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Research Paper :

Evaluation of storage period and acceptability of dehydrated carrot in recipe form

J.P. ZEND, MANJUSHA REVANWAR AND JYOTSNA NERLEKAR

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See end of the article for authors' affiliations

Correspondence to:

J.P. ZEND
Department of Family Resource Management, College of Home Science, Marathwada Agricultural University, PARBHANI (M.S.) INDIA

ABSTRACT

Carrot is the best source of carotene, which is the precursor of vit-A. Dehydration is one of the methods used for processing and making different products and to extend shelf-life. Dehydration of carrots was carried out in three conditions *i.e.* open sun drying and drying in solar cooker in covered and uncovered condition. The highest dehydration temperature was attained when carrots were dried in uncovered condition in solar cooker. On an average, 50.25^{0}C higher temperature was noted inside the solar cooker than that of atmospheric temperature. In respect to evaporation rate per unit area, solar cooker dehydration method was significantly efficient over the open sun drying. Organoleptic score for colour, aroma, taste and overall acceptability was significantly high till six months of storage period. It was reduced after 6 months onwards of storage period.

Key words : Dehydration, Carrot, Drying of vegetables

Carrot (*Daucus carota* L.) is one of the most important root vegetables used for making curries, salads, sauces, pickles, preserves, juice, powder, flakes, sweet meats and soups. It is the best source of carotene, which is the precursor of vit. A. (Sagar *et al.,* 2004). However, it is not available throughout the year because of the fact that it is seasonal crop of perishable nature (Singh, 2001). Various processing methods such as radiation, freezing, canning, pickling and dehydration are used for making different products and to extend the shelf-life. Among them dehydration is preferred to be better because it reduces the cost of packaging, storage and transportation by reducing both, weight and volume of the end product (Brackett, 1987).

METHODOLOGY

The study was undertaken to investigate the potential of preservation of carrots by means of sun drying and solar cooker drying, which can be useful for urban as well as rural areas to store carrots for more time. Dehydration of carrots was carried out in three conditions *i.e.* open sun drying and drying in solar cooker in covered and uncovered condition. For covered condition of dehydration in solar cooker, black coloured cotton cloth was used for the experiment.

Domestic type solar cooker recommended by MEDA (Maharastra Energy Development Association, Pune) was selected for the experiment. All the solar cookers were of similar size *i.e.* 49x 49x16.5 cm with one reflector consisted of rectangular enclosures insulated at the sides and bottom and two glass covers on top. Solar radiation entered through top and heated up the enclosures in which carrots were placed for dehydration.

The carrot used in the study was procured from the local market of Parbhani city. They were washed with running tap water and kept for draining for 10 min., peeled with stainless steel knife and grated with the help of stainless steel grater. 300 g of grated carrots were evenly spread on stainless steel trays. Trays were kept for dehydration in three conditions *i.e.* open sun drying and in solar cooker covered and uncovered condition. The dehydration was done to reduce moisture content up to 8-10 per cent from initial moisture content. The dehydrated carrots were packaged in LDPE pouches (400 gauges) with the help of sealing machine and stored in stainless steel and plastic containers at ambient temperature. The moisture content of fresh carrots was determined by standard oven drying method (AOAC, 1985). Temperature of open drying was measured by laboratory thermometer and for solar cooker drying dialed thermometer was used. Weight of carrots was measured by digital top pan balance. Final moisture content was measured by using infrared moisture balance. Moisture evaporation content per cent was calculated by difference in initial and final moisture content. Evaporation rate, moisture removed per unit area and evaporation rate per unit area were calculated by following formula (Nawle 1992) :

$$\text{Evaporation rate} = \frac{TM_R \times 1\,hr}{D_t}$$

where,
TM_R = Total moisture removed (g)
D_t = Total drying time

$$\text{Moisture removed per unit area} = \frac{TM_R \times 1\,cm}{S_a}$$

where,
TM_R = Total moisture removed (g)
S_a = Total surface area used for drying (cm^2)

$$\text{Evaporation rate per unit area } (g/cm^2/hr) = \frac{M_R \times 1}{D_t}$$

where,
M_R = Moisture removed (g/cm^2)
D_t = Total drying time (hr)

The dehydrated carrots were stored for one year and the sensory evaluation was done by the intervals of 2 months. Sensory evaluation was done in recipe form *i.e.* in the form of chutney. For sensory evaluation, panel consisting 10 semi trained members from staff and students of the Department were selected and evaluated the samples for colour, aroma, taste and overall acceptability. Five-point scale was used for the evaluation, where 5- represents, highly acceptable and 1- represents not acceptable. (Patel, 1994). The samples were served to the similar panelists in random order for evaluation after each interval of 2 months. The data were analysed statistically.

FINDINGS AND DISCUSSION

From Table 1 highest dehydration temperature was attained when carrots were dried in uncovered condition in solar cooker. On an average 50.25^0C higher temperature was noted inside the solar cooker than that of atmospheric temperature. Statistically significant difference was found between the treatments with respect to dehydration temperature. The per cent moisture removed and evaporation rate were also highest and ultimately values were reduced for moisture content of dried carrot. The trend was reverse in direct sun drying. Statistically, there was no significant difference in the values with respect to weight after drying, moisture evaporation, final moisture content, evaporation rate and moisture removed per unit area. In respect to evaporation rate per unit area solar cooker dehydration method was significantly efficient over the open sun drying.

Effect of storage on the acceptability of dehydrated carrots in recipe form was highly significant with respect to all the organoleptic characteristics. Organoleptic score for colour, aroma, taste and overall acceptability was significantly high till six months of storage period. It was reduced after 6 months onwards of storage period (Table 2).

Table 1 : Observations of dehydration of carrots

Treatments	Temperature (^{0}C)	Wt. after drying (g)	Moisture evaporation (%)	Final moisture content (%)	ER (g/hr)	MRPA (g/cm^2)	ERPA (g/cm^2/ hr)
T_1	29.37	38.38	23.00	8.00	4.60	0.050	0.010
T_2	49.27	39.21	23.35	7.65	5.83	0.051	0.012
T_3	50.25	37.55	23.55	7.45	5.31	0.052	0.013
C.D. (P=0.05)	0.193*	NS	NS	NS	NS	NS	0.0019*

T_1- Open sun drying, T_2- covered condition in solar cooker, T_3- uncovered condition in solar cooker
* indicates significance of value at P=0.05 NS-Non significant

Table 2 : Effect of storage on acceptability of dehydrated carrots in recipe form

Storage period	Organoleptic characteristics											
	Colour			Aroma			Taste			Overall acceptability		
	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3	T_1	T_2	T_3
2 months	5.0	4.9	5.0	4.9	4.9	5.0	4.9	5.0	4.9	4.8	4.9	4.9
4 months	4.9	4.8	4.9	4.6	4.9	4.8	4.7	4.9	4.9	4.7	4.7	4.8
6months	4.4	4.6	4.9	4.1	4.8	4.7	4.6	4.8	4.9	3.9	4.5	3.7
8 months	3.6	3.4	3.8	3.6	3.5	3.4	3.5	3.5	3.8	3.3	3.5	3.4
10months	2.8	2.8	3.3	2.5	2.2	2.5	2.5	2.3	2.6	3.2	3.2	3.3
12 months	2.3	2.5	2.5	2.2	2.0	2.4	2.3	2.1	2.4	3.0	2.9	3.0
C.D. (P=0.05)	0.47^{**}	0.47^{**}	0.37^{**}	0.53^{**}	0.52^{**}	0.4^{**}	0.46^{**}	0.43^{**}	0.37^{**}	0.57^{**}	0.48^{**}	0.59^{**}

T_1- Open sun drying, T_2- covered condition in solar cooker, T_3- uncovered condition in solar cooker
** indicates significance of value at P=0.01

Conclusion:

Evaporation rate per unit area in solar cooker dehydration method was significantly effective over the open sun drying. An organoleptic characteristic of dehydrated carrot was accepted for 6 months of storage period.

Authors' affiliations:
MANJUSHA REVANWAR AND JYOTSNA NERLEKAR, Department of Family Resource Management, College of Home Science, Marathwada Agricultural University, PARBHANI (M.S.) INDIA

REFERENCES

A.O.A.C. (1985). *Official methods of analysis*. Association of Agricultural Chemists, Washington, U.S.A.

Brackett, R.E. (1987). Microbial consequence of minimally processed fruits and vegetables. *J. Food Quality,* **10**: 195-206

Nawale, E. M. (1992). Solar energy utilization for khoa production, M.Sc. Thesis (Dept. of Animal Husbandry and Dairying), Marathwada Agricultural University, Parbhani (M.S.).

Patel, S.P. (1994). Feasibility of solar cooker for dehydration of selected vegetables, M.Sc. Thesis, College of Home Science, Marathwada Agricultural University, Parbhani (M.S.).

Sagar, V.R., Pal, N. and Kumar, R. (2004). Quality characteristics of carrot varieties for dehydration. *J. Food Sci. Technol.,* **41**(4) : 417-420.

Singh, H. (2001). Osmatic dehydration of carrots shreds for Gazrail preparation. *J. Food Sci. Technol.,* **38** (2): 152-154.

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