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Short communication

Influence of slice thickness on the quality of dehydrated bitter gourd rings

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Bitter gourd (*Momardica charantia*) is an important vegetable of summer as well as rainy season. It is consumed throughout the Asian sub-continent for culinary and medicinal purposes. The vegetable is valued for its medicinal properties, particularly, for the treatment of general fever, malaria and diabetes (Kedar and Chakraborti, 3). Antidiabetic properties of bitter gourd are due to its potent oxygen-free radical scavenging activity of the fruit juice (Sree Jayan and Rao, 8). It is also said to be a good vegetable for patients suffering from ascites, gout pain in joints and indigestion. Drying and canning are common methods employed for its preservation. Canning is uneconomical due to increased cost of cans. Dried product is, therefore, preferred because of some advantages like reduced mass (bulk), lower cost of packaging, transportation and storage requirement (Singh *et al*., 7). Keeping these in view, the present investigation was undertaken to standardize the thickness of bitter gourd rings for preparation of good quality dehydrated product.

Fruits of four bitter gourd cultivars, *viz*. Pusa Do Mousami (PDM), Pusa Vishesh (PV), Pusa Hybrid-1 (PH-1) and Pusa Hybrid-2 (PH-2) were obtained from the Research Farm of the Division of Vegetable Science, IARI, New Delhi. Fruits were washed in running tap water, surface dried and cut with a sharp stainless steel knife into three different thicknesses, *viz.,* 1.0, 1.5 and 2.0 cm. Known quantity of rings from each thickness was taken in a muslin cloth and dipped in boiling water (1:5 ratio, bitter gourd rings: water) for 3 min. Thereafter, the material was removed, cooled in running tap water and subjected to peroxidase inactivation test for adequacy of blanching followed by drying in a cabinet drier at a temperature of 58±2°C.

The moisture content was determined by drying the sample in a hot air oven (60±5°C) to a constant weight. Total chlorophyll, ascorbic acid, drying ratio and rehydration ratio were determined according to the methods described by Ranganna (6). Sensory evaluation of rehydrated samples for colour, flavor, texture and overall acceptability was done by a panel of seven semi-trained members. Attributes were scored on a five point hedonic scale as excellent = 1, good = 2, fair = 3, poor = 4 and very poor = 5 (Okoli *et al*., 5).

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The data presented in Table 1 showed that moisture content was relatively low in dehydrated bitter gourd rings of 1.0 cm thickness as compared to rings prepared from 2.0 and 1.5 cm thick slices in all the four cultivars. This may be due to faster removal of moisture during dehydration of thinner slices and less travelling distance for water diffusion from the rings and getting heat into them. High content of ascorbic acid was noticed in dehydrated bitter gourd rings prepared from 1.5 cm thick slices as compared to 1.0 and 2.0 cm thick slices. This may be due to better protection of ascorbic acid by the optimum thickness (1.5 cm) of the slices because of faster removal of water and less drying time. The low ascorbic acid content in 1.0 cm thick slices may be due to higher oxidation of ascorbic acid and lesser thickness of the slices at same drying temperature, while, in case of 2.0 cm thick slices the ascorbic acid may be degraded due to longer drying time during dehydration. Similarly, Kalra *et al.* (2) have also reported that ascorbic acid content decreased in 1 cm thick rings of bitter gourd cv. BG-12 during dehydration. Total chlorophyll content was also higher in dehydrated bitter gourd rings prepared from 1.5 cm thick slices as compared to 1.0 and 2.0 cm thick slices. The higher chlorophyll loss in 1.0 and 2.0 cm thick slices may be due to faster rate of moisture removal in thin slices and longer time of contact with heat, in case of 2.0 cm thick slices during dehydration.

The drying ratio was better in dehydrated rings prepared from 1.5 cm thick slices followed by 2.0 and 1.0 cm thick slices in all the four cultivars of bitter gourd (Table 1). However, the differences were not significant. The less drying ratio obtained in 1.0 cm thick slices may be broken of the rings during dehydration. Similar results have been reported by Meena and Lal (4) in dehydrated *kachari* (*Cucumis melo*) slices. Rehydration ratio was higher in the dehydrated bitter gourd rings prepared from 1.5 cm thick slices as compared to 1.0 and 2.0 cm thick slices in all the four cultivars of bitter gourd. It is because of higher absorption of water during soaking by the 1.5 cm thick dehydrated rings and lesser absorption of water by the dehydrated rings prepared from 1.0 and 2.0 cm thick slices.

Table 1. Effect of thickness (cm) of slices on chemical constituents of dehydrated bitter gourd rings (dry weight basis).

Parameter	Cultivar	Slice thickness (cm)			$CD_{0.05}$
		1.0	1.5	2.0	
Moisture	PDM	6.12	6.31	6.43	0.06
	PV	6.21	6.33	6.47	0.07
	PH-1	6.26	6.35	6.51	0.16
	PH-2	6.07	6.13	6.26	0.16
Ascorbic acid (mg/100 g)	PDM	51.48	51.91	51.75	0.24
	PV	51.51	51.82	51.66	0.19
	PH-1	50.91	51.25	51.07	0.27
	PH-2	51.80	52.12	51.97	0.29
Total chlorophyll	PDM	10.58	10.93	10.79	0.29
(mg/100 g)	PV	10.68	10.96	10.86	0.15
	PH-1	10.75	11.01	10.90	0.06
	PH-2	10.77	11.43	11.04	0.07
Drying ratio	PDM	11.70:1	11.53:1	11.54:1	NS
	PV	11.62:1	11.23:1	11.22:1	NS
	PH-1	12.00:1	11.86:1	11.87:1	NS
	PH-2	11.25:1	11.15:1	11.16:1	NS
Rehydration ratio	PDM	1:5.02	1:5.16	1:4.86	0.28
	PV	1:4.95	1:5.10	1:4.83	0.18
	PH-1	1:4.95	1:5.10	1:4.81	0.18
	PH-2	1:5.14	1:5.18	1:4.93	0.13

Each value is a mean of three replications

Table 2. Effect of thickness of slices on sensory mean score of dehydrated bitter gourd rings.

Sensory characteristic	Cultivar	Thickness (cm)			$CD_{0.05}$
		1.0	1.5	2.0	
Colour	PDM	3.00	2.20	3.30	0.27
	PV	3.10	2.00	4.00	0.13
	PH-1	2.50	2.10	3.25	0.26
	PH-2	2.50	1.75	3.25	0.26
Flavour	PDM	3.50	2.15	3.50	0.26
	PV	2.75	1.75	3.50	0.18
	PH-1	3.00	2.00	3.75	0.13
	PH-2	2.75	1.50	3.35	0.10
Texture	PDM	3.00	2.00	3.15	0.13
	PV	2.70	1.50	3.75	0.13
	PH-1	3.50	1.85	4.00	0.33
	PH-2	2.25	1.12	3.50	0.24
Overall acceptability	PDM	3.25	1.92	3.35	0.19
	PV	3.50	2.00	3.50	0.26
	PH-1	3.00	2.15	3.50	0.25
	PH-2	2.00	1.63	3.25	0.20

Each value is a mean of three replications

The sensory score of rehydrated bitter gourd rings for overall acceptability was better (low) in 1.5 cm thick slices prepared from all the four cultivars of bitter gourd compared to rehydrated material prepared from 1.0 cm and 2.0 cm thick slices (Table 2). This is due to better colour, flavour and texture of the rehydrated material and more absorption of water in case of 1.5 cm thick slices in comparison to inferior quality of rehydrated material and less absorption of water in case of dehydrated rings prepared from 1.0 and 2.0 cm thick slices. Similar results have been reported by Akbari and Patel (1) in dehydrated onion flakes. On the basis of higher retention of ascorbic acid and total chlorophyll, drying characteristics and sensory score in all the four cultivars, of bitter gourd 1.5 cm thick slices were found most suitable for preparation of better quality dehydrated rings.

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