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DEVELOPMENT OF A PROCESS FOR PREPARING COMMINUTED GUAVA DRINK

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Comminuted guava drinks prepared with different bases, water and sugar: acid ratios were evaluated for physicochemical and organoleptic characteristics during storage at room temperature (11-36°). Drink prepared with the base: water and sucrose: citric acid ratios of 100:200 and 450: 7.6 was superior organoleptically (odour + taste) to all the other formulations studied. The ascorbic acid and the acid content decreased, and the total soluble solids/acid ratio increased whereas the total soluble solids remained unchanged during the storage of this drink.

Key words: Comminuted guava drink,, Ascorbic acid, Sensory scores.

INTRODUCTION

The essential principle involved in the preparation of a comminuted product is the treatment of whole fruit to produce the base for a beverage [1]. In actual practice, the whole fruit is not utilized but the comminuted base may contain some portion of each part of the fruit [2]. Inclusion of peel in comminuted base can increase the nutritive value of the drink [3,4] as the peel of the fruit is rich in many nutrients. The other main advantage of the comminution process in beverage technology is that it permits the utilization of essential oils directly from the skin for flavouring purpose instead of the extraction of the peel oils and their readdition. These essential oils emulsified in comminuted products impart stability, probably due to natural antioxidants present in the skin [5,6] and result in stabilizing aroma and flavour during storage [1].

Guava is a cheap, delicious and nutritious fruit. It is mostly in excess to local demand in the peak harvest season which results in wastage and very low market prices. Hence the development of new foods can go a long way in reducing wastage and stabilizing the price of this fruit. This project, therefore, was undertaken to develop a process for preparing a comminuted guava drink. Parameters such as base and water ratio, sugar and acid ratio were standardized and the storage stability of the product at room temperature condition was also studied.

MATERIALS AND METHODS

Fully mature good quality guava fruit of white colour variety was procured from local market, washed, and the whole fruit was cut into small pieces with a stainless steel knife. The pieces were then passed through a fruit pulper (sieve size 1.3 mm) for the extraction of the base. The yield of the base ranged from 75 to 82 %. Comminuted beverages of following composition varying in base, water, sugar and acid levels were prepared.

Base: water ratio

	Base	Water	Sugar	Acid
A	100 (19.8 %)	150 (29.7 %)	250 (49.5 %)	5 (1 %)
B	100 (16.5 %)	200 (33.0 %)	300 (49.5 %)	6 (1 %)
C	100 (14.1 %)	250 (35.4 %)	350 (49.5 %)	7 (1 %)
D	100 (12.4 %)	300 (37.1 %)	400 (49.5 %)	8 (1 %)

Sugar: acid ratio

	Base	Water	Sugar	Acid
A	100 (16.58 %)	200 (33.17 %)	300 (49.75 %)	3 (0.5 %)
B	100 (16.50 %)	200 (33.00 %)	300 (49.50 %)	6 (1.0 %)
C	100 (16.42 %)	200 (32.84 %)	300 (49.26 %)	9 (1.5 %)
D	100 (16.34 %)	200 (32.67 %)	300 (49.02 %)	12 (2.0 %)
A	100 (16.50 %)	200 (33.00 %)	300 (49.50 %)	6.0 (1 %)
B	100 (13.33 %)	200 (26.67 %)	450 (60.00 %)	7.6 (1 %)
C	100 (11.00 %)	200 (22.00 %)	600 (66.70 %)	9.0 (1 %)

The ingredients of different formulations of this drink were separately mixed thoroughly and passed through a double folded muslin cloth. Potassium metabisulphite was used as a preservative at the rate of 0.06 % (350 ppm) in all the formulations. These drinks were filled in sterilized glass bottles which were then corked, waxed and stored under ambient conditions.

Samples of different formulations of comminuted drink were analysed periodically during storage for acidity,

ascorbic acid and total soluble solids (TSS) by the standard AOAC methods [7]. The ascorbic acid contents of various samples were determined by titrating against standardized 2,6-dichlorophenol indophenol dye to pink end-point which persisted for 15 sec. Results were expressed as mg ascorbic acid per 100 ml drink. Total acidity was determined and calculated as volume in ml of 0.1 N NaOH required to titrate 100 ml of the comminuted drink to the phenolphthalein end-point and expressed as the percent citric acid or total acid. Total soluble solids (TSS) were determined in degrees Brix using refracto-meter (K. Fuji Model No. 5601). Sensory evaluation of different drinks (after dilution with water in the ratio of 1:4) was carried out for characteristics like colour, flavour by a panel of 10 judges according to the scoring method of Krum [8]. A scale of 0 to 10 was used where O represented dislike extremely and 10 like extremely. All the data were analysed statistically [9].

RESULTS AND DISCUSSION

(a) *Physicochemical characteristics.* Results regarding changes in physico-chemical characteristics of guave comminuted drink during storage are given in Table 1. There was decrease in ascorbic acid and acid contents and increase in total soluble solid/acid ratio, with insignificant change in total soluble solids of this drink during storage period of 9 months at room temperature (11-36°). In the present study, the loss of ascorbic acid in guava drink ranged from 27.7 to 41.0 % after 9 months of storage. Bender [10] reported its 20 % loss in orange squash after 12 months storage period. However, in lemon squashes, Palaniswamy and Muthukrishnan [11] found that ascorbic acid contents decreased from 5-15 to 1-6 mg/100 ml in 7 months at ambient temperatures. Verma and Sastry [12] could not find any difference in ascorbic acid retention during 24 weeks storage between citrus squash and its comminuted drink. Variations in the retention of ascorbic acid might be due to differences in type of preservatives used [13] and storage temperature [10].

Ovbiously, comminuted guava drink containing more solids had higher ascorbic acid than those prepared with more water. Ascorbic acid contents of fresh drinks with 1:1.5, 1:2.0, 1:2.5 and 1:3.0 base/ water ratios, were 29.24, 23.58, 20.75 and 17.75 mg/100 ml, respectively. The fruit content of this drink ranged from 12 to 20 %. However, its ascorbic acid contents were comparable to those of citrus squash but higher than mango squash, prepared with juice/pulp contents of 50 to 60 % or 25 to 33 %, respectively [12].

(b) *Sensory characteristics.* Results regarding the effect of base: water ratios and sugar: acid ratios on the organoleptic scores of comminuted guava drink are given in Table 2. Significantly more colour and flavour scores were obtained for 1:1.5 and 1:2 base/water ratio drinks than those prepared with 1:2.5 and 1:3.0 ratios. Overall acceptability scores after 6 months storage of this guava drink prepared with 1:1.5, 1:2.0, 1:2.5 and 1:3.0 base/ water ratios were 7.2, 7.1, 6.4 and 6.1, respectively. Base/ water ratio of 1:1.5 could not be recommended as the drink prepared with this ratio was very viscous (almost semisolid). Moreover, there was no significant differences in the organoleptic scores of drinks prepared with 1:1.5 and 1:2.0 base: water ratios.

Table 1. Changes in the physico-chemical characteristics of comminuted guava drink prepared with different base: water ratios [1].

Treatments (Base: Water)	Ascorbic acid (mg/100 ml)	Acidity (g citric acid/100 ml)	Total soluble solids (TSS, %)	TSS/acid (ratio)
		0-Month		
A (1:1.5)	29.2	1.24	49.8	40.0
B (1:2.0)	23.5	1.24	49.2	39.6
C (1:2.5)	20.7	1.20	48.6	39.2
D (1:3.0)	17.7	1.20	47.4	38.2
		3-Months		
A (1:1.5)	27.5	1.21	48.4	40.0
B (1:2.0)	20.9	1.08	49.2	45.5
C (1:2.5)	17.0	1.28	47.2	36.8
D (1:3.0)	16.7	1.15	48.6	42.2
		6-Months		
A (1:1.5)	23.3	1.02	48.4	47.6
B (1:2.0)	18.8	1.08	49.2	45.5
C (1:2.5)	14.3	1.28	47.2	45.9
D (1:3.0)	13.6	1.08	48.6	45.0
		9-Months		
A (1:1.5)	21.1	1.08	49.0	45.3
B (1:2.0	15.0	1.08	50.0	46.2
C (1:2.5)	12.2	1.03	47.6	46.3
D (1:3.0)	12.2	1.01	49.0	48.6

[1] Storage at room temperature (11-36°).

Table 2. Organoleptic characteristics of comminuted guava drink prepared with different pulp, water, sugar and acid levels [1].

Treatments		Colour score (0-10)	Flavour score (0-10)	Overall acceptability score (0-10)*
	Base: Water 2			
A	1:1.5	7.4 ±0.98	7.1 ±0.89	7.2 ±0.96
B	1:2.0	7.3 ±0.78	7.0 ±0.73	7.1 ±0.67
C	1:2.5	6.3 ±1.10	6.5 ±0.91	6.4 ±0.65
D	1:3.0	5.9 ±1.10	5.4 ±0.62	6.1 ±0.75
	Acid (%) 3			
A	0.5	6.8 ±0.87	6.6 ±0.56	6.7 ±0.61
B	1.0	6.8 ±0.59	7.2 ±0.35	7.0 ±0.60
C	1.5	6.8 ±0.61	6.6 ±0.65	6.7 ±0.62
D	2.0	6.8 ±0.57	5.6 ±0.87	6.2 ±0.64
	Sugar (%) 4			
A	50	6.6 ±0.43	6.5 ±0.43	6.3 ±0.43
B	60	6.8 ±0.37	7.2 ±0.41	7.0 b 0.42
C	68	6.4 ±0.57	6.2 ±0.53	6.2 ±0.56

[1] After storage for 6 months at room temperature (11-36°). All the values are average of 10 judgements.

* 0 = Extremely Disliked
10 = Extremely Liked

2. Sucrose and citric acid levels of 50 and 1 % respectively.
3. Base Water ratio of 1.2 and 50 % sucrose.
4. Base Water ratio of 1.2 and 1 % citric acid.

Chemical preservatives inhibit spoilage in various types of drinks. Sugar and acid concentrations in a drink are important as they influence the affectiveness [15], formation of addition products [16-20] and degradation [21-22] of the preservatives. Moreover, an optimum sugar/acid balance is required to develop an acceptable taste of the drink. In the present study, different sugar/acid levels had no significant effect on the colour scores of guava drink (Table 2). However, maximum flavour (odour + taste) scores were given to drink prepared with 60 % sugar and 1 % citric acid. Hence, the addition of sucrose and citric acid at the level of 60 % and 1 %, respectively developed optimum odour and taste in this comminuted drink. It has been concluded from these results that base: water: sucrose: citric acid ratio of 100: 200:450:7.6 is optimum for preparing a comminuted guava drink.

REFERENCES

1. V.L.S. Charley, Fd. Technol., **17**, 987 (1963).
2. Anony., Fd. Eng., **35**, 40 (1963).
3. J.B.S. Braverman and A. Levi, Fd. Technol., **14**, 106 (1960).
4. D.J. Casimir and B.V. Chandler, CSIRO Fd. Preserv. Quart., **30**, 28 (1970).
5. W.F. Newhall and S.V. Ting, J. Agr. Fd. Chem., **13**, 281 (1965).
6. S.V. Ting and W.F. Newhall, J. Fd. Sci., **30**, 56 (1965).
7. *A.O.A.C. Official Methods of Analysis,* (Bejamin Franklin Station, Washington, D.C., 1975), 12th ed.
8. J.K. Krum, Fd. Eng., **27**, 74 (1955).
9. R.G.D. Steel and J.H., Torrie, *Principles and Procedures of Statistics,* (MaGraw Hill Book Co., New York, 1980).
10. A.E. Bender, J. Sci. Fd. Agr., **9**, 754 (1958).
11. K.P. Palaniswamy and C.R. Muhukrishnan, Indian Fd. Packer, **28**, 37 (1974).
12. A.K. Verma and L.V.V. Sastry, Indian Fd. Packer, **23**, 5 (1969).
13. C.M. Martin, Fd. Technol. Aust., **13**, 363 (1961).
14. M.A. Chaudhry, M. Ahmad and I. Khan, Ann. Rep. (1983-84) Nucl. Inst. Fd. Agr. (NIFA), Peshawar, (1984), pp. 55.
15. J.F. Kefford and B.V. Chandler, In *Citrus Science and Technology*, E. Nagy, P.E. Shaw, M.K. Veldhuis, ed. (The AVI Publishing Company, INC, Westport, Connecticut, **2**, 346 (1977).
16. K. Vas, J. Soc. Chem. Ind., London, **68**, 340 (1949).
17. M. Ingram and K. Vas., J. Sci. Fd. Agr., **1**, 21 (1950).
18. M. Ingram and K. Vas, J. Sci. Fd Agr., **2**, 63 (1950).
19. H. Gehman and E.M. Osman, Fd. Res., **5**, 53 (1954).
20. L.F. Green, Fd. Chem., **1**, 103 (1976).
21. S.S. Arya, J. Agr. Fd. Chem., **28**, 1246 (1980).
22. K. Vidyasagar and S.S. Arya, J. Agr. Fd. Chem., **31**, 1262 (1983).