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RESEARCH ARTICLE :

Nutritional quality of dehydrated spine gourd (*Momordica dioca* L.) slices as influenced by drying methods

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SUMMARY : An investigation was conducted in the year 2016-2017 to evaluate nutritional quality of dehydrated spine gourd (*Momordica dioca* L.) slices as influenced by drying methods. Spine gourd is very nutritive vegetable available in market for very short period.The selected spine gourd fruits were cut manually with stainless steel knife and 0.5 cm thick slices were prepared. Slices were allowed for pre-treatments and blanching was carried out in boiling water for 3 minutes. The spine gourd slices were dried by solar and cabinet dryers and observations were recorded upto storage period of six month at ambient conditions. Solar drying was found superior and exhibited maximum dehydration and rehydration ratio, ascorbic acid, crude protein content, carbohydrate content and crude fibre content with minimum moisture and titrable acidity content as compared to cabinet drying. Solar dried slices maintained good nutritional status of dehydrated spine gourd slices during storage period.

KEY WORDS :
Spine gourd, Solar drying, Cabinet drying, Nutritional quality

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BACKGROUND AND OBJECTIVES

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. India is the second largest producer of vegetables in the world after China. Spine gourd is the member of cucurbitaceae family having a high nutritional as well medicinal value. It is an important vegetable which is normally seen in the Indian markets in the season of monsoon. It fetches very good price in the market. It has many health benefits and it is started to crop up all around the world besides Indian subcontinent. Dehydration of spine gourd not only increases its value but also its availability. Proper drying method should be selected for better nutritional status of dehydrated spine gourd slices for extended storage and availability. The preservation methods such as dehydration, steeping (salt solution) and pickling can be successfully adapted to preserve products for off-season. Dehydration is one of the best methods of preservation; the main principle of preservation of product is to remove the

moisture content to a level where micro-organism may not able to spoil the product (Anonymous, 2010).

Objectives:

The study was undertaken with following objectives:

– To study the effect of drying methods on nutritional quality of dehydrated spine gourd slices.

– To find out suitable drying method for better nutritional quality of dehydrated spine gourd slices.

RESOURCES 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 per cent potassium metabisulphite (KMS) and 2 per cent salt (NaCl) were prepared in water and slices were soaked for 10 min. and allowed to dry in solar drying (D_1) and cabinet dryer (D_2) for 3 hrs at 60°C upto 6 per cent moisture level (Singh *et al*., 2008). After drying, the dried slices were allowed for chemical analysis at 30 days interval upto 180 days of storage. Dried slices were cooled, packed and stored at room temperature (Manimegalai and Ramah, 1999 and Shams-Ud-Din and Shirazi, 2008). 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 procedures given by Rangana (1979).

OBSERVATIONS AND ANALYSIS

The present investigations were undertaken with an objective to standardize the drying method for preparation of good quality dehydrated spine gourd slices. The dehydrated slices retained in good nutritive quality after six months storage at ambient temperature. Physical properties of dehydrated spine gourd slices are presented in Table 1.

Table 1: Dehydration ratio and time required for drying of spine gourd slices influenced by different drying methods

Drying methods	Dehydration ratio	Time required for drying (hr)
Solar drying (D_1)	10.34	11.53
Cabinet drying (D_2)	10.00	9.58

As regards the data presented in Table 1, it was found that the dehydration ratio and time required for drying was influenced by the drying methods. Highest dehydration ratio was observed in solar drying (10.34) whereas it was lower in cabinet drying(10.00). However, cabinet drying took minimum time for drying (9.58 hrs) as compared to solar drying (11.53 hrs). The total drying period required for drying of spine gourd slices recorded minimum in cabinet

Table 2: Effect of drying methods on physico-chemical parameters of dehydrated spine gourd slices

Treatments	Physical and chemical parameters							
	Moisture (%)		Rehydration ratio		Titrable acidity (%)		Protein content (%)	
Drying methods	1st day	180th day	1st day	180th day	1st day	180th day	1st day	180th day
D_1	6.02	10.67	3.50	2.56	0.10	0.66	5.21	4.55
D_2	6.01	10.80	3.50	2.54	0.11	0.71	5.21	4.46
F test	NS	Sig.	NS	Sig.	NS	Sig.	NS	Sig.
S.E.±	0.002	0.001	0.003	0.004	0.001	0.002	0.000	0.001
C.D. (P=0.05)	-	0.004	-	0.013	-	0.006	-	0.003

NS= Non-significant

Table 3 : Effect of drying methods on chemical parameters of dehydrated spine gourd slices

Treatments	Chemical parameters					
	Ascorbic acid (mg/100g)		Carbohydrate content (%)		Crude fibre content (%)	
Drying methods	1st day	180th day	1st day	180th day	1st day	180th day
D_1	33.39	27.73	53.23	52.25	20.24	19.96
D_2	33.39	27.75	53.19	52.10	20.24	20.14
F test	NS	Sig.	Sig.	Sig.	NS	NS
S.E.±	0.14	0.005	0.008	0.047	0.000	0.007
C.D. (P=0.05)	-	0.015	0.022	0.140	-	-

NS= Non-significant

drying and maximum in solar drying. This may be due to the intense concentrated heat, control air circulation inside the dryer, low relative humidity and faster removal of water during drying (Singh and Sagar, 2013).

The perusal of data presented in Table 2 showed that, solar dried spine gourd slices had minimum moisture (10.67 %) while cabinet dried slices had maximum (10.80%) moisture content 180 days after storage. The progressive increase in moisture content was noticed in all the samples due to hygroscopic nature of the slices during storage (Dhotre *et al.*, 2012). The highest rehydration ratio (2.56) was recorded in solar drier and lowest rehydration ratio (2.54) was recorded in cabinet dryer at the end of study period. The decreasing trend might be due to gain of moisture by dried slices from atmosphere (Shams-Ud-Din and Shirazi, 2008).

Solar dried spine gourd slices had minimum (0.66 %) titrable acidity while cabinet dried slices had maximum (0.71%) titrable acidity during storage period. The increasing trend might be due to conversion of some amount of sugars into acid. Increase in acidity is not only due to pre-treatments but also due to drying methods. Solar dried spine gourd slices showed minimum loss in protein content while cabinet dried slices showed maximum loss in protein content during storage period. The decreasing trend might be due to gain of moisture by dried slices from atmosphere. Denaturation of protein is brought about by heat in presence of moisture (Khurdiya *et al.*, 1972).

Observation recorded in Table 3 reflected that, the spine gourd slices dried in cabinet drier had maximum ascorbic acid content (27.75 mg/100g) as compared to solar dried slices (27.73 mg/100g) at 180 days of storage.The decreased trend of ascorbic acid content was observed mostly due to its oxidation during the storage period and also ascorbic acid is very sensitive to heat. It might be lost due to application of heat during drying. An antioxidant that might have reduced the discoloration of the dried bitter gourd slices (Dhotre *et al.*, 2012).

Significantly maximum carbohydrate content was observed in solar dryed slices (52.25%) at 180 days after storage. Carbohydrate content of spine gourd slices decrease with advancement of storage upto 180 days. The decreasing trend might be due to the effects of processing and storage involves chemical changes in components (Spencer, 1973). Crude fibre content of spine gourd slices decreased during storage period but there was non-significant influence of drying methods on crude fibre content of spine gourd slices.

Conclusion :

The physico-chemical parameters like moisture, titrable acidity showed the increasing trend while rehydration ratio, ascorbic acid, protein, carbohydrates and crude fibre content noticed the decreasing trend with the advancement of storage period and drying methods *i.e.* qualitative product were obtained in solar drying as compared to cabinet drying.

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