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ORIGINAL ARTICLE

Effect of pretreatment and drying methods on quality of value-added dried aonla (*Emblica officinalis* Gaertn) shreds

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Abstract Value added dried Indian gooseberry (aonla) shreds were prepared using aonla fruits of *cv.* 'NA-7'. Two blanching methods (hot water and potassium metabisulphite (KMS) at 0.1%) and two drying methods (solar and hot air oven drying) were tried for the production of aonla shreds. Common salt, black salt and ginger juice were mixed for enhancing sensory quality of the product. The best product was obtained with KMS blanching and drying in solar dryer with added common salt at 3%. The most acceptable product had ascorbic acid content 298.3 mg/100 g, tannin 2.4%, acidity 2.6%, reducing sugar 3.0%, non-reducing sugar 21.0% and total sugar 24.0%. The recovery was 8.0–8.5%.

Keywords Aonla · Blanching · Drying · Recipe · Quality · Recovery

Introduction

Indian gooseberry (*Emblica officinalis* Gaertn.) also known as aonla is a low cost important fruit valued for its nutritional and medicinal properties. It is one of the richest sources of ascorbic acid (500–1,500 mg/100 g) used as a strong rejuvenator in Indian pharmacopoea (Pathak and Ram 2007) and is very popular for its medicinal properties as mentioned both in Ayurvedic and Unani system of medicines in India. It is valued as an anti-ascorbic, acidic, cooling laxative and diuretic (Singh et al. 1993). Aonla fruits are not consumed in fresh form because of its acidic and bitter taste. It is, therefore, not popular as a table fruit. However, excellent nutritive and therapeutic values of the fruit have great potentiality for processing into several quality products. As aonla is highly perishable in nature, the fruit needs processing for increasing shelf-life and value addition; particularly during glut period. Processing not only reduces the post harvest losses but also provides higher returns to the growers. Drying is an effective method to increase shelf life of aonla fruits. Dried fruits are useful in chronic dysentery, diarrhea, diabetes, dyspepsia, cough, anemia and jaundice (Kirtikar and Basu 1993). Studies have been carried out to prepare dried whole fruit (Verma and Gupta 2004), slice (Alam et al. 2010), supari (Damame et al. 2002), shreds (Sagar and Kumar 2006), flakes (Verma and Gupta 2004) and powder (Sharma et al. 2002; Alam and Singh 2005; Vijayanand et al. 2007). Blanching with hot water or with potassium metabisulphite (KMS) before drying checks the enzymatic spoilage and also improves the colour and texture of the shreds (Prajapati et al. 2009). Solar drying is cheaper whereas hot air oven drying is more convenient method of lowering moisture from the product. Keeping these points in view present study was under taken to develop a value added product of aonla in the form of shreds and to study the effect of pretreatments (blanching) and drying methods on quality of dried aonla shreds.

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Materials and methods

Freshly harvested mature hard aonla (*cv.* 'Narendra Aonla -7') fruit was procured from the farm of College of Horticulture, Mandsaur. The diseased, bruised and spotted fruits were sorted out and then thoroughly washed in running tap water to remove dust and other extraneous materials from the surface of fruits. The fruits were shredded with a manual shredder, then shreds were subjected to different treatments as shown in Table 1. In each treatment 400 g of aonla shreds were taken for experiment and each treatment was replicated thrice. In case of combination of pretreatments, drying methods and recipes, shreds were first blanched, then given different recipe treatment and kept for 12 h for uniform absorption (Tandon and Kumar 2005). Thereafter, the shreds were dried in solar dryer and hot air oven dryer. In case of control, the shreds were dried under sun without any treatment. For blanching, the shreds were dipped in 1 l boiling water for 3 min. To prevent any excess cooking, shreds were taken out and dipped immediately in normal water for 3 min. Similarly for KMS treatment, the shreds were soaked in 1 l normal water containing 0.1% KMS for 3 min. For different recipe treatments: 3% common salt/black salt was added to 400 g shreds after blanching with hot water/KMS. Similarly, for 10% ginger juice treatment, 40 ml ginger juice were added to 400 g shreds as per treatment combination and kept for 12 h. Aonla shreds were loaded uniformly on aluminum trays. The trays were then kept in solar dryer/hot air oven dryer (55–60 °C) for drying. The trays were changed in rotation from lower shelf to upper one to ensure uniform drying. Drying was carried out until constant weight was achieved. Weights before and after drying were measured.

Table 1 Treatment combinations to aonla shreds

Treatment combinations		
Drying method	Recipe	Symbols
Hot water blanching (B1)		
Solar drying (D1)	Common salt @3% (R1)	B1D1R1
	Black salt @3% (R2)	B1D1R2
	Common salt @3% and ginger juice @10% (R3)	B1D1R3
	Black salt @3% and ginger juice @ 10% (R4)	B1D1R4
Hot air oven drying (D2)	(R1)	B1D2R1
	(R2)	B1D2R2
	(R3)	B1D2R3
	(R4)	B1D2R4
Blanching with KMS @ 0.1% (B2)		
D1	(R1)	B2D1R1
	(R2)	B2D1R2
	(R3)	B2D1R3
	(R4)	B2D1R4
D2	(R1)	B2D2R1
	(R2)	B2D2R2
	(R3)	B2D2R3
	(R4)	B2D2R4

Fresh and dried aonla shreds were evaluated for ascorbic acid, acidity, tannin, reducing sugar, non-reducing sugar and total sugars. Ascorbic acid, reducing sugar and total sugars of fresh and dried shreds were determined as per AOAC (1984) methods. Tannin content was determined by Folin Denis reagent method (Sadasivam and Manickam 1992). Acidity of samples was determined by titration as per Ranganna (1986) method. The sensory quality of dried aonla shreds was assessed for colour, taste, texture and overall acceptability. The different attributes of the product were evaluated by a panel of six judges using 9-point Hedonic rating scale (Ranganna 1986).

Results and discussion

The recovery of dried aonla shreds was 8.1–8.5% whereas in control it was 9.7%, which may be due to losses of solids during blanching. Some of chemical and physical properties of fresh aonla and dried aonla shreds are shown in Table 2.

Ascorbic acid The data of Table 3 show that the pretreatments do not significantly affect the ascorbic acid content of dried aonla product. The higher ascorbic acid content of 277.5 mg/100 g was recorded when blanched with KMS. Shrivastava and Kumar (2007) also reported that vitamins in sulphured fruits were preserved but not in unsulphured ones during storage. Beneficial effect of blanching with KMS/sulphitation on retention of ascorbic acid content of dried product was also observed by many workers (Sethi 1986; Tripathi et al. 1988; Sagar and Kumar 2006; Singh et al. 2006b) in aonla. It may be due to inactivation of oxidase enzyme. The ascorbic acid content of dried aonla product is significantly affected by drying methods. Among two drying methods, higher ascorbic acid content in the product was obtained (285.2 mg/100 g) with solar drying (D1). The present finding is supported by Pragati et al. (2003) who found that indirect solar drying method was comparatively better than direct solar drying in terms of nutritional value of dried aonla fruit. Similarly, in aonla slices Murthy and Joshi (2007) reported that retention of ascorbic acid in fluidized bed drying of aonla was higher compared to those dried under sun and hot air oven dryer. In control, the ascorbic acid content was 153.7 mg/100 g. The present findings are further supported by Verma and Gupta (2004) and Singh et al. (2006b) who reported that solar drier proved better for retention of ascorbic acid than sun drying in dried aonla

Table 2 Chemical and physical properties of fresh aonla and dried aonla shreds

Constituents	Fresh aonla	Dried aonla shreds	Control
Ascorbic acid, mg/100 g	503	298.3	153.7
Tannin,%	0.9	2.4	2.5
Acidity,%	1.7	2.6	3.0
Reducing sugar,%	1.9	3.0	3.3
Non-reducing sugar,%	6.2	21.0	22.8
Total sugars,%	8.1	24.0	26.1
Total soluble solids, °Brix	14	–	–
Total phenol, mg/g	270	–	–
Appearance	Yellowish green	–	–
Average size (diameter), mm	34.4	–	–
Fruit weight, g	26.3	–	–
No. of fruits/kg	38	–	–

(n=3)

fruit. Comparing recipes it can be seen that there is significant difference between ascorbic acid content of the product of different types of recipes treatment. Among, the various recipes, the maximum ascorbic acid content of 293.7 mg/100 g was found when black salt and ginger juice were mixed (R4). It was also observed that adding black salt is helpful in retaining ascorbic acid in presence or absence of ginger juice. Similarly ginger juice mixing increases ascorbic acid retention in both common salt and black salt. However, product of any treatment combination had higher ascorbic acid content over control (153.7 mg/100 g). In combined application of all treatments (B×D×R), non-significant effect was found on ascorbic acid content of dried aonla product (Table 4).

Tannin It is evident from Table 3 that untreated control had highest (2.5%) tannin content in dried aonla as compared to others. Sethi (1986) also reported higher retention of tannin in unblanched dried fruit of aonla than blanched fruits. Losses of tannin during blanching have been reported (Pant et al. 2004) as 17.5–20.4% by previous workers (Sethi and Anand 1983; Singh et al. 2006a). Blanching with hot water (B1) retained significantly higher tannin content (2.3%). There was non-significant difference between different types of drying methods; however solar dried (D1) product maintained higher tannin content of 2.3%. Vijayanand et al. (2007) have reported tannin content in aonla powder in the range of 2.7–3.2% when whole fruit was blanched. It suggests that loss of tannin is more when blanching is done

Table 3 Effect of pretreatments, drying methods and recipes on ascorbic acid, tannin, acidity, reducing sugar, non-reducing sugar and total sugars of dried aonla product

Treatments	Ascorbic acid, mg/100 g	Tannin,%	Acidity,%	Reducing sugar,%	Non-reducing sugar,%	Total sugars,%
Hot water blanching (B1)	270.8	2.3	2.7	3.1	20.1	23.2
KMS (0.1%) blanching (B2)	277.5	2.2	2.6	3.0	18.8	21.8
S. Em. ±	2.35	0.02	0.01	0.01	0.22	0.22
CD at 5% level	NS	0.05	0.05	0.04	0.64	0.63
Solar drying (D1)	285.2	2.3	2.6	3.1	19.5	22.6
Hot air oven drying (D2)	263.1	2.2	2.6	3.1	19.4	22.5
S. Em. ±	2.35	0.02	0.01	0.01	0.22	0.22
CD at 5% level	6.77	NS	0.05	NS	NS	NS
Shreds with common salt @ 3% (R1)	261.8	2.3	2.6	3.1	19.5	22.6
Shreds with black salt @ 3% (R2)	278.7	2.3	2.6	3.0	19.9	22.9
Shreds with common salt @ 3% and ginger juice @ 10% (R3)	262.6	2.2	2.6	3.1	19.0	22.2
Shreds with black salt @ 3% and ginger juice @ 10% (R4)	293.7	2.3	2.6	3.1	19.3	22.4
S. Em. ±	3.33	0.02	0.02	0.01	0.31	0.31
CD at 5% level	9.57	NS	NS	0.05	NS	NS

(n=3)

after making shreds. Similarly, in recipes there is no significant difference between different types of recipes however maximum tannin content was found in shreds with common salt (R1) (2.3%). Combined effect of blanching, drying method and recipe exerted significantly on tannin content of dried aonla product (Table 4). Among all the three treatments maximum tannin content of 2.4% was in B2D1R1 treatment, whereas 2.5% was in untreated control. These results are well supported by previous workers (Sethi and Anand 1983; Sethi 1986; Pant et al. 2004).

Acidity Both the blanchings produced products with lower acidity as compared to unblanched control (2.9%) (Table 3). It was found that blanching with KMS (B2) or with hot water (B1) (2.6%) had similar acidity. The findings of the present investigation are in confirmation with the work of Pant et al. (2004) who reported heavy leaching losses of acids during blanching of aonla fruit slices. Sethi (1986) reported higher retention of acidity in pulp of raw aonla fruit and unblanched whole fruit compared to blanched fruit. Hot air oven drying (D2) and solar drying (D1) caused similar acidity (2.6%). Decrease in acidity might be because that acids get converted into sugars or some other compounds or might have been utilized in process of respiration. These results are in confirmation with findings of Mehta and Tomar (1979) in mango and Sagar and Kumar (2006) in aonla. Vijayanand et al. (2007) have reported acidity in aonla powder as 10.7% when whole fruit was blanched. It suggests that loss of acidity is more when blanching is done after making shreds. Recipes showed non-significant difference in acidity. However, minimum acidity was obtained in both shreds with common salt and ginger juice (R3) and shreds with black salt and ginger juice (R4) (2.6%). The combined application of blanching, drying method and recipe had significant effect on acidity of dried aonla product (Table 4). Among all samples the minimum acidity of 2.4% was found with B2D2R3, which was significantly lowest among all treatments.

Sugar content The reducing sugar content of dried aonla as affected by pretreatments, drying methods and recipes (Table 3) reveals that blanching significantly affected the reducing sugar content. Blanching with hot water (B1) retained significantly higher reducing sugar content (3.1%). All the treatments exhibited lower reducing sugar content as compared to untreated control of dried aonla. There is non-significant difference in reducing sugar content of aonla under different types of drying methods. There is significant difference between different types of recipes however maximum reducing sugar content was obtained in black salt with ginger juice (R4) (3.1%). The combined effect of blanching, drying method and recipe showed significant effect on reducing sugar content of dried aonla (Table 4). All treatments showed significantly lower reducing sugar content compared to control (3.3%).

Blanching significantly affected the non-reducing sugar content of dried aonla product (Table 3). All treatments exhibited lower non-reducing sugar content as compared to control. Blanching with hot water (B1) gave significantly higher non-reducing sugar content (20.1%). There was non

Table 4 Combined effect of pretreatments, drying methods and recipes on ascorbic acid, tannin, acidity, reducing sugar, non-reducing sugar and total sugar of dried aonla product

Interaction (B×D×R)	Ascorbic acid mg/100 g	Tannin,%	Acidity,%	Reducing sugar,%	Non-reducing sugar,%	Total sugars,%
B1D1R1	264.3	2.3	2.7	3.1	19.7	22.7
B1D1R2	289.0	2.3	2.6	3.1	20.5	23.5
B1D1R3	272.3	2.4	2.7	3.2	21.1	24.3
B1D1R4	289.0	2.4	2.7	3.3	17.8	21.0
B1D2R1	233.7	2.3	2.7	3.1	20.0	23.1
B1D2R2	263.7	2.3	2.6	3.1	21.6	24.7
B1D2R3	246.3	2.4	2.7	3.1	19.9	23.0
B1D2R4	308.3	2.3	2.5	3.2	20.3	23.5
B2D1R1	298.3	2.4	2.6	3.0	21.0	24.0
B2D1R2	289.7	2.3	2.6	3.0	19.6	22.6
B2D1R3	294.0	2.3	2.7	3.1	18.0	21.1
B2D1R4	285.0	2.1	2.6	3.1	18.3	21.4
B2D2R1	250.7	2.3	2.6	3.1	17.5	20.5
B2D2R2	272.3	2.3	2.5	3.0	17.8	20.8
B2D2R3	237.7	1.9	2.4	3.1	17.1	20.2
B2D2R4	292.3	2.3	2.6	3.1	20.8	23.9
S. Em. ±	6.66	0.05	0.05	0.04	0.63	0.62
CD at 5%level	NS	0.16	0.14	0.11	NS	NS

(*n*=3)

Treatment combinations as given in Table 1 significant difference between different types of drying methods; however solar drying (D1) gave higher non-reducing sugar content of 19.5%. Maximum non-reducing sugar content was obtained in recipe containing black salt (R2) (19.9%). The combined effect of blanching, drying method and recipe showed non-significant effect on non-reducing sugar content of dried aonla product (Table 4).

Blanching significantly affected the total sugar content of dried aonla product (Table 3). All treatments exhibited lower total sugar content as compared to control. Sethi (1986) also reported higher retention of sugars in unblanched aonla fruit compared to blanched fruit. Geetha et al. (2006) reported heavy leaching losses in sugars during blanching and sulphitation of aonla. Blanching with hot water (B1) helped in retaining significantly higher total sugar content (23.2%). There was non significant difference between different types of drying methods; solar drying (D1) recorded higher total sugar content of 22.6%. These results are in confirmation with findings of Sagar and Kumar (2006) in dried aonla shreds and Vijayanand et al. (2007) in dehydrated aonla powder. There was non-significant difference between different types of recipes in sugar content; maximum total sugar content was obtained in black salt (R2) (22.9%). The combined effect of blanching, drying method and recipe was found to have non-significant effect on total sugar content of dried aonla product (Table 4). All the treatments had lower total sugar content compared to control (26.1%).

Sensory quality Pretreatments significantly affected the colour of dried aonla product (Table 5). The higher colour rating of 6.7 was obtained when blanched with KMS (B2). These results are in confirmation with the findings of Singh et al. (2006b) and Verma and Gupta (2004) in aonla. Sethi (1986) also reported less non enzymatic browning in blanched aonla fruit as compared to unblanched fruit after drying. Shrivastava and Kumar (2007) reported that sulphur dioxide fumes act as a disinfectant and prevent the oxidation and darkening of fruits on exposure and thus retain their colour. The colour rating of dried aonla product was significantly affected by drying method. Higher colour (6.6) rating of the product was obtained with solar drying (D1). The retention of fruit colour due to different pretreatments over control was also reported by Verma and Gupta (1996, 2004) in aonla *cv.* 'Banarasi'. These results are in confirmation with the findings of earlier researchers (Sharma et al. 2002; Alam and Singh 2005). There was significant difference between colour ratings of the product of different types of recipes treatment. Maximum colour rating of 8.0 was found when common salt (R1) alone was added. Vijayanand et al. (2007) have reported browning and loss of natural colour and flavour in the production of aonla powder by hot air drying at 45 °C. The combined application of all three treatments was found to have non-significant effect on colour of dried aonla product (Table 6). Maximum colour rating of 8.9 was obtained with B2D1R1 treatment. The lowest color rating was with control sample.

The higher taste rating of 6.4 was recorded when blanched with KMS (B2) (Table 5). The results are in confirmation with the findings of Dabhade and Khedkar (1980) in mango powder. It was observed that loss of taste was maximum in the control sample while KMS treated product improved the taste of the dried aonla compared to

Table 5 Effect of pretreatments, drying methods and recipes on colour, taste, texture and sensory acceptability rating of dried aonla product

Treatments	Colour	Taste	Texture	Overall acceptability
Hot water blanching (B1)	6.2	6.4	7.4	6.6
KMS (0.1%) blanching (B2)	6.7	6.4	7.4	6.5
S. Em. ±	0.05	0.02	0.02	0.05
CD at 5% level	0.16	NS	NS	NS
Solar drying (D1)	6.6	6.4	7.4	6.7
Hot air oven drying (D2)	6.3	6.4	7.4	6.4
S. Em. ±	0.05	0.02	0.02	0.05
CD at 5% level	0.16	NS	NS	0.15
Shreds with common salt @ 3% (R1)	8.0	7.8	8.1	8.0
Shreds with black salt @ 3% (R2)	5.7	5.8	7.8	6.0
Shreds with common salt @ 3% and ginger juice @ 10% (R3)	6.9	6.7	6.9	6.9
Shreds with black salt @ 3% and ginger juice @ 10% (R4)	5.1	5.2	6.8	5.3
S. Em. ±	0.08	0.03	0.03	0.07
CD at 5% level	0.23	0.09	0.10	0.21

(n=6 panelists)

other treatments. The taste rating of dried aonla product is not significantly affected by drying methods. Though among two drying methods, the higher taste rating of the product obtained as 6.4 with solar drying (D1). Solar dryer uses the available solar radiation in a better and effective way, reduces the drying time (Khurdiya and Roy 1986) as compared to sun drying. Comparing recipes it can be seen that there is significant difference between taste ratings of the product of different types of recipes treatment. Among the various recipes, the maximum taste rating of 7.8 were found when common salt alone was added (R1). The present results corroborate with the findings of Mehta and Tomar (1979) who observed that mango slices treated with 1% KMS and 5% common salt gave the best dried product. The combined application of all treatments was found to have non-significant effect on taste rating of dried aonla product (Table 6). Among, all three treatments the maximum taste rating of 7.9 for B1D1R1 treatment was obtained, whereas, lowest (2.5) was recorded at control.

The higher texture rating of 7.4 was obtained when blanched with KMS (B2) (Table 5). Verma and Gupta (2004) reported better texture in aonla flakes when blanched with KMS. The results are also in confirmation with the findings of Dabhade and Khedkar (1980) in mango powder. The texture rating of dried aonla product is not significantly affected by two drying methods. Among two drying methods, the higher texture rating of the product obtained as 7.4 with solar drying (D1). Comparing recipes it can be seen that there is significant difference between texture ratings of the product of different types of recipes treatment. Among, the various recipes, the maximum texture ratings of 8.1 were found when common salt alone was added (R1). The combined application of all treatments was found to have non-significant effect on texture rating of dried aonla product (Table 6). Among, all three treatments the maximum texture rating of 8.4 at B2D1R1 treatment was obtained, whereas, lowest texture rating 6.5 was recorded in control.

The higher sensory acceptability rating of 6.6 was recorded when blanched with hot water (B1) (Table 5). The present findings are supported by Singh et al. (2006b). They obtained aonla *cv.* 'NA-7' of excellent sensory quality when dried after blanching with hot water and blanching with KMS. The results are in confirmation with the findings of Verma and Gupta (1996, 2004) who reported that overall acceptability of aonla fruits *cv.* 'Banarasi' was more in those receiving different pretreatments of blanching and sulphitation compared to untreated control. The sensory acceptability rating of dried aonla product is significantly affected by two drying methods. Higher sensory acceptability rating of the product was obtained as 6.7 with solar drying (D1). Verma and Gupta (2004) also found that solar dryer was more efficient for getting good quality dried aonla product. The present findings are further supported by Singh et al. (2006a). In solar tunnel dryer it was found to be superior to the sun dried product in terms of overall acceptability but Alam et al. (2002) found the pretreated and mechanically dried aonla *cv.* '*Chakaiya'* to be of better quality after drying. Maximum sensory acceptability rating of 8.0 was found

Table 6 Combined effects of pretreatments, drying methods and recipes on colour, taste, texture and sensory acceptability rating of dried aonla product

Interaction (B×D×R)	Colour	Taste	Texture	Overall acceptability
B1D1R1	8.0	7.9	8.2	8.1
B1D1R2	5.6	5.9	7.8	6.0
B1D1R3	6.7	6.4	7.0	7.3
B1D1R4	4.9	5.3	6.5	5.5
B1D2R1	7.4	7.6	7.8	8.0
B1D2R2	5.6	5.9	7.9	6.1
B1D2R3	6.7	6.5	7.1	6.7
B1D2R4	4.9	5.2	6.9	5.3
B2D1R1	8.9	7.9	8.4	8.1
B2D1R2	6.0	5.7	7.8	6.2
B2D1R3	7.3	6.8	6.9	7.1
B2D1R4	5.3	5.2	6.8	5.2
B2D2R1	7.9	7.8	8.0	7.8
B2D2R2	5.7	5.7	7.8	6.0
B2D2R3	7.0	6.8	6.7	6.3
B2D2R4	5.4	5.2	6.9	5.1
S. Em. ±	0.16	0.06	0.06	0.15
CD at 5%level	NS	NS	NS	NS

(*n*=6 panelists)

Treatment combinations as given in Table 1

NS Not significant

when common salt alone was added (R1). Damame et al. (2002) also reported that overall acceptability of aonla *supari* is affected by different recipe treatments. Most of the samples were in acceptable range as overall quality score of 7 or above was considered acceptable (Askar and Treptow 1993). The combined application of all treatments (B×D×R), was found to have non-significant effect on sensory acceptability rating of dried aonla product (Table 6). Among, all three treatments the maximum sensory acceptability rating of 8.1 was obtained for B2D1R1 treatment.

Conclusion

Blanching significantly affected all chemical properties except ascorbic acid content and significant effect only on sensory colour. Drying method has significant effect only on ascorbic acid contents and acidity in biochemical properties, whereas on colour and overall acceptability in sensory properties. Ascorbic acid and reducing sugar are significantly affected by recipe whereas all sensory properties are significantly affected by recipe. Combined effect of pretreatments, drying methods and different recipes had significant effect on preparation of dried aonla product for tannin content, acidity, reducing sugar and texture. Blanching with KMS exhibited superior quality over hot water blanching. Solar drying was more effective as compared to hot air oven drying method. In case of recipes, shreds with 3% common salt were more acceptable followed by shreds with 3% common salt + 10% ginger juice. The average recoveries of dried aonla shreds was 8.1–8.5% whereas in control it was 9.7%. The best product was obtained with KMS, dried in solar dryer and added with 3% common salt. The most acceptable product had ascorbic acid content of 298.3 mg/100 g, tannin 2.4%, acidity 2.6%, reducing sugar 3.0%, non-reducing sugar 21.0% and total sugar 24.0%.

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