, aluminated foils, plastic bottles and as control (unpacked samples) stored upto 180 days from drying. Solar drying followed by packaging in aluminated foil found to be good for retaining maximum nutritional contents during storage period. Maximum retention of nutrients like crude protein, ascorbic acid, carbohydrates, crude fibre content with minimum moisture and titrable acidity was recorded in dehydrated spine gourd slices packed in aluminated foil.

Introduction

Vegetable sector has emerged as an important component of Indian agriculture. Vegetables have contributed largely towards food and nutritional security of the people, particularly the poor. Vegetables are rich and cheap source of carbohydrates, proteins, fibre, vitamins and minerals, hence vegetables are rightly called as protective food. Spine gourd belongs to family cucurbitaceae having botanical name *Momordica dioca* L. and commonly known as Kantola, Kakrol, Teasel gourd, Kankro. The average nutritional value per 100 g edible contain of spine gourd is 84.1% moisture, 7.7 g carbohydrate, 3.1 g protein, 3.1 g fat, 3.0 g fibre and 1.1 g minerals. It also contained small quantities of essential vitamins like ascorbic acid, carotene, thiamin, riboflavin and niacin (Talukdar, 2014). Spine gourd is also used as medicine to cure different health problem in different forms. The primary purpose of packaging is to protect the food products and to keep it in good condition and to preserve the products.

The packaging must be capable of protecting the product from thermal changes, humidity variation and the hazards of rough handling, infestation and contamination from microbes. The material must be effective in preventing the product from quality deterioration. Considering this an experiment was conducted to assess the effect of packaging materials and storage on nutritional qualities of dehydrated spine gourd slices.

Materials and Methods

The study was conducted in Post-Harvest technology Laboratory at University Department of Horticulture, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during 2016 - 2017. The selected spine gourd fruits were cut manually with stainless steel knife and prepared slices of 0.5 cm thickness. Slices were allowed for pre-treatments and blanching was carried out in boiling water for 3 minutes. Steeping solution of 0.2% potassium metabisulphite (KMS) and 2% salt (NaCl) were prepared in water and slices were soaked for 10 minutes and dried in solar drying (D_1) for 3 hrs at 60°C upto 6 % moisture level (Singh *et. al*., 2008). After drying, the dried slices were packed in different packaging materials viz. 200 gauge polyethylene bags (P_2), 300 gauge polyethylene bags (P_3), aluminated foils (P_4), plastic bottles (P_5) and as control (P_1) (unpacked samples) stored at room temperature upto 180 days from drying (Manimegalai and Ramah, 1999 and Shams-Ud-Din and Shraji, 2008). Chemical analysis of slices weredone at 30 days interval upto 180 days of storage. The physical and chemical parameters like dehydration ratio, rehydration ratio, moisture, protein, titrable acidity, ascorbic acid, carbohydrates and crude fibre content were determined according to methods given by Ranganna (1979).

Results and Discussion

The data presented in Table 1 indicated that, moisture content, rehydration ratio, crude protein content and titrable acidity content showed non-significant differences on 1st day of storage.

Moisture content increased during storage of dehydrated spine gourd slices irrespective of packaging material and storage period. The moisture content was low (9.35 per cent) in the dehydrated spine gourd slices packed in aluminated foil (P_4). The increasing trend might be due to gain of moisture by dried slices from atmosphere. The gain in moisture was highest in control as compared to rest of the treatments. Similar results of increase in moisture content with the advancement of storage period were also reported by Jadhav *et al.,* (2009) and Mudgal *et al.,* (2009) for drying of bitter gourd slices.

Higher rehydration ratio (2.60) was observed in samples packed with aluminated foil (P_4) as compared to other packaging materials. The rehydration ratio of dehydrated spine gourd slices decreased gradually with increase in storage period. The decreasing trend might be due to gain of moisture by dried slices from atmosphere (Shams-Ud-Din and Shirazi, 2008).

On 180th day of storage, maximum protein content was found in slices packed in aluminated foil (4.80) and same showed minimum loss in protein content during storage period as compared to rest of the packaging materials. Decreased protein content was recorded with increase in storage duration (Negi and Roy, 2001). The decreasing trend might be due to gain of moisture by dried slices from atmosphere. Denaturation of protein was brought about by heat in presence of moisture (Khurdiya *et al.,* 1972). The titrable acidity was found minimum in spine gourd slices packed in aluminated foil (0.64) at 180th day of storage. Increasing titrable acidity was recorded with advancement of storage period. This might be due to higher rate of oxidation at ambient temperature (Dhotre *et al.,* 2012).

The ascorbic acid content was higher in the dehydrated spine gourd slices packed in

aluminated foil (28.30) on 180th day of storage as compared to control and other packaging materials. The ascorbic acid content of spine gourd slices decreased with advancement of storage. This might be due to its oxidation during dehydration which resulted in decreased ascorbic acid content (Dhotre *et al.*, 2012).

Significantly maximum carbohydrate content was observed in aluminated foil (52.52 per cent) over the rest of the treatments on 180th day of storage (Table 2). The decreasing carbohydrate trend might be due to the effects of processing and storage involves chemical changes in components (Spencer, 1973), while crude fibre showed non-significant effect on spine gourd slices packed in different packaging materials. The dehydrated spine gourd slices can be stored for longer duration in aluminated foil with better retention of nutrients. Protein content, ascorbic acid, carbohydrates, crude fibre content were retained maximum in aluminated foil with minimum moisture and titrable acidity content. Slices remained in good condition and preserved the nutritive quality throughout storage period.

Table.1 Effect of packaging material on physical and chemical parameters of dehydrated spine gourd slices

Treatments	Physio-chemical parameters							
	Moisture (%)		Rehydration ratio		Crude protein Content (%)		Titrable Acidity (%)	
Packaging materials	1st Day	180th day	1st Day	180th day	1st Day	180th day	1st day	180th day
P_1	6.05	12.97	3.49	2.45	5.21	4.06	0.11	0.72
P_2	6.02	10.15	3.50	2.59	5.21	4.61	0.10	0.66
P_3	6.02	10.59	3.50	2.55	5.21	4.55	0.10	0.66
P_4	6.02	9.35	3.50	2.60	5.21	4.80	0.10	0.64
P_5	6.02	10.62	3.50	2.57	5.21	4.51	0.10	0.75
'F' test	NS	Sig.	NS	Sig.	NS	Sig.	NS	Sig.
SE(m)±	0.003	0.002	0.004	0.007	0.001	0.002	0.001	0.003
CD at 5%	-	0.006	-	0.020	-	0.005	-	0.009

Table.2 Effect of drying methods on chemical parameters of dehydrated spine gourd slices

Treatments	Chemical parameters					
	Ascorbic acid (mg/100g)		Carbohydrate content (%)		Crude fibre content (%)	
Packaging materials	1st day	180th day	1st day	180th Day	1st Day	180th Day
P_1	33.23	27.50	53.20	52.06	20.36	20.24
P_2	33.32	27.75	53.16	52.08	20.21	19.80
P_3	33.38	27.62	53.22	52.14	20.11	20.06
P_4	33.50	28.30	53.29	52.52	20.30	20.16
P_5	33.40	27.53	53.18	52.07	20.14	20.01
'F' test	NS	Sig.	Sig.	Sig.	NS	NS
SE(m)±	0.23	0.008	0.012	0.075	0.00	0.011
CD at 5%	-	0.024	0.036	0.222	-	-

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