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Physicochemical and Organoleptic Characteristics of Dehydrated Apricots under Different Drying Conditions

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ABSTRACT

The present study was carried out to investigate the effect of different drying methods on the physicochemical composition and organoleptic characteristics of dehydrated apricot fruits. The fresh apricot was dehydrated in open sun and in moveable solar drier developed by Pakistan Council of Scientific and Industrial Research (PCSIR) Skardu. The chemical composition showed that the fresh apricots contained moisture 83.3%, ash 0.72%, crude fat 0.03%, crude Protein 0.9%, crude fiber 1.02% and carbohydrates 14.03%. The moveable solar drier and using open sun drying substantially decreased moisture content to 14.61% and 15.7% respectively. Proportions of other components were increased, which include ash (3.51% and 3.43%), crude fat (1.99% and 1.82%), crude protein (1.0% and 0.97%), crude fiber (2.98% and 2.95%) and carbohydrates (75.91% and 75.13%). Organoleptic characteristics of open sun dried apricot has a little negative effect on over all acceptability when compared to moveable solar dehydrated apricot, however the open sun dried method was declared acceptable by the panel of judges for color, taste and overall acceptability.

KEYWORDS: Apricot; Dehydration; Sun drying; Moveable solar drier.

ABBREVIATIONS: PCSIR: Pakistan Council of Scientific and Industrial Research; GB: Gilgit-Baltistan; FTC: Food Technology Center; PSF: Pakistan Science Foundation.

INTRODUCTION

Gilgit-Baltistan (GB) is the most important part of the country extends over an area of 27188 sq miles. Administratively it is distributed among 10 Districts (Gilgit, Skardu, Diamer, Astore, Ghagchae, Ghizer, Hunza, Nagar, Shigar and Kharmang) with a population of 2 million. The main issue of Gilgit-Baltistan is food insecurity as cultivated lands are less than one kanal per capita.[1,2] The people of GB totally depend on wheat supplied through Government on subsidized rates form Punjab.[3-5] Apricot (*Prunus armeniaca L.*) is one of the most important, attractive, delicious, highly nutritious and major fruits of Gilgit-Baltistan. The fruit tree grows from plain to altitude of 3000 meters.[6] The fruit is having a distinct pleasant aroma and is used for preparing many products including jam and nectar. The dried fruit is available in the market round the year, while the fresh fruit comes in the market by the end of May to September.[7] Due to lack of processing, preservation, testing, transportation, communication and research large amount of fruits and vegetables are wasted and do not reach in distant markets because of their perishability.[8] To overcome the food security issues of Gilgit-Baltistan and to cope the tremendously increasing demand of food locally without bringing more land under cultivation. Dehydration, processing and preservation of fruits through trainings to farming community are milestone.[9,10] The present work was thus under taken to evaluate the chemical and organoleptic

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characteristics of dehydrated apricot and to compare their quality on the basis of nutritional significance under different drying methods used in Gilgit-Baltistan.[11]

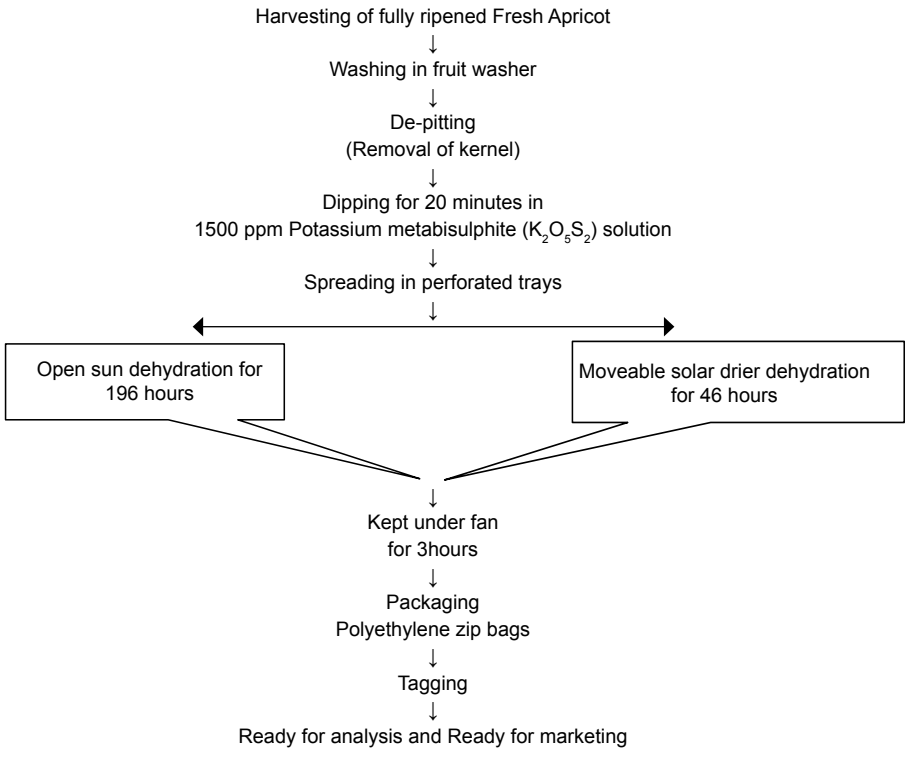
MATERIALS AND METHODS

Dehydration of Fruits

Proper healthy and mature Apricot (Halman variety) fruits were selected for this study. The fruits were washed with deionized water and dipped in already prepared 1500 ppm potassium metabisulphite solution[12-14] for 20 minutes. The fruits were then kept in pre-washed stainless steel perforated trays. The trays were put in moveable solar drier and in open sun on the roof of PCSIR processing hall. The moveable solar drier moved according the direction of sun 8:00 am and 3:00 pm.[15,16] The moveable solar drier temperature reached to 70-75 °C maximum and the open sun maximum temperature was noted up to 20-27 °C during the month of July. The apricot dehydrated in moveable solar drier during 46 hours (approximate 2 days) while apricot dehydrated in open sun during 196 hours (8 days and 4 hours). The trays collected from moveable solar drier and open sun were packed in polyethylene zip bags with proper tags for further physicochemical and organoleptic evaluation.[3,17] (See Flowsheet diagram)

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.[18-22] (Tables 1 and 2)



Flow sheet diagram of dehydrated apricot.

S #	Parameter	Result
1	Moisture	83.3
2	Ash	0.72
3	Carbohydrate	14.03
4	Protein	0.9
5	Fat	0.03
6	Fiber	1.02

Table 1: Chemical composition of fresh apricot halman (gm/100 gm).

S #	Parameter	Results	
		Moveable solar drier dehydrated apricot (%)	Open Sun dehydrated apricot (%)
1	Moisture	14.61	15.7
2	Ash	3.51	3.43
3	Carbohydrates	75.91	75.13
4	Crude Protein	1.0	0.97
5	Crude Fat	1.99	1.82
6	Crude Fiber	2.98	2.95

Table 2: Chemical composition of dehydrated apricot halman (gm/100 gm).

Organoleptic/Sensory Evaluation of Dehydrated Apricot

The organoleptic/sensory evaluation for appearance, color, texture, taste and overall acceptability conducted using nine point hedonic scale in accordance with the method described by Larmond.[23-27] The panel members were selected on the basis of their ability to discriminate and scale abroad range of different attributes of dehydrated apricot. An orientation program was organized for the panel members to brief them the objective of the study. The samples were served to the panelists for organoleptic/sensory analysis. The judges were provided with prescribed questionnaires to record their observation. The information contained on the performa was Larmond nine point hedonic scale i.e. 9=Liked extremely; 8=Liked very much; 7=Liked moderately; 6=Liked slightly; 5=Neither liked nor disliked; 4=Disliked slightly; 3=Disliked moderately; 2=Disliked very much; 1=Disliked extremely. The panelists expectorated the samples and rinsed mouth using distilled water between samples. The experiment was repeated twice and the values are presented as means.[28]

RESULTS AND DISCUSSION

Physicochemical Composition of Dehydrated Apricot Samples

The highest moisture content was recorded in fresh apricot i.e. (83.3%), followed by the open sun drying apricot was found to be (15.7%) whereas, the lowest values (14.61%) was recorded in the moveable solar dehydrated apricot sample and the results are highly significant ($p<0.01$) among the different methods. The highest ash (3.51%) was found in moveable solar dehydrated sample fallowed by open sun drying sample at (3.43%), whereas the lowest (0.72%) ash observed in the fresh apricot sample, which were significantly different from each other. The highest moisture content in fruits makes it ideal for fruit juicing as a supplement. Simultaneously, high moisture content tends to promote microbiological contamination and chemical degradation. The results indicated that the highest mean values (75.91%) carbohydrate was recorded in moveable solar drier dehydrated samples, while in the open sun drying sample ranked 2nd which was observed (75.13%), where as the minimum mean values (14.03%) observed in fresh samples of apricot. The results obtain from dehydrated sample was statistically different as compared to fresh samples. The highest (%) of protein was observed in moveable solar drier dehydrated samples i.e. (1.0%) followed by open sun dehydrated samples (0.97%). 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 moveable solar drier dehydrated samples i.e. (1.99%) followed by open sun dehydrated samples (1.82%). The lowest value of fat (%) of apricot (0.03%) was recorded in fresh apricot samples and the results were highly significant. The highest (%) of crude fiber was observed in moveable solar drier dehydrated samples i.e. (2.98%) followed by open sun dehydrated samples (2.95%). The lowest value of carbohydrate (%) of apricot (1.02%) was recorded in fresh apricot samples and the results were highly significant.

This study showed that apricot has high moisture (83.3%). 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. The high moisture content of apricot is consistent with the report[29] of which a high moisture value for fruits like white mulberry (82.50%) and black mulberry (78.03%) was observed.

The carbohydrate (%) of apricot fresh fruit (14.03%) in this study is low but it is higher than that of the related fruit mulberry (13.83%). Similarly, 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 apricot is (0.03%) which is than that of kale (0.26%).[30] 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 (1.02%) was found to be lower than some other fruits such as “mulberry” 11.1%. 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.[31,32] Moveable solar dehydrated and open sun dehydrated apricot samples had higher proximate analysis values due to removal of moisture.

Parameters	Open sun dehydrated apricot	Moveable solar drier dehydrated apricot
Appearance	7.5	8.7
color	7.9	8.5
Texture	8.4	8.4
Taste	8.7	8.7
Overall acceptability	7.6	8.7

Table 3: Mean acceptability scores for dehydrated apricot samples.

Organoleptic/Sensory/Evaluation of Dehydrated Apricot Samples

The dehydrated apricots of open sun dehydration and moveable solar drier dehydrated apricot samples were evaluated organoleptically. The samples were graded by numerical scoring, on a nine point hedonic scale. The results of organoleptic evaluation were reported in Table 3. The organoleptic evaluation shows, slightly reduction in the mean score for over all acceptability of open sun dehydrated apricot. Taste and texture of the both dehydration methods remains same. There was a clear difference shown in mean scores of color, appearance and overall acceptability of samples. The open sun dehydrated apricot has a less attractive color, appearance and overall acceptability as compared to portable and moveable solar drier dehydrated apricot that have high scores in color, appearance and overall acceptability. The dehydration completed in open sun in 9 days interval and in moveable solar drier it dehydrated in only 2 days interval. The poor color and appearance of open sun dehydration is due to more time exposing to light and wind as compared to moveable drier. The fewer score in sensory evaluation in overall acceptability of open sun dehydration may be due to dust and color.[29] However the portable and moveable solar drier dehydrated apricot was liked very much by the panel of judges and open sun dehydrated apricot was declared acceptable.

CONCLUSION

The findings of this study show that the moveable solar dehydration and open sun dehydration of apricot fruit are effective in preserving the chemical composition of apricot and preventing deterioration by reducing moisture.[33] In comparison of open sun dehydration and moveable solar dehydration, organoleptic characteristics of open sun dried apricot have a little negative effect on over all acceptability as compared to moveable solar dehydrated apricot. The moveable solar dehydration is so for good on color, taste and over all acceptability. The fruits dehydrated using solar dryer were hygienically more acceptable as compared to open sun dehydration. However; the open sun dried fruits were declared acceptable by the panel of judges for color, taste and overall acceptability.[34]

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CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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