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Standardization of Drying Method and Organoleptic Evaluation of Wild Pomegranate (*Anardana*) Seeds

Parshant Bakshi, Bharat Bhushan, V.K. Wali,
Manish Bakshi, Akash Sharma and Deep Ji Bhat

Division of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Main Campus, Chatha, Jammu (J andK)-180009

Abstract: Drying of wild pomegranate seeds was carried out by using various drying methods to evaluate the best and feasible method of drying and to produce a value added product "*anardana*". The various drying methods used were vacuum drying, oven drying, sun drying, poly-tent house drying and room drying. The experimental results showed that out of all the drying methods, sun drying method for *anardana* preparation is the best one method as it resulted in 73.62% reduction in moisture content with a dehydration ratio of 3.81. Moreover, overall acceptance score of 23.4 was obtained which was significantly higher as compared to other treatments under study.

Key words: Anardana · Drying · Organoleptic evaluation

INTRODUCTION

Wild pomegranate (*Punica protopunica* L.) belongs to the plant family Punicaceae. It is a hardy and can survive in arid as well as in semi-arid climatic conditions. As a crop, it is beneficial because of its hardy nature, low requirement of inputs and higher yield. Pomegranate fruit consists of three parts: the seeds (about 3% of the weight of the fruit); the juice (about 30% of the fruit weight); and the peels which include the husk and interior network membranes [1]. It is one of the minor fruits of great economic importance in the vast tract of the hill slopes of Jammu and Kashmir. It grows in wild state as a large evergreen shrub, 4 to 6 m high and flowers during the month of May and June. The fruit ripens towards the middle of October and are handpicked. The conventional utilization of this fruit lies in drying the seeds along with pulp i.e. aril, which constitutes the product "*anardana*" [2]. Dried pomegranate (*anardana*) finds its utility as a condiment in the acidification of chutneys and adds a peculiar taste to some famous north Indian delicacies. The traditional healers used a number of formulations of *anardana* as ayurvedic medicines in the treatment of dysentery, diarrhoea, stomachache, inflammations, hymenoletidosis, dyspepsia, bronchitis and cardiac problem. It is also used in tanning and colouring in industries [3]. Besides, therauptic use includes condiment powders, churan tablets and avaleha. Due to high percentage of sourness, the fruits are not fit for fresh consumption and hence do not fetch a good price to the grower. Moreover, the shelf-life of the fruits is limited which leads to loss in the food value. Processing of wild pomegranate for value added product like *anardana* holds promise as it can supplement the annual income of the grower. Every year, *anardana*, worth crores of rupees is collected from the hills and sold at various places throughout the country and abroad. Besides, *anardana,* huge quantities of the fruit rind, worth thousands of rupees is also exported for use in various industries. The availability of fruit (seasonal commodities) can be extended by the process of dehydration which acts as a preservation technique. The basic principle of dehydration is the removal of moisture through simultaneous heat and mass transfer, that provide more

Corresponding Author: Parshant Bakshi, Division of Fruit Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Main Campus, Chatha, Jammu (J andK)-180009.

shelf-life, reduces weight and volume. Fruit drying can play a significant role in developing countries to diversify the economy, reduce imports and meet export demands, stimulate fruit production, generate both rural and urban employment especially for women's, reduces post harvest losses, improve nutrition, develop new value added products and promote micro and small scale rural enterprise development [4]. The processing (drying) of pomegranate seeds has not been standardized which leads to production of *anardana* with poor colour and quality. Its seeds are often dyed with artificial colour and adulterated with seeds of mature fruits. Such *anardana* is very hard and sour and when used in dishes are not so good in quality. Hence, a study was undertaken to standardize the drying method for wild pomegranate and to find out the effect of various drying methods on the quality of *anardana*.

MATERIALS AND METHODS

The present study was conducted in the year 2006 and 2007 in Udhampur district of J and K state, India which is home to wild pomegranate. Fruit samples were collected from the wild pomegranate growing belts and three randomly collected samples were brought to the Division of Pomology and Post harvest Technology, SKUAST-J for the purpose of the study. The seeds were separated from the peel and septa manually in the divisional laboratory. First, the seeds were treated to steam blanching for 30 ^{0}C and then sulphuring @ 0.3% for 60 min. Blanching reduces the drying time by inactivating enzymes along with softening of tissues [5]. Sulphur acts as blanching agent for naturally coloured fruit products [6]. Also sulphuring increases energy absorption by the product leading to elevated product temperature and shorter drying time [7]. From these treated seeds, 1 kg seeds were withdrawn for each treatment (T). The selected seeds were treated with five drying treatments *viz.* T_1 (vacuum drying for 13 hr at 42 ± 2° C), T_2 (oven drying for 16.5 hr at 42 ± 2° C), T_3 (sun drying for 38 hr), T_4 (poly-tent house drying for 42 hr) and T_5 (room temperature for 10-12 days at 23 ± 2° C). The treatments were triplicated and moisture content (%) of the seeds was calculated as mean difference in the fresh and dry weight [8]. The organoleptic evaluation was performed using 9 point hedonic scale as described by [9]. Panelists were selected on the basis of their ability to discriminate and scale a broad range of different attributes. The judges randomly tested the texture, taste, colour and overall acceptability for *anardana* samples prepared using different treatments. The judges were provided with prescribed questionnaires to record their observations. The information contained on the performa was 9 = Like extremely; 8 = Like very much; 7 = Like moderately; 6 = Like slightly; 5 = Neither like nor dislike; 4 = Dislike slightly; 3 = Dislike moderately; 2 = Dislike very much; 1 = Dislike extremely. The panelists expectorated the pulp and rinsed mouth using distilled water between samples. Sensory testing was made in the panel room completely free of food/chemical odour, unnecessary sound and mixing of daylight. Experimental results of all the treatments were analyzed statistically as per RBD using OPSTAT software.

RESULTS AND DISCUSSION

Analysis of the data obtained produced significant results among the different treatments used and the results thus obtained are discussed under the following heads:

Standardization of Drying Method *Vis-a-vis* Moisture Percentage of the Dried Seeds: Of all the drying treatments, oven drying (42 $\pm$ 2°C) for 16.5 hrs as well as drying at room temperature (23 ± 2° C) for 10-12 days resulted in maximum loss of moisture from the fresh seeds of wild pomegranate i.e. 75.12% (Fig. 1). This was followed by vacuum drying for 13 hrs (42 $\pm$ 2°C) which resulted in 73.88% reduction in moisture content of the pomegranate seeds. The least reduction in moisture percentage of the fresh pomegranate seeds was observed in drying under poly-tent house where only 71.27% reduction in moisture content was recorded. Jagam et al. [10] reported that convective drying gave maximum drying rates in sapota.

Dehydration ratio of different methods of drying was worked out (Fig. 2). Maximum dehydration ratio was recorded in room drying method (4.13) followed by oven drying (4.02). Dehydration ratio of 3.83 and 3.81 in two treatments viz. vacuum drying and sun drying, respectively was at par with each other. Minimum dehydration ratio (3.48) was recorded with the drying of pomegranate seeds in poly-tent house. Kaur et al. [11] studied the effect of various drying methods on physico-chemical and organoleptic characteristics of chayote and reported that dehydration at 55 to 65° C yielded better quality product.

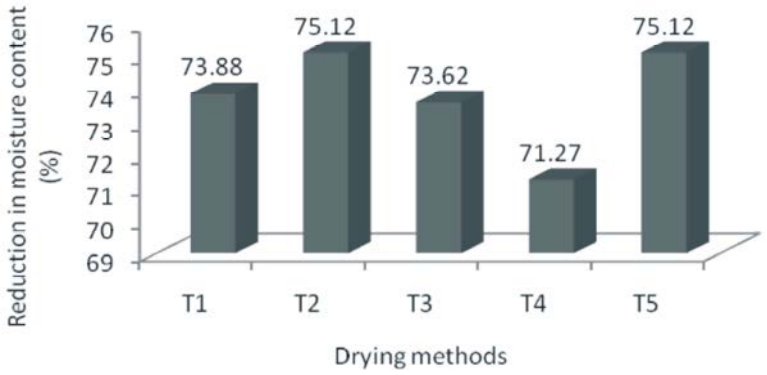

Fig. 1: Effect of various drying methods on reduction in moisture content (%) of wild pomegranate.

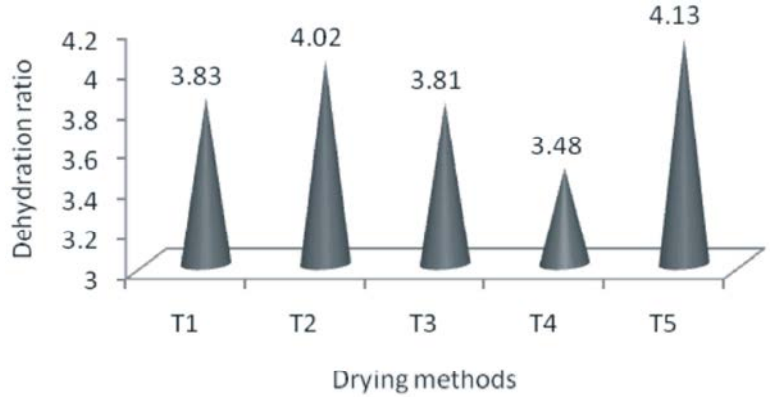

Fig. 2: Effect of various drying methods on dehydration ratio of pomegranate seeds.

Table 1: Effect of different types of drying methods on quality of anardana.

		Organoleptic rating			
S.No.	Drying method	Texture (9.0)	Taste (9.0)	Colour (9.0)	Overall acceptance (27.0)
1.	Vacuum drying	6.30	5.40	5.40	17.1
2.	Oven drying	5.40	5.40	5.40	16.2
3.	Sun drying	7.20	8.10	8.10	23.4
4.	Poly-tent house drying	8.10	7.20	7.20	22.5
5.	Room drying	3.60	5.40	3.60	12.6
	S E (m) ±	0.19	0.09	0.08	
	CD at 5% level	0.55	0.27	0.23	

Organoleptic Evaluation: Organoleptic quality evaluation was made from *anardana* samples prepared using different methods of drying (Table 1).

Maximum texture score of 8.10 was obtained in poly-tent house dried pomegranate sample whereas, minimum texture score of 3.60 was recorded in room dried pomegranate sample. For taste, maximum score of 8.10 was obtained with sun dried sample whereas, minimum taste score of 5.40 each was received in three samples dried using vacuum drying, oven drying and room drying methods. For colour, maximum score of 8.10 was obtained in sun dried sample followed by poly-tent house dried sample (7.20), while, minimum colour score was obtained in room dried samples. The overall acceptance score was calculated and results showed that sun drying method showed a maximum score of 23.40 followed by poly-tent house drying method (22.50). Minimum overall acceptance score of 12.60 was obtained in room dried samples.

The study yielded significant results with regard to the final quality of the finished product (*anardana*) based on different drying methods used. It can be concluded that sun drying method of drying is the best and most feasible method of *anardana* drying. The market quality was also acceptable by a fair score.

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