

Storage studies of carbonated beverage from pomegranate juice

V.S. SANDHAN,* D.R. NANDRE AND B.M. KUSHARE¹

Department of Horticulture, College of Agriculture, (M.P.K.V.), NASHIK (M.S.) INDIA

ABSTRACT

Present investigation was undertaken to study storage life of carbonated beverage from pomegranate juice in different storage condition. Carbonated beverage with 10 per cent pomegranate juice and ginger juice 1 per cent was stored in ambient storage condition and cool storage. Increase in T.S.S., pH, reducing sugars, non-reducing sugars and total sugars as well as decrease in titrable acidity, ascorbic acid, anthocyanin content and score for all sensory attributes, was recorded in all treatments irrespective of storage condition. The rate of increase in T.S.S., pH, reducing sugars, non-reducing sugars and total sugars as well as decrease in titrable acidity, ascorbic acid, anthocyanin content and score for all sensory attributes was higher in ambient condition than cool storage condition.

Key words : Carbonated beverage, Pomegranate, Storage studies.

INTRODUCTION

Pomegranate (*Punica granatum L.*) is important fruit crop for Maharashtra as well as whole India mainly because of its versatile adaptability, drought tolerant nature and also steady and high yield. Pomegranate juice is useful for the patients suffering from Leprosy, high cholesterol level, heart patients and kidney problems. Processed fruit products will not only avoid the seasonal glut in the market but also helps in stabilization of market prices and provide incentive for increase in the area and production of pomegranate fruits. Pomegranate fruits can be processed into different products like juice, squash, syrup, jelly, wine, anardana, anar-rub (Adsule and Patil, 1995). Pomegranate juice can be utilized for preparation of ready-to-serve (RTS) beverage by adding cane sugar and citric acid and maintaining T.S.S. up to 15°Brix and 0.25 per cent acidity (Vaidya *et al.*, 1998). More *et al.* (1999) prepared ready-to-serve beverage from juice using 20 per cent juice and adding cane-sugar, citric acid by maintaining 15°Brix and 0.25 per cent acidity.

Khurdiya (1989) studied the carbonation in fruit beverages. For preparation of carbonated beverages, the ingredients required are water, sweeteners, acidulates, colorings, flavorings, carbon dioxide, clouding agents, emulsifiers etc. The fruit based carbonated drinks from lime, phalsa, jamun, ber, and apple and described the processing, preservation of their carbonated drinks (Khurdiya, 1990). He also standardized a formulation for orange concentrate (Khurdiya, 1990). Rokade *et al.* (2001) prepared carbonated beverage from grapes. The carbonated beverage with 0.3 per cent acidity and 14°Brix scored for the maximum organoleptic properties. Jadhav *et al.* (2002) conducted studies on preparation and storage

of carbonated beverage from tamarind juice.

MATERIALS AND METHODS

Pomegranate fruits:

Pomegranate fruits of ganesh variety were obtained from department of horticulture. The fruits of uniform size, color, and maturity were used for investigation.

Chemicals:

Most of the chemicals used for this investigation are of analytical grade obtained from Sigma Trading Company, Nashik.

Physical characteristics of matured pomegranate fruits:

Five fruits were selected randomly. The length, width and weight were measured and these values were added to find out average.

Extraction of fruit juice :

The juice was extracted by squeezing the arils gently through two layers of muslin cloth. The extracted juice was centrifuged at 5000 rpm for 20 min. (Siddapa, 1943)

Analysis of juice:

The Pomegranate juice was analyzed for total soluble solids (T.S.S.), acidity, pH, total soluble sugars, reducing sugars, non-reducing sugars, anthocyanin content and ascorbic acid content etc.

Total soluble solids (T.S.S.):

Total soluble solids (T.S.S.) in the juice were measured with the help of Erma hand refractometer.

* Author for correspondence. ¹ Krishi Vigyan Kendra, KOSBAD (M.S.) INDIA

Acidity:

Acidity of juice was determined by titration with 0.01 N sodium hydroxide (Ranganna, 1986). The per cent acidity was expressed in terms of anhydrous citric acid.

pH:

The pH of juice was measured by using Perkin-Elmer pH meter

Ascorbic acid:

Determination of ascorbic acid was done by 2,6-dichlorophenol-indophenol dye method suggested by Ranganna [1986]

Sugars:

Reducing, non-reducing and total sugars were determined by the methods of Lane and Eynon [1923] with slight modifications suggested by Ranganna [1986].

Anthocyanin content:

The total anthocyanin pigment were measured by the method of Flueki and Francis [1986] with slight modification suggested by Khurdiya and Roy [1984]

Preparation of carbonated beverage:

Preliminary trials were taken to adjust the acidity level to 0.30 per cent and T.S.S. to 15 °Brix by using pomegranate juice level .10 per cent and ginger juice 1 per cent. The syrup was filled up in the bottles in appropriate quantity and carbonated water added with the help of carbonation unit to make the final volume to 200 ml of the beverage per bottle

Analysis of carbonated beverage:

The carbonated beverage obtained by using different levels of pomegranate juice and ginger juice were analyzed for T.S.S., acidity, pH, ascorbic acid content, anthocyanin content, reducing sugars, non reducing sugars, total sugars in the same way as that of juice.

Organoleptic evaluation of the carbonated beverage:

The Organoleptic evaluation of the carbonated beverage was carried out according to the method of Amerine *et al.* (1965) on 9-point hedonic scale. The average score of the panel of judges for different quality characteristics *viz.*, color, flavor, taste and overall acceptability was reported.

Storage of the carbonated beverage:

Storage of carbonated beverage was done at two

different condition *viz.*, ambient storage (12.2- 33.1°C) and cool storage (5-8 °C) for a period of three months.

Statistical analysis:

Statistical analysis of the results during storage of carbonated beverage of pomegranate juice was done according to the Factorial Completely Randomised Design (FCRD).

RESULTS AND DISCUSSION**Physico-chemical characteristics of pomegranate fruit and juice:**

Fruits of pomegranate cv. GANESH used in present investigation were having following physical as well as chemical properties.

Characteristics	Range	Average
Color	-	Pale yellow
Length [cm]	7.9-8.9	8.4
Width [cm]	7.9-8.3	8.1
Weight [gm]	230-330	280
T.S.S. [°Brix]	14.2-14.6	14.40
Acidity [%]	0.34-0.40	0.38
pH	2.9-3.15	3.00
Reducing sugars [%]	10.40-11.60	11.00
Non-reducing sugars [%]	2.88-3.03	2.88
Total sugars [%]	13.40-14.20	13.88
Ascorbic acid [mg/ 100 ml]	13.20-14.80	14.00
Anthocyanin content [mg/100 ml]	18.20-20.30	19.25

The values of physico-chemical characteristics of pomegranate fruits and juice used in present investigation are comparable with those reported by Swaminathan (1977), Sood *et al.* (1982), Jagtap *et al.* (1992), Waskar and Deshmukh (1995) and Vaidya *et al.* (1998).

Chemical composition of carbonated beverage prepared:

T.S.S. [°Brix]	15.00
Acidity [%]	0.30
pH	2.90
Reducing sugars [%]	13.70
Non-reducing sugars [%]	0.92
Total sugars [%]	14.62
Ascorbic acid [mg/ 100 ml]	1.12
Anthocyanin content [mg/100 ml]	1.81

Carbonated beverages of various compositions have been reported by several workers. The values of various chemical parameters of carbonated beverage prepared from 10% pomegranate juice and 1% ginger juice are comparable with those reported by Khurdiya *et al.* (1989), Rokade *et al.* (2001), Shelar (2001) and Jadhav *et al.* (2002).

Effect of ambient storage condition on chemical composition of carbonated beverage:

Sr. No.	Chemical parameters	Storage duration (month)			
		Initial	After 1 month	After 2 month	After 3 month
1.	T.S.S. (°Brix)	15.00	15.40	16.20	*
2.	Acidity (%)	0.30	0.28	0.25	*
3.	pH	2.90	3.00	3.30	*
4.	Reducing sugars (%)	13.70	13.90	14.15	*
5.	Non-reducing sugars (%)	0.92	1.41	2.05	*
6.	Total sugars (%)	14.62	15.31	16.19	*
7.	Ascorbic acid (mg/ 100 ml)	1.12	1.09	1.01	*
8.	Anthocyanin content (mg/ 100 ml)	1.81	1.42	0.99	*

* spoiled

Effect of cool storage condition on chemical composition of carbonated beverage:

Sr. No.	Chemical parameters	Storage duration (month)			
		Initial	After 1 month	After 2 month	After 3 month
1.	T.S.S. (°Brix)	15.00	15.20	15.60	16.10
2.	Acidity (%)	0.30	0.29	0.27	0.24
3.	pH	2.90	2.90	3.10	3.30
4.	Reducing sugars (%)	13.70	13.82	13.98	14.18
5.	Non-reducing sugars (%)	0.92	1.15	1.44	1.83
6.	Total sugars (%)	14.62	14.97	15.42	16.01
7.	Ascorbic acid (mg/ 100 ml)	1.12	1.10	1.05	0.94
8.	Anthocyanin content (mg/ 100 ml)	1.81	1.50	1.30	0.97

The carbonated beverage prepared from pomegranate juice could be stored for two months in ambient condition storage and three months in cool storage condition.

During storage of the carbonated beverage slight changes in chemical composition were recorded. Increase in T.S.S., pH, reducing sugars, non-reducing sugars and total sugars as well as decrease in titrable acidity, ascorbic acid and anthocyanin content was recorded in all treatments irrespective of storage condition . The rate of

increase in T.S.S., pH, reducing sugars, non-reducing sugars and total sugars as well as decrease in titrable acidity, ascorbic acid and anthocyanin content was higher in ambient condition than cool storage condition. Similar findings were reported by Khurdiya *et al.* (1996) and Shelar (2001).

Effect of ambient storage condition on organoleptic composition of carbonated beverage:

Sr. No.	Organoleptic test	Storage duration (month)			
		Initial	After 1 month	After 2 month	After 3 month
1.	Taste	8.5	8.3	8.0	*
2.	Colour	7.7	7.4	7.0	*
3.	Flavour	8.2	7.9	7.5	*
4.	Overall acceptability	8.5	8.3	8.1	*

* spoiled

Effect of cool storage condition on organoleptic composition of carbonated beverage:

Sr. No.	Organoleptic test	Storage duration (month)			
		Initial	After 1 month	After 2 month	After 3 month
1.	Taste	8.5	8.4	8.2	7.9
2.	Colour	7.7	7.5	7.1	7.0
3.	Flavour	8.2	8.0	7.7	7.3
4.	Overall acceptability	8.5	8.4	8.2	8.0

The score for all sensory attributes decreased gradually during storage period. The decrease in score for taste, flavor , colour and overall acceptability was rapid in ambient storage condition than cool storage condition. Similar findings were reported by Khurdiya *et al.* (1996), and Shelar (2001).

REFERENCES

- Adsule, R.N. and Patil, N.B. (1995).** Pomegranate in *Handbook of Fruit Science and Technology*. (D.K. Salunke and S.S. Kadam, Ed.) Marcel Dekker, Inc. New York. pp455-464.
- Amerine, M.A., Pangborn, R.M. and Rosseler, E.B. (1965).** *Principles of Sensory Evaluation of Food*. Academic Press, London.
- Flueki, T. and Francis, F.T. (1968).** Quantitative methods for anthocyanin. Extraction and determination of total anthocyanin in cranberries. *J. Food Sci.*, **33** : 72.
- Jadhav, H.M., Kotecha, P.M. and Kadam, S.S. (2002).** Studies on preparation and storage of carbonated beverage from tamarind juice. *Beverage and Food World*, **28** (9) : 28-29.

- Jagtap, D.B., Desai, U.T. and Kale, P.N. (1992).** Chemical composition of indigenous and exotic cultivars of pomegranate. *Maharashtra J. Hort.*, 6(1) : 10-12.
- Khurdiya, D.S. (1989).** Carbonation in fruit beverages. *Beverage and Food World*, 16 (2) : 9-11.
- Khurdiya, D.S. (1990).** A study of fruit juice based carbonated drinks. *Indian Food Packer*, 44(6) : 45-50.
- Khurdiya, D.S. and Roy, S.K. (1984).** Anthocyanins of quality index in jamun beverages (*Syzygium cumini* L.). *Indian Food Packer*, 38 (6) : 71-76.
- Khurdiya, D.S. (1990).** Orange concentrate based carbonated beverage. *J. Food Sci. Technol.*, 27(5) : 394-396.
- Khurdiya, D.S., Islam and Verma, O.P. (1996).** Processing and storage of carbonated guava beverage. *J. Food Proc. and Preservation*, 20 (1) : 79-86.
- Lane, J.H. and Eynon, L. (1923).** Determination of sugars by Fehling solution with methylene blue as indicator. *J. Soc. Chem. India*, 42 : 32-34.
- More, T.A., Karale, A.R., Wasker, D.P. and Choudhari, S.M. (1999).** Preparation of RTS and wine from pomegranate juice. Paper presented in training on post-harvest handling, processing and export of hort. crops held at Mahatma Phule Krishi Vidyapeeth, Rahuri., during July 14- August 3.
- Ranganna, S. (1986).** *Handbook of Analysis and Quality control for Fruit and Vegetable Products*. 2nd Ed. Tata McGraw Hill Publication, New Delhi. pp.12-15.
- Rokade, A.S., Kotecha, P.M. and Kadam, S.S. (2001).** Studies on preparation of carbonated beverages from grapes. *Beverage and Food World*, 28 (9) : 28-29.
- Shelar, Y.V. (2001).** Preparation of carbonated ready-to-serve (RTS) beverage from pomegranate juice. M. Sc. (Ag.) Thesis, Mahatma Phule Krishi Vidyapeeth, Rahuri, M.S., India .
- Sidappa, G.S. (1943).** Pomegranate juice. *Indian Farmg.*, 4 : 196-198.
- Sood, D.R., Dhindsa, K.S. and Wagh, D.S. (1982).** Studies on the nutritive value of pomegranate (*Punica granatum* L.). *Haryana J. Hort. Sci.*, 11 (3-4) : 175-178.
- Swaminathan, M. (1977).** *Handbook of Foods and Nutrition*, Ganesh and Co., Madras, India.
- Vaidya, R.N., Kotecha, P.M. and Kadam, S.S. (1998).** Studies on mixed fruit juice beverages based on ber, pomegranate and guava. *Beverage and Food World*, 25 (2) : 41-47.
- Waskar, D.P. and Deshmukh, A.N. (1995).** Effect of packaging containers on the retention of anthocyanins of pomegranate juice. *Indian Food Packer*, 49 (1) : 5-8.

Received : September, 2008; Accepted : December, 2008