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RESEARCH PAPER

Studies on the standardization and preservation of guava (*Psidium guajava* L.) and barbados cherry (*Malpighia glabra* L.) pulp blended ready-to-serve beverage

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SUMMARY : The experiment was conducted to standardization of the suitable blending of guava and barbados cherry fruit pulps, among different blending ratios and recipes for the preparation of quality blended ready-to-serve (RTS) beverage and assess their storage stability at ambient temperature. The prepared blended RTSs were organoleptically evaluated by adopting 9 point hedonic rating scale. Among the different blending ratios and recipes, 10 per cent blended pulp (50% guava pulp + 50% barbados cherry pulp) with, 12 per cent TSS and 0.2 per cent acidity was found to be the best on overall sensory score. Best blended RTS stored in glass bottles and chemical changes during storage were also studied at monthly intervals. Total soluble solids and acidity did not change upto three month and then increased continuously upto the end of storage. Non- enzymatic browning did not change upto the two month and thereafter, it increase continuously upto the entire period of storage. Ascorbic acid content and organoleptic score of the beverage decreased gradually with the storage period. According to the organoleptic score, the blended RTS was found to be acceptable upto five months of storage at ambient temperature with good appearance, flavour, taste and overall acceptability.

KEY **W**ORDS : Guava fruits, Barbados cherry fruits, Blending ratio, Recipe, Blended RTS, Organoleptic quality, Storage life

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Guava (*Psidium guajava* L.) is one of the most important tropical and subtropical fruits, because of its high nutritive value and possibility of cultivation even under adverse condition of India. Fruit is considered one of the delicious and luscious fruit. It is a rich source of vitamin- C and also contains appreciable amount of minerals, vitamins, proteins and sugars. Fruits are also known the good source of pectin which is an important constituent of jelly as well as thickening agent of beverages. Guava fruits contain high pulp percentage and good flavour and used for making of several products *viz.*, RTS, nectar, squash, jam, jelly, toffee, bar etc.

Barbodas cherry or acerola or west Indian cherry (*Malpighia glabra* L.) is a promoting tropical and sub tropical fruit plant. The presence of highest natural ascorbic acid content in barbodas cherry fruits aroused interest in this plant among horticulturist as well as food supplement industries. It is also rich in protovitamin-A, but low in vitamin B. Fruits also have good antioxidant property.

Guava fruits have very pleasant flavour and taste with good nutritional quality but fruit pulp is not attractive in colour. In the other hand barbados cherry pulp have attractive colour and also the richest source of vitamin C and rich in vitamin A, lycopin and other antioxidants. Therefore, if pulps of both fruits are blended, there is a possibility to obtain a new beverage of attractive colour, pleasant flavour, highly nutritional, refreshing and medicinal properties along with good organoleptic value and storage stability. This may be due to pleasant flavour of guava fruits, coloured pulp of barbados cherry and excellent

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nutritional and medicinal properties of both fruits. Therefore, attempts were made to prepare a new RTS product through blending of guava and barbados cherry fruit pulps and to assess their storage stability.

EXPERIMENTAL METHODS

The investigation was conducted at Narendra Deva University of Agriculture and Technology, Kumarganj, Faizabad (U.P.) during the year 2008-09. The freshly ripe fruits of guava cv. L-49 were collected and washed thoroughly in running water. Fruits were cut in to pieces and then added water in 1:0.25 ratios, thereafter passed through pulper. The seeds were removed by staining through muslin cloth then pulp was collected. The ripe barbados cherry fruits were taken and washed thoroughly in water. The fruits ware passed through pulper after addition of water in ratio of 1:0.25. Juice was extracted from barbados cherry pulp by pressing through double muslin cloth.

Blended RTSs were prepared with 12 per cent TSS, 0.3 per cent acidity and 10 per cent blended pulp by standered method (Fig. A) of different blending ratio *viz.*, 75 per cent guava pulp + 25 per cent barbados cherry pulp, 50 per cent guava pulp+ 50 per cent barbados cherry pulp, 25 per cent guava pulp + 75 per cent barbados cherry pulp, 100 per cent guava pulp and 100 per cent barbados cherry pulp. Best blended RTS was selected by organoleptic test. This was conducted by a panel of eight judges and samples were rated on nine point hedonic rating scale (Amerine *et al*.,1965).

10 per cent best blending ratio was used to prepare different recipes *viz.*, 11 per cent TSS with 0.2 per cent acidity, 11 per cent TSS with 0.3 per cent acidity, 11 per cent TSS with 0.4 per cent acidity, 12 per cent TSS with 0.2 per cent acidity, 12 per cent TSS with 0.3 per cent acidity, 12 per cent TSS with 0.4 per cent acidity, 13 per cent TSS with 0.2 per cent acidity, 13 per cent TSS with 0.3 per cent acidity and 13 per cent TSS with 0.4 per cent acidity. The best recipe with best blending ratio was selected by organoleptic evaluation of panel and used to prepare final product for the study of storage stability.

Best bottled RTS was kept in storage at ambient temperature and chemical changes were determined during storage at monthly intervals. The TSS (^{0}Brix) was determined with hand refractometer. Acidity, ascorbic acid and non-enzymatic browning were determined by the procedures of Ranganna (1986). Organoleptic evaluation for assessing sensory attributes of the sample was conducted by a panel of eight judges and samples were rated on the nine point hedonic rating scale described by Amerine *et al.*(1965). The analysis of variance (ANOVA) of the data was carried out by the techniques as by Raghuramula *et al*. (1983).

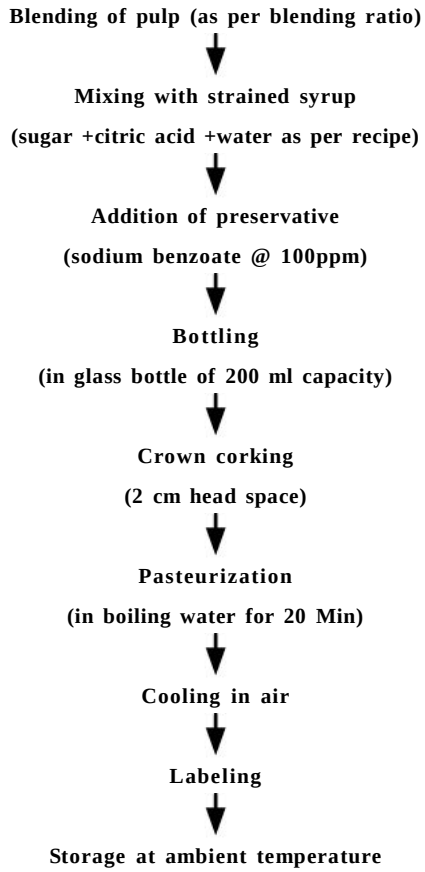


Fig. A : Flow chart for the preparation of blended RTS

EXPERIMENTAL FINDINGS AND ANALYSIS

It is apparent from data presented in Table 1 that the organoleptic quality of blending ratio of 50 guava pulp + 50 per cent barbados cherry pulp was found to be significantly superior with 8.38 score (Like very much) among all the blending ratios. This blending ratio was selected for final product. Similarly Kumar (1991) also observed that the blended RTS containing 50 per cent mango pulp and 50 per cent plum pulp and Pruthi (1978) recorded 50 per cent kinnow juice+ 50 per cent sweet orange juice secured maximum acceptability which are very close to present finding.

From the data presented in Table 2, result revealed that the organoleptic quality of recipe containing 10 per cent blended pulp, 12 per cent TSS and 0.2 per cent acidity had the acceptability score 8.38 (Like very much) recorded the best among the all recipes. Very closely reports to the present finding have also been reported by Jain and Broker (1970) in guava RTS and Beg *et al*. (2008) in mango + papaya blended RTS.

The data on chemical changes in finally prepared blended RTS during storage are presented in Table 3 and Fig 1. Result revealed that the total soluble solids did not change upto three

month of storage and then increased continuously during the storage period (Fig. 1 A). This increase in TSS content of RTS during storage might be due to conversion of polysaccharide into sugar. Similarly increase in TSS of stored RTS made from different fruits, has also been reported by several workers (Dube, 1984 in bael ; Dobhal, 2000 in phalsa; Mandal, 2003) in pineapple + phalsa blended beverage).

Total acidity (%) of product did not change up to three month of storage and then gradually increased (Fig.1 B). Pectic substance has been reported to increase the acidity of fruit products (Conn and Stumpt, 1976), hence, degradation of pectic substances into soluble solids might have contributed toward an increase in the acidity of products. The present finding is also in agreement with the observations of several authors (Dobhal, 2000; Mandal, 2003; Beg *et al*., 2008).

A marginal decrease in ascorbic acid content of RTS was observed during the entire period of storage (Fig.1 C), which might be due to its oxidation into dehydro-ascorbic acid by oxygen. This result is in accordance with reports of Asraf, (1987), Dobhal (2000) and Mandal (2003).

The browning in term of optical density (O.D) of RTS did not change upto two month of storage and thereafter, it increased continuously upto the end of storage period (Fig.1 D). It may be due to non-enzymic reactions which occur between nitrogenous compounds with sugars or organic acids and organic acids with sugars causes browning. Similar reports

Table1 : Organoleptic quality of different blending ratios of guava + barbados cherry pulp blended RTS:

Sr. No.	Blending ratio	Score	Organoleptic quality
1.	75% Guava pulp+ 25% barbados cherry pulp	7.27	Like moderately
2.	50% Guava pulp + 50% barbados cherry pulp	8.38	Like very much
3.	25% Guava pulp + 75% barbados cherry pulp	6.90	Like slightly
4.	100% Guava pulp	7.83	Like moderately
5.	100% Barbados cherry pulp	7.95	Like moderately
	C.D. @ 5%	0.29	

Table 2 : Organoleptic quality of different recipes of guava+ barbados cherry blended RTS

Sr. No.	Blended pulp (%)	TSS (%)	Acidity (%)	Score	Organoleptic quality
1.	10	11	0.2	6.72	Like slightly
2.	10	11	0.3	6.72	Like slightly
3.	10	11	0.4	6.90	Like slightly
4.	10	12	0.2	8.38	Like very much
5.	10	12	0.3	7.92	Like moderately
6.	10	12	0.4	6.54	Like slightly
7.	10	13	0.2	7.45	Like moderately
8.	10	13	0.3	6.00	Like slightly
9.	10	13	0.4	6.81	Like slightly
	C.D. @ 5%			0.42	

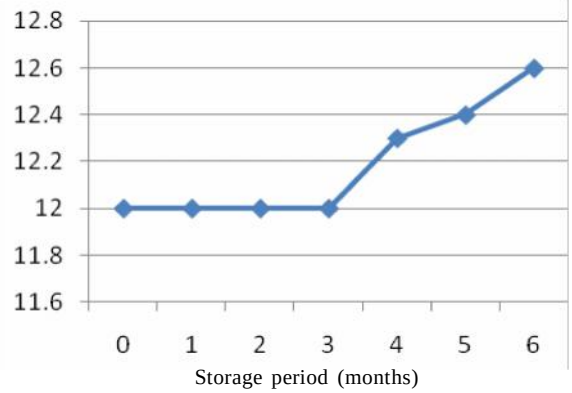
Table 3: Chemical changes in guava+ barbados cherry blended RTS during the storage at ambient temperature

Sr.No.	Storage (month)	TSS (%)	Acidity (%)	Ascorbic acid (mg/100ml)	Browning (O.D.)	Organoleptic score
1.	0	12.0	0.20	68	0.04	8.59
2.	1	12.0	0.20	65	0.04	8.59
3.	2	12.0	0.20	62	0.04	8.40
4.	3	12.0	0.20	59	0.05	8.20
5.	4	12.3	0.22	57	0.06	8.00
6.	5	12.4	0.23	55	0.07	7.80
7.	6	12.6	0.25	50	0.11	6.94
	C.D. @ 5%	NS	NS	13.4	0.03	0.81

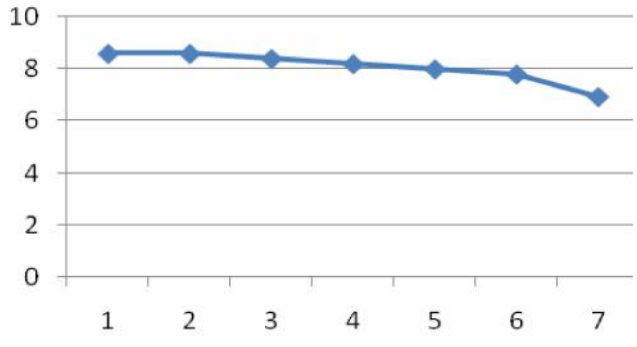
NS- Non-significant

have also been obtained in fruit RTS by other workers (Asraf, 1987; Dobhal, 2000; Mandal, 2003; Deka *et al*., 2005and Beg *et al*., 2008).

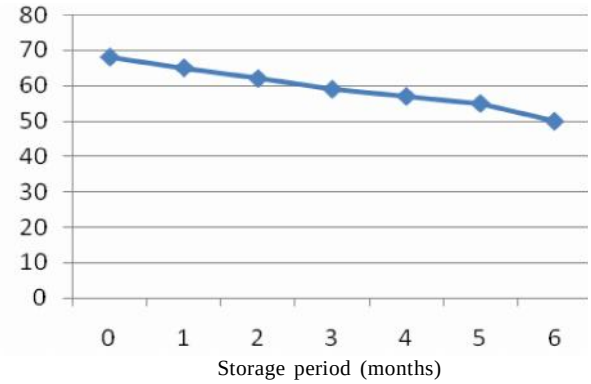
Organoleptic quality determines the storage stability of



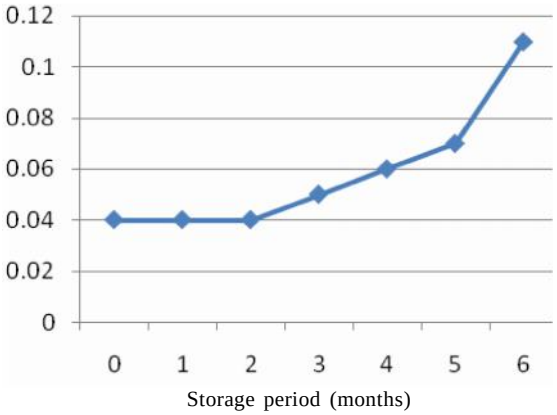
(A) TSS (%)



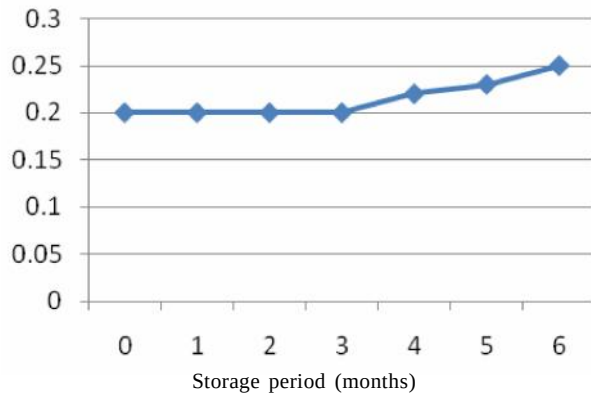
(B) Acidity (%)



(C) Ascorbic acid (mg/100ml)



(D) Browning (OD)



(E) Organoleptic score

Fig 1: Chemical changes in (A) TSS, (B) Acidity, (C) Ascorbic acid, (D) Non- enzymetic browning and (E) Organoleptic score of guava+ barbados cherry blended RTS during the storage at ambient temperature

the products. In present finding there was a gradual decrease in organoleptic score of blended RTS beverage during the storage period at room temperature (Fig.1 E). The RTS was found acceptable up to five month of storage. There are many factors, which determine the storage stability of the product. Hence, loss in organoleptic quality and storage stability of the product after certain period is obvious. Certain bio-chemical changes in the product and discoloration (browning) and thus, masking the original flavour of the product. Similar findings on reduction in organoleptic quality during storage of RTS were also reported by several workers (Asraf, 1987; Dobhal, 2000; Mandal, 2003; Deka *et al.*, 2005 and Singh *et al.*, 2007).

Conclusion :

Thus, it is concluded that a new blended RTS beverage using 10 per cent blended pulp (50% guava pulp+ 50% barbados cherry pulp) with 12 per cent TSS and 0.2 per cent acidity may be prepared for obtaining a new taste of tongue, attractive colour and pleasant flovour along with nutritional and medicinal properties. This product can be stored upto five month at ambient temperature with all over acceptability.

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