Int.J.Curr.Microbiol.App.Sci (2019) *8*(5): 500-504

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 8 Number 05 (2019)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2019.805.059

Effect of Drying Methods on Physico-chemical Characteristics of Dehydrated Apricots in Cold Arid Region of Ladakh

Towseef A. Wani[1*], Quraazah A. Amin[2], S. Fauzia[2], N. Dorjey[1], B.A. Zargar[1], Phuntsog Tundup[1], Kunzanglamo[1], N. Deldan[1], R. Safal[1] and M.A. Beigh[2]

[1]Krishi Vigyan Kendra Leh, SKUAST-K, J&K, India
[2]Division of Food Science and Technology, SKUAST-K, J&K, India

**Corresponding author*

Keywords

Drying, Apricot, Leh, Solar, Moisture

Article Info

Accepted:
07 April 2019
Available Online:
10 May 2019

A B S T R A C T

The present study was carried out to investigate the effect of different drying methods on physicochemical composition of dehydrated apricot fruits. The fresh apricots were dehydrated in open sun and in local solar drier developed by Krishi Vigyan Kendra Leh. The chemical composition showed that the fresh apricots contained moisture 81.7%, ash 0.69%, crude Protein 0.9%, crude fat 0.05%and crude fiber 1.07%. The solar drier and using open sun drying substantially decreased moisture content to 12.61% and 14.7% respectively. Proportions of other components were increased, which include ash (3.34% and 3.13%), crude fat (1.82% and 1.59%), crude protein (0.98% and 0.92%) and Crude fiber (2.75% and 2.08%) respectively.

Introduction

Apricot (*Prunus armeniaca* L.) is the most important fruit crop of Ladakh. Its production is mostly confined to the lower belt (double cropped area) of Ladakh, where the climate is milder. The lower belt includes areas from Saspol to Batalik, Nubra valley and larger parts of Kargil. The crop is intimately associated with the culture and traditions of the region because it is one of the major sources of livelihood. Almost every part of the fruit is used by the local inhabitants; ripe apricot is an excellent dessert fruit and is used fortable purposes. Drying is one of the oldest preservation techniques for foods and is the most important process in the successful storage of apricots (Goğuş *et al.*, 2007). The objective in drying apricots is to reduce the moisture content to a level that allows safe storage over an extended period.

The most common drying method for apricots is open-air sun-drying, requiring low capital, simple equipment, and low energy input (El Halouat and Labuza, 1987; Gezer *et al.*, 2003). Generally, the fruits are spread on rooftops or on rocks without subjecting them to any pretreatment or washing with water (Mir *et al.*, 2009). To decrease the effect of spoilage reactions, to facilitate the drying process, to prevent browning, to ensure colour stability, and to improve the overall product quality, some pretreatments are advised. One of these treatments is sulphuring (Rossello *et al.,* 1993; Lewicki, 2006; Miranda *et al.*, 2009). Sulphur dioxide is used widely in the food industry to prevent quality losses of foods and to reduce fruit darkening rate during drying and storage. Both enzymatic and non-enzymatic browning and microbial activity are prevented by using sulphites at low concentration (Joslyn and Braverman, 1954).

The oxygen-scavenging action of sulphur dioxide helps in stabilizing the carotenes. When sulphur dioxide is absorbed into the fruit, it is converted mainly to the bisulphate ion, which remains free and retards the formation of Maillard-type compounds, and it can also be reversibly bound to certain compounds, such as the carbonyl group of aldehydes. This bound sulphite is considered to have no retarding effect on product deterioration (Bolin and Jackson, 1985; Mir *et al.,* 2009). It was reported that sulphites cause some health problems such as asthmatic reactions when inhaled or ingested by sensitive individuals (Freedman, 1980; Miranda *et al.,* 2009). Apricots are rich in carbohydrates and minerals, having a striking color and characteristic flavor (Ghorpade *et al.,* 1995). Sugars such as glucose, fructose, sucrose, and sorbitol and malic and citric acid are the main components.

The most abundant minerals are potassium and iron. The apricot fruit is an important source of provitamin A carotenoids, as 250 g of fresh or 30 g of dried fruit supplies 100% of the RDA (recommended dietary allowance) of carotenoids. Additionally, chlorogenic and neochlorogenic acids, (+)-catechin, (-)-epicatechin and rutin (or quercetin-3-rutinoside) are the most important phenolic compounds in this fruit (Drogoudi *et al.*, 2008). However, the most preferred way to conserve food by reducing its moisture content is convective drying (Mundada *et al.*, 2010). Nevertheless the drying of fruit over a long time at high temperatures is the biggest disadvantage of conventional hot-air drying. The exposure of apricots to high temperatures for a long time in the presence of oxygen induces enzymatic and non-enzymatic oxidation. These conditions lead to some changes in not only the sensorial attributes of the product, such as color and flavor, but also the content and profile of carotenoids (Zhang *et al.,* 2006; Rodriguez-Amaya, 2010).

Materials and Methods

Proper healthy and mature Apricot fruits were selected for this study. The fruits were washed with deionized water and dipped in already prepared 1500 ppm potassium metabisulphite solution for 20 minutes. The fruits were then kept in pre-washed perforated trays. The trays were put in locally made solar drier and in open sun on the roof of KVK Leh. The solar drier (Fig. 1) moved according the direction of sun 9:00 am and 4:00 pm. The solar drier temperature reached to 55-65 °C maximum and the open sun maximum temperature was noted up to 22-28 °C during the month of August. The apricot dehydrated in solar drier during 48 hours (approximate 2 days) while apricot dehydrated in open sun during 168 hours (7days). The trays collected from solar drier and open sun were packed in polyethylene zip lock bags for further physicochemical evaluation.

Physicochemical analysis

Moisture, total ash, crude fat, crude protein, crude fiber and carbohydrates were determined according to the Association of Analytical Communities (AOAC) methods. Crude protein was estimated by kjeldhal method, Carbohydrates were determined by difference method indicated below.

Results and Discussion

Physicochemical composition of dehydrated apricot

The highest moisture content was recorded in fresh apricot i.e. (81.7%), followed by the open sun drying apricot was found to be (14.7%) whereas, the lowest values (12.61%) was recorded in the solar dehydrated apricot sample and the results are highly significant ($p<0.01$) among the different methods. The highest ash (3.34%) was found in solar dehydrated sample fallowed by open sun drying sample at (3.13%), whereas the lowest (0.69%) ash observed in the fresh apricot sample, which were significantly different from each other. Simultaneously, high moisture content tends to promote microbiological contamination and chemical degradation. The results obtain from dehydrated sample was statistically different as compared to fresh samples. The highest (%) of protein was observed in solar drier dehydrated samples i.e. (0.98%) followed by open sun dehydrated samples (0.92%). The lowest value of protein (%) of apricot (0.9%) was recorded in fresh apricot samples and the results were highly significant. The highest (%) of fat observed in solar drier dehydrated samples i.e. (1.82%) followed by open sun dehydrated samples (1.59%). The lowest value of fat (%) of apricot (0.05%) was recorded in fresh apricot samples and the results were highly significant. The highest (%) of crude fiber was observed in solar drier dehydrated samples i.e. (2.75%) followed by open sun dehydrated samples (2.08%).

This study showed that apricot has high moisture (81.7%). It is known that products that have low fat values normally have high moisture contents. Moisture (%) is a widely used parameter in the processing and testing of food. The observed value implies that cauliflower may have a short shelf-life since microorganisms that cause spoilage thrive in foods having high moisture content and also is indicative of low total solids (Table 1 and 2).

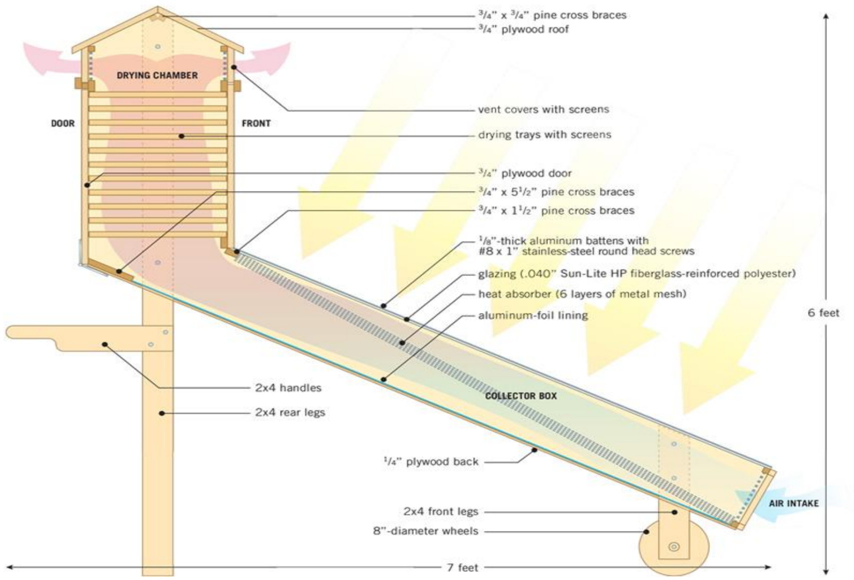
Table.1 Proximate composition of fresh apricot

S.no	Parameter	Result
1	Moisture	81.7
2	Ash	0.69
4	Protein	0.90
5	Fat	0.05
6	Fibre	1.07

Table.2 Open sun and solar drying of apricots

S.no	Parameter	Results	
		Open Sun dehydrated apricot (%)	**solar drier dehydrated apricot (%)**
1	Moisture	14.7	12.61
2	Ash	3.13	3.34
4	Crude Protein	0. 92	0.98
5	Crude Fat	1.59	1.82
6	Crude Fiber	2.08	2.75

Fig.1 Solar drier developed in KVK Leh



The high moisture content of apricot is consistent with the report (Samann., 1991) of which a high moisture value for fruits like white mulberry (82.50%) and black mulberry (78.03%) was observed. Protein (%) in apricot is (0.9%) is low and similar to these values reported by researchers in other fruits. such as “mulberry” (1.73%). The fat of apricots (0.03%) is lower than that of kale (0.26%) (Ali *et al.*, 2011). Since fresh and dry apricot fruit has low fat (%), it can be used by individuals as a low caloric diet to reduce weight. The fiber (%) of apricot (1.07%) was found to be lower than some other fruits such as “mulberry” 1.1%. Fiber cleanses the digestive tract, by removing potential carcinogens from the body and prevents the absorption of excess cholesterol. Fiber also adds bulk to the food and prevents the intake of excess starchy food and may therefore guard against metabolic conditions such as hypercholesterolemia and diabetes mellitus. Fiber can also help to keep blood sugar levels under control (Akin *et al.*, 2008; Aubert and Chaforan, 2007). Solar dehydrated and open sun dehydrated apricot samples had higher proximate analysis values due to removal of moisture.

The findings of this study show that the solar dehydration and open sun drying of apricot fruit are effective in preserving the chemical composition of apricot and preventing deterioration by reducing moisture.. The fruits dehydrated using solar dryer were hygienically more acceptable as compared to open sun dehydration.

References

Abdelhaq, E.H., & Labuza, T. P. (1987). Air drying characteristics of apricots. *Journal of Food Science*, 52(2), 342-345

Akin, EB., Karabulut I, Topcu A. Some compositional properties of main Malatya apricot (*Prunus armeniaca*) varieties. *Food Chem.* 2008; 107(2): 939-948.

Ali, S., Masud T, Abbasi KS. Physico-chemical characteristics of apricot (*Prunus armeniaca* L.) grown in Northern Areas of Pakistan. *Sci Hort.* 2011; 130(2): 386-392.

Aubert, C., Chaforan C. Postharvest changes in physicochemical properties and volatile constituents of apricot (*Prunus armeniaca* L.). Characterization of 28 cultivars. *J Agric Food Chem.* 2007: 55: 3074-3082.

Bolin, HR., Jackson R (1985). Factors affecting sulphur dioxide binding in dried apples and apricots. J Food Process Pres 9: 25-34.

Drogoudi, P.D., Vemmos, S., Pantelidis, G., Petri, E., Tzoutzoukou, C., and Karayiannis, I. (2008). Physical characters and antioxidant, sugar, and mineral nutrient contents in fruit from 29 apricot (*Prunus armeniaca* L.) cultivars and hybrids. *Journal of Agricultural and Food Chemistry*, 56(22), 10754-10760

El Halouat A, Labuza, TP (1987). Air drying characteristics of Apricots. J Food Sci 52: 342-345.

Freedman, BJ. (1980). Sulphur dioxide in foods and beverages: its use as a preservative and its effect on asthma. Br J Dis 74: 128-134.

Gezer I, Acaroğlu M, Haciseferoğullari H (2003). Use of energy and labour in apricot agriculture in Turkey. Biomass Bioenerg 24: 215-219

Goğuş, F., Ozel MZ, Lewis AC (2007).The effect of various drying techniques on apricot volatiles using direct thermal desorption- GC-TOF/MS. Talanta 73: 321-325

Joslyn, MA., Braverman JB (1954). The chemistry and technology of the pretreatment and preservation of fruit and vegetable products with sulphur dioxide and sulphites. Adv Food Res 5:97-160.

Karatas, F., and Kamıslı, F. (2007). Variations of vitamins (A, C and E) and MDA in apricots dried in IR and microwave. *Journal of Food Engineering*, 78(2), 662-668. Journal of food engineering. 2005.10.040.

Lewicki, P.P., (2006). Design of hot air drying for better foods. Trends Food Sci Tech 17: 153-163

Mir, MA., Hussain, PR, Fouzia S, Rather AH (2009). Effect of sulphuring and drying methods on physico-chemical and sensorial quality of dried apricots during ambient storage. Int J Food Sci Tech 44: 1157-1166.

Miranda, G., Berna A, Salazar D, Mulet A (2009). Sulphur dioxide evolution during dried apricot storage. LWT-Food Sci Tech 42: 531-533.

Mundada, M., Hathan, B. S., and Maske, S. (2010).Convective dehydration kinetics of osmotically pretreated pomegranate arils pretreated pomegranate arils. *Biosystems Engineering*, 107(4), 307-316.

Rodriguez-Amaya, D.B., (2010). Quantitative analysis, in vitro assessment of bioavailability and antioxidant activity of food carotenoids: a review. *Journal of Food Composition and Analysis*, 23(7), 726-740

Rossello, C., Canellas J, Santiesteban I, Mulet A (1993). Simulation of the absorption process of sulphur dioxide in apricots. LWT Food Sci Tech 26: 322-328.

Sablanı, S.S., (2006). Drying of fruits and vegetable: retention of nutritional/ functional quality. *Drying Technology*, 24(2), 123-135.

Samann, H., Suitability of indigenous fruit. Cultivars for the production of dried fruit. Mitteilungen-Klosterneubury Rebe Und Wein, Obstbau and Fruchtever Wertung. 1991; 41(3): 127-133.

Zhang, M., Tang, J., Mujumdar, A., and Wang, S. (2006). Trends in microwave related drying of fruits and vegetables. *Trends in Food Science & Technology*, 17(10), 524-534.

How to cite this article:

Towseef A. Wani, Quraazah A. Amin, S. Fauzia, N. Dorjey, B.A. Zargar, Phuntsog Tundup, Kunzanglamo, N. Deldan, R. Safal and Beigh, M.A. 2019. Effect of Drying Methods on Physico-chemical Characteristics of Dehydrated Apricots in Cold Arid Region of Ladakh. *Int.J.Curr.Microbiol.App.Sci.* 8(05): 500-504. doi: https://doi.org/10.20546/ijcmas.2019.805.059