Indian J. Hort. 67(3), September 2010: 376-380

Improvement in quality of beverages prepared from Rumani mango blended with Dashehari and Mallika

D.K. Tandon*, Sanjay Kumar, Abhay Dikshit and D.K. Shukla
Central Institute for Subtropical Horticulture, Rehmankhera, P.O. Kakori, Lucknow 227 107

ABSTRACT

The preserved mango pulp of mangro cv. Rumani was blended either with Mallika or Dashehari pulp in the ratio of 9:1, 8:2 and 7:3 and stored under ambient conditions. The pulp samples were analysed for various chemical parameters at 0, 6 and 12 months of storage. The RTS (ready-to-serve) beverage was prepared at each interval and evaluated organoleptically. Results revealed that addition of Mallika or Dashehari pulp improved the colour of Rumani pulp with significant by increase in yellowness index and total carotenoids content. Significant increase in the content of total soluble solids (TSS) and total sugars was also observed by pulp blending. During storage, the content of TSS and sugars increased, while those of total carotenoids decreased. The organoleptic evalution of prepared beverage, based on colour, flavour and taste, showed that drink prepared from pure Rumani pulp was not acceptable. However, acceptability of beverage increased with the increasing concentration of either Mallika or Dashehari pulp. The best pulp blend for beverage preparation was observed to be 7:3 after 12 months of storage. The pulp of Dashehari was better over Mallika for blending with Rumani.

Key words: Mango, pulp blending, beverage, quality, storage.

INTRODUCTION

Mango is one of the most potent fruits known for its processing qualities. However, all the varieties are not equally suitable for processing purposes. Certain varieties like Rumani of south India, though have good yield, are not preferred for making processed products, especially canned pulp and ready-to-serve beverage. The variety bears mild flavour and poor pulp colour due to low carotenoid content.

Addition of synthetic colour and flavour is a normal practice for improving the quality of beverages prepared from mango varieties having insufficient colour and/or low aroma. Kalra *et al.* (9) added a mixture of synthetic lemon yellow and sunset yellow colours to improve acceptability of drink prepared from mango cv. Babli Ponesa. This practice, though, widely adopted by the fruit processors due to cost effectiveness, excessive use of such additives is, however, prohibited under PFA as it poses serious threat to human health. Furthermore, the consumer has also become health conscious and avoids processed products/drinks having artificial colour. Blending has emerged as an alternative to improve the quality of product. According to Deka *et al.* (6), it not only provides newer products but also helps in improving nutrition and palatability. Mango-papaya (Kalra *et al.*, 10) and mango-pineapple (Deka *et al.*, 5) are some of the examples of blended beverages, which have been successfully standaradized in recent past.

*Corresponding author's E-mail: dr.dktandon@gmail.com

Certain mango varieties like Banganpalli, Fazli, Langra, Chausa, etc., despite having good commercial acceptability, are not preferred for processing due to lack of proper colour, fibre, etc. Such varieties can be utilized for processing after blending with the pulp of other varieties with coloured pulp like Amrapali, Dashehari, Mallika, etc., which are particularly rich in carotene pigment. Srivastava (15) mixed the pulp of Banganpalli and Dashehari for obtaining good quality of RTS drink. Similarly, Kalra *et al.* (9) added Dashehari to Babli Ponesa, while Khurdiya (11) mixed Amrapali to Totapuri to improve the quality of beverage. In the present investigation, an attempt has, therefore, been made to improve the nutrients and sensory qualities of beverage prepared from poor pulp colour mango cv. Rumani through blending.

MATERIALS AND METHODS

The mature fruits of mango cvs. Rumani, Mallika and Dashehari, obtained from the Experimental Farm of CISH, were treated with 250 ppm ethrel in hot water at 52 ± 2°C for 5 min. for uniform ripening. The ripe fruits were washed, peeled and pulp was extracted using 20 per cent water through pulper and finisher, pasteurized at 78°C and preserved with 500 ppm SO_2 as potassium meta-bisulphite in air tight glass containers. The pulp of Rumani was mixed with Mallika or Dashehari pulp in the ratio of 9:1, 8:2 and 7:3, apart from control, stored under ambient conditions (15-37°C & 45-85% RH) and analysed for different quality parameters at 0, 6 and

Table 1. Changes in chemical attributes of Rumani-Mallika blended pulp during storage.

Blend	Ratio	TSS (°Brix)			Total carotenoids (mg 100 g^{-1})		
Month		0	6	12	0	6	12
Rumani	Pure	8.7	9.0	8.8	0.19	0.18	0.13
Rumani : Mallika	9:1	9.1	10.3	10.0	0.66	0.56	0.39
	8:2	10.2	10.9	10.2	0.83	0.73	0.57
	7:3	11.1	11.8	11.9	1.15	1.02	0.83
Mallika	Pure	18.2	18.6	18.8	3.30	3.01	2.53
CD at 5%							
Treatment		0.083			0.028		
Period		0.064			0.022		
Treatment × Period		0.143			0.049		

Blend	Ratio	Total sugars (%)			Reducing sugars (%)		
Month		0	6	12	0	6	12
Rumani	Pure	7.4	7.7	7.7	3.5	3.8	4.1
	9:1	7.8	8.1	8.0	4.1	4.9	5.2
Rumani : Mallika	8:2	8.6	8.9	8.8	4.6	5.5	6.0
	7:3	9.4	9.7	10.1	4.9	5.8	6.5
Mallika	Pure	16.7	16.7	16.9	5.4	8.2	9.3
CD at 5%							
Treatment		0.116			0.070		
Period		0.090			0.054		
Treatment × Period		0.200			0.121		

Table 2. Changes in chemical attributes of Rumani-Dashehari blended pulp during storage.

Blend	Ratio	TSS (°Brix)			Total carotenoids (mg 100g^{-1})		
Month		0	6	12	0	6	12
Rumani	Pure	8.7	9.0	8.8	0.19	0.18	0.13
Rumani : Dashehari	9:1	9.8	10.2	10.2	0.97	0.98	0.67
	8:2	10.2	10.7	10.4	1.08	1.11	0.89
	7:3	10.8	11.2	11.1	1.32	1.33	1.10
Dashehari	Pure	16.0	16.7	16.6	3.69	3.50	3.09
CD at 5%							
Treatment		0.072			0.030		
Period		0.056			0.023		
Treatment × Period		0.124			0.052		

Blend	Ratio	Total sugars (%)			Reducing sugars (%)		
		0	6	12	0	6	12
Rumani	Pure	7.4	7.7	7.7	3.5	3.8	4.1
Rumani : Dashehari	9:1	8.3	8.6	8.5	4.2	5.4	6.0
	8:2	8.9	9.0	8.8	4.5	5.3	6.1
	7:3	9.6	9.8	9.8	4.6	5.2	6.2
Dashehari	Pure	14.7	14.9	14.9	4.8	5.8	6.5
CD at 5%							
Treatment		0.132			0.087		
Period		NS			0.068		
Treatment × Period		0.229			0.151		

12 months of staorge. The beverage was prepared at each analytical date using 10 per cent pulp, 15°B TSS and 0.3 per cent acidity and evaluated organoleptically on Hedonic scale. Total soluble solids (TSS) in the pulp was measured by hand refractometer (Erma, Japan), while total carotenoids by extracting the pulp in 3 per cent petroleum ether and recording the optical density (OD) at 452 nm in a spectrophotometer (Ranganna, 13). The pulp samples for sugars were clarified as per the method of Lane and Eynon (12). The total sugars were estimated spectrophotometrically by Roughan and Batt's (14) method, while reducing sugars by Folin and Wu's method as described in AOAC (3). The yellowness index of the pulp was measured by Colour Fle'x Meter (Hunter's Lab, USA). The sensory evaluation of the bverage was done by seven semi-skilled judges on a 9-point Hedonic scale on the basis of colour, flavour and taste as prescribed by Amerine *et al.* (2). The data was analysed statistically through the software package developed by O.P. Sheoran of CCS HAU, Hisar.

RESULTS AND DISCUSSION

The data pertaining to changes in chemical parameters of Rumani and Mallika blended pulps are presented in Table 1, while those of Rumani and Dashehari blended pulp in Table 2. The TSS of Rumani pulp was found to be 8.7^{0}B, which was much lower as compared to 18.2 and 16.0^{0}B of Mallika and Dashehari, respectively. The TSS increased proportionately with the amount of Mallika or Dashehari pulp added to Rumani. Slight increase in TSS content of pulp was observed in all the samples during storage up to 6 months, thereafter, it remained almost unchanged. Similar trend in TSS was observed by Doreyappa Gowda and Huddar (7) during storage of canned mango pulp. Total sugars content also exhibited similar pattern of increase until 6 months. According to Altaf *et al.* (1) an increase in total sugars may be due to degradation of insoluble polysaccharides like hemicelluloses and oligosaccharides into soluble compounds. The reducing sugars content of Rumani pulp (3.5%) was also low as compared to Mallika and Dashehari (5.4 and 4.8%, respectively). Addition of Mallika or Dashehari pulp enhanced the reducing sugars values of blended pulps. The reducing sugars content increased continuously in all the samples during storage up to 12 months. Gradual hydrolysis of non-reducing forms of sugars into reducing sugars might be the reason behind such increase in the content of reducing sugars during storage. Increase in reducing sugars content in mango pulp during storage was also reported by Kalra and Tandon (8).The pulp of Rumani was very light in colour owing to low values of carotenes. Its total carotenoids content was as low as 0.19 mg 100 g^{-1}. Mallika and Dashehari fruits, on the other hand, were rich in total carotenoids and contained 3.30 and 3.69 mg 100 g^{-1} total carotenoids, respectrively, in their pulps. Addition of pulp from either of the variety sharply increased the pigment content of Rumani pulp. During storage of blended pulps, the total carotenoids content declined regularly. Oxidation of pigments during storage may be responsible for such loss in carotenoids component. This finding is

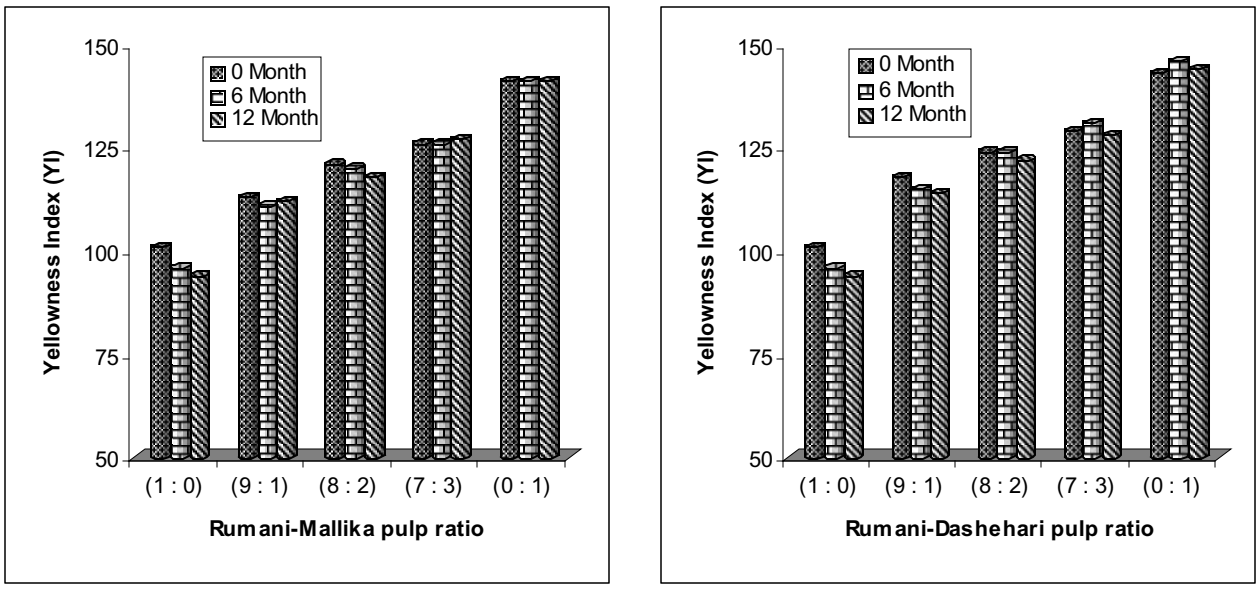

Fig. 1. Changes in yellowness index of blended mango pulps during storage.

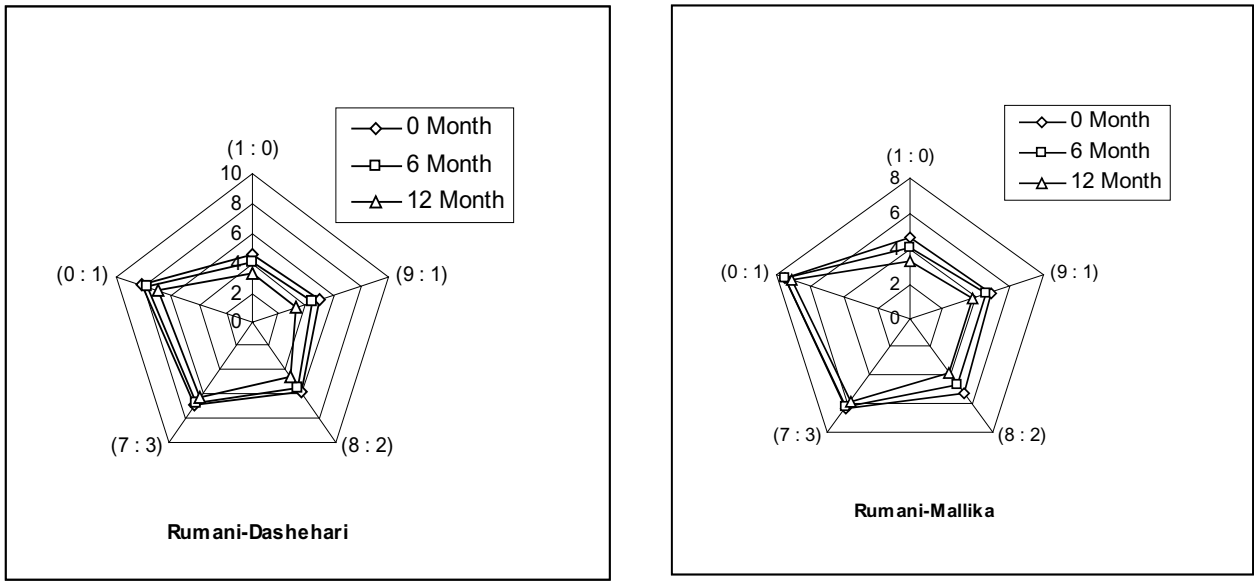

Fig. 2. Changes in Sensory scores of RTS beverages prepared from stored blended pulps.

in agreement with that of Deka *et al.* (5) in mango-pineapple spiced beverage. Yellowness index data of pulps also revealed colour intensification with the increasing concentration of Mallika or Dashehari pulp in the blended pulp of Rumani (Fig. 1). The index value of pulp increased from 101 in Rumani to 126 in blend with Mallika and 129 in blend with Dashehari, when blended in 7:3 ratio. The storage data of all the pulp samples, however, did not show any significant change in yellowness index. The sensory evaluation of RTS beverages prepared from the pulp at 0, 6 and 12 months of storage revealed an increase in organoleptic score with the increase in the proportion of pulp of Mallika or Dashehari in the blends (Fig. 2). The decrease in acceptability of beverage was noted as the storage period prolonged. Das (4) has also reported a fall in acceptability of *jamun* beverages during storage at room temperature. The beverages prepared from pure pulp of Rumani and 9:1 blend of pulps were totally unacceptable from the very beginning acquiring score below 5.0 out of 9.0 and deteriorated further as the storage period advanced. The blend combination 8:2, though acceptable initially, came below average at the end of 12 months. It was only the 7:3 blend ratio, besides pure Mallika and Dashehari pulp, that performed within acceptable range throughout the storage period. Comparing between the same blend ratio of Rumani with Mallika or Dashehari, Dashehari was preferred more than that of Mallika due to higher organoleptic score.

Thirty per cent pulp of Mallika or Dashehari could be added to Rumani pulp for obtaining good quality of RTS beverage, having optimum colour, flavour and taste. Dashehari pulp was found to be more suitable for blending with Rumani for beverage preparation.

ACKNOWLEDGEMENT

The authors are grateful to the Director, CISH, Lucknow for providing necessary facilities for the study.

REFERENCES

1. Altaf, A., Singh, D.B. and Tandon, D.K. 2006. Studies on effect of stabilizers on the quality of mango nectar. *Prog. Hort.* **38**: 208-13.

2. Amerine, M.A., Pangborn, R.M. and Roessler, E.B. 1965. *Principles of Sensory Evaluation of Food*. Academic Press, New York and London.

3. A.O.A.C. 1975. *Official Methods of Analysis.* Association of Official Analytical Chemists. Washington, DC. 11th edn.

4. Das, J.N. 2009. Studies on storage stability of *jamun* beverages. *Indian J. Hort*. **66**: 508-10.

5. Deka, B.C., Sethi, V. and Saikia, A. 2005. Changes in quality of mango-pineapple spiced beverage during storage. *Indian J. Hort*. **62**: 71-75.

6. Deka B.C., Sethi, V. and Saikia, J. 2002. Developments in mixed juice beverages- A review. *Indian Food Packer,* **56**: 61-68.

7. Doreyappa Gowda, I.N. and Huddar, A.G. 2004. Investigation on processing quality of some mango

varieties, hybrids and their blends. *J. Food Sci. Technol*. **41**: 154-59.

8. Kalra, S.K. and Tandon, D.K. 1985. Physico-chemical changes in mango pulp during ambient storage in glass containers. *J. Food Sci. Technol*. **22**: 350-53.

9. Kalra, S.K., Tandon, D.K. and Garg, N. 2001. Improved beverages from mangoes with poor coloured flesh. *Indian Food Packer* **55**: 70-74.

10. Kalra, S.K., Tandon, D.K. and Singh, B.P. 1991. Evaluation of mango-papaya blended beverage. *Indian Food Packer* **45**: 33-36.

11. Khurdiya, D.S. 1993. Composition and quality of nectar prepared from blended pulps of Amrapali and Totapuri mangoes. *J. Food Sci. Technol*. **30**: 139-40.

12. Lane, J.H. and Eynon, L. 1923. Determination of reducing sugars by means of Fehling solution and methylene blue as an internal indicator. *J. Food Sci.* **40**: 370-73.

13. Ranganna, S. 1986. *Handbook of Analysis and Quality Control for Fruit and Vegetable Products*. IInd edn. Tata McGraw Hill Publication Co. Ltd., New Delhi.

14. Roughan, P.G. and Batt, R.D. 1968. Quantitative analysis of sulfolipid (sulfoquinovosyl diglyceride) and galactolipids (monogalactosyl and digalactosyl diglyceride) in plant tissues. *Anal. Biochem.* **22**: 74-88.

15. Srivastava, J.S. 1998. Comparative study of RTS drinks prepared from Dashehari and Banganpalli mangoes. *Indian Food Packer,* **52**: 38-42.

Received: July, 2009; Revised: June, 2010;
Accepted : August, 2010