International Journal of Food, Agriculture and Veterinary Sciences ISSN: 2277-209X (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jfav.htm
2014 Vol. 4 (3) September-December, pp. 15-20/Bhagwan and Awadhesh
Research Article

DEVELOPMENT AND STORAGE OF MANGO GINGER RTS BEVERAGE

***Deen Bhagwan and Kumar Awadhesh**
Department of Horticulture, N.D. University of Agriculture and Technology, Kumarganj, Faizabad-224229, UP, India
**Author for Correspondence*

ABSTRACT
The incorporation of sensory, nutritional and medicinal properties of two or more plant species into beverage is possible by blending technology of beverage processing. The mango is rich in carbohydrates and carotenoides while ginger is rich in the medicinal and antioxidant properties. Mango pulp and ginger juice were used in the preparation of ready-to- serve beverage and evaluated for its best combination. The RTS prepared from best combination was investigated for its storability. The study revealed that palatable RTS beverage of 13 per cent TSS and 0.25 per cent acidity could be prepared using 12 per cent of blend comprising mango pulp and ginger juice in 9:1 ratio. The TSS, acidity, reducing sugars and total sugars content increased whereas ascorbic acid and non-reducing sugar content decreased when beverage was stored into glass bottles at ambient temperature. The beverage could be stored for 4 months with acceptable sensory quality.

Keywords: *RTS, Blend Beverage, Mango, Ginger*

INTRODUCTION
The blending technology has become an important tool in modern fruit beverage processing in the developing of new beverages of superior quality having sensory, nutritional and medicinal properties of two or more plant species. The attractive appearance, appealing flavour, nutrients retention, medicinal values and other organoleptic qualities are the main consideration in standardization of different ratios of blend components which meets the consumers preference and improves the marketability of the new blended products. The ready to serve (RTS) beverages are very popular among consumers of all age groups because of its easiness to carry and consume.
The mango (*Mangifera indica* L.) is cultivated in tropical and subtropical parts of the world and the fruit is rich source of carbohydrates and carotenoids. The both ripe and unripe mangoes are used extensively in food processing industry to prepare a wide variety of products like syrup, squash, juice, RTS, pickles, chutney, slices, amchur, candy, jam, jelly and preserve. Ginger (*Zingiber officinale* Rosc.) a perennial herb is popular as cooking ingredient throughout the world. It is a potent antioxidant and is of medicinal uses (Parthasarathy *et al*., 2008). The fresh ginger is widely used in pickles and candies making whereas fresh ginger juice is used in beverage preparation. The ginger powder, oleoresin, essence, soft drink, non-alcoholic beverages and ginger oil are manufactured from dry ginger. This investigation has been conducted to develop new RTS beverage rich in the medicinal and nutritional properties of both mango and ginger.

MATERIALS AND METHODS
Preparation of Mango Pulp
The fresh fully ripe mangoes of cv. Amrapali were procured from local market and thoroughly washed with water. The fruits were peeled, de-stoned and passed through pulper to get the pulp (Figure 1).
Extraction of Ginger Juice
The fresh ginger rhizomes available in the local market were peeled, washed with water and grated manually.
To one part of ginger two parts water was added and material was mixed in to mixer cum grinder. The juice was extracted by straining the material through cheese cloth (Figure 2).

Production of RTS Beverages

The two different blends of mango pulp and ginger juice in 9:1 (B_1) and 8:2 (B_2) ratios were prepared and analyzed for TSS and acidity content. The 10 and 12 per cent of each blend were incorporated with precalculated quantity of water, sugar and citric acid to maintain 13 per cent TSS and 0.25 per cent acidity in all four types of beverages and organoleptically evaluated to find out the best combination of mango and ginger blend for palatable beverages. The production process flow sheet is shown in Fig.-3. The best blend was used to prepare the beverage of similar TSS and acidity for storage studies.

Proximate Analysis

The fresh mango pulp and ginger juice were analyzed for total soluble solids (TSS), acidity and vitamin-C content. The beverage, stored at ambient temperature, was analyzed at 30 days intervals. The TSS was recorded by hand refractometer model ERMA at room temperature and corrected at 20^0C with the help of reference table (Ranganna, 2010) and the samples were titrated against 0.1 N NaOH using phenolphthalein as an indicator to get acidity content. The ascorbic acid content was determined by preparing samples in 3 per cent metaphasphoric acid (HPO_3) solution and titrating against 2, 6 dichlorophenol- indophenol dye solution to the end point (AOAC, 2012). The Fehling's solution 'A' and 'B' (Lane and Eynon, 1923) were used to analyze the sugars following the method of (Ranganna, 2010). A panel of 7 semi trained judges scored the beverage samples on a 9- Point Hedonic scale (Amerine *et al*., 1965) for organoleptic quality and over all acceptability of beverage.

Statistical Analysis

The data recorded on different parameters were statistically analyzed using Completely Randomized Design and critical differences (CD) were calculated at 5 % level of significance to compare the treatments effects (Gomez and Gomez, 1984).

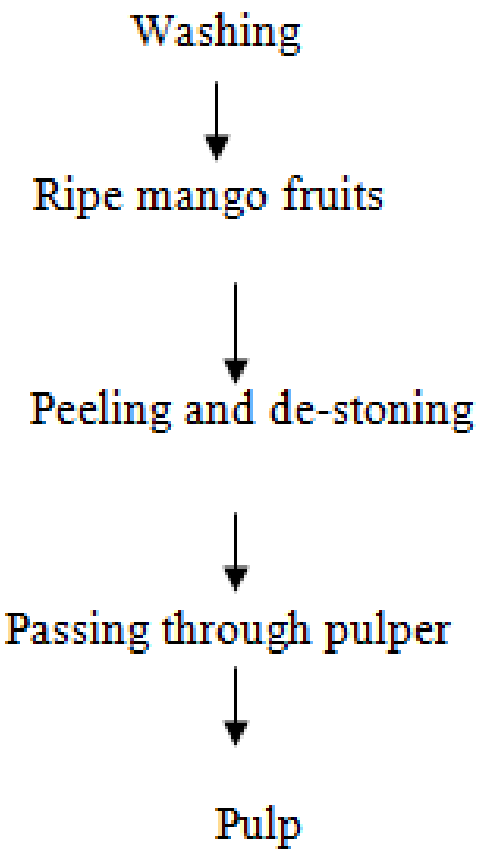

Figure 1: Flow sheet for extraction of pulp from ripe mango fruits

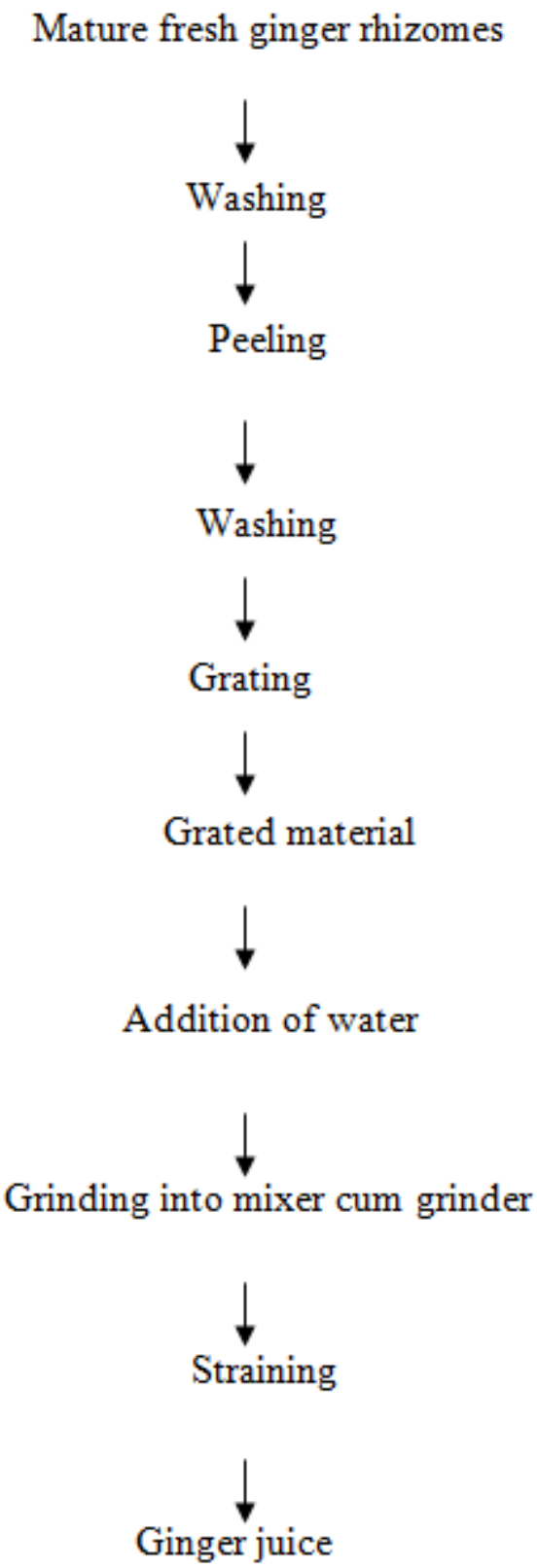

Figure 2: Flow sheet for extraction of juice from fresh ginger rhizomes

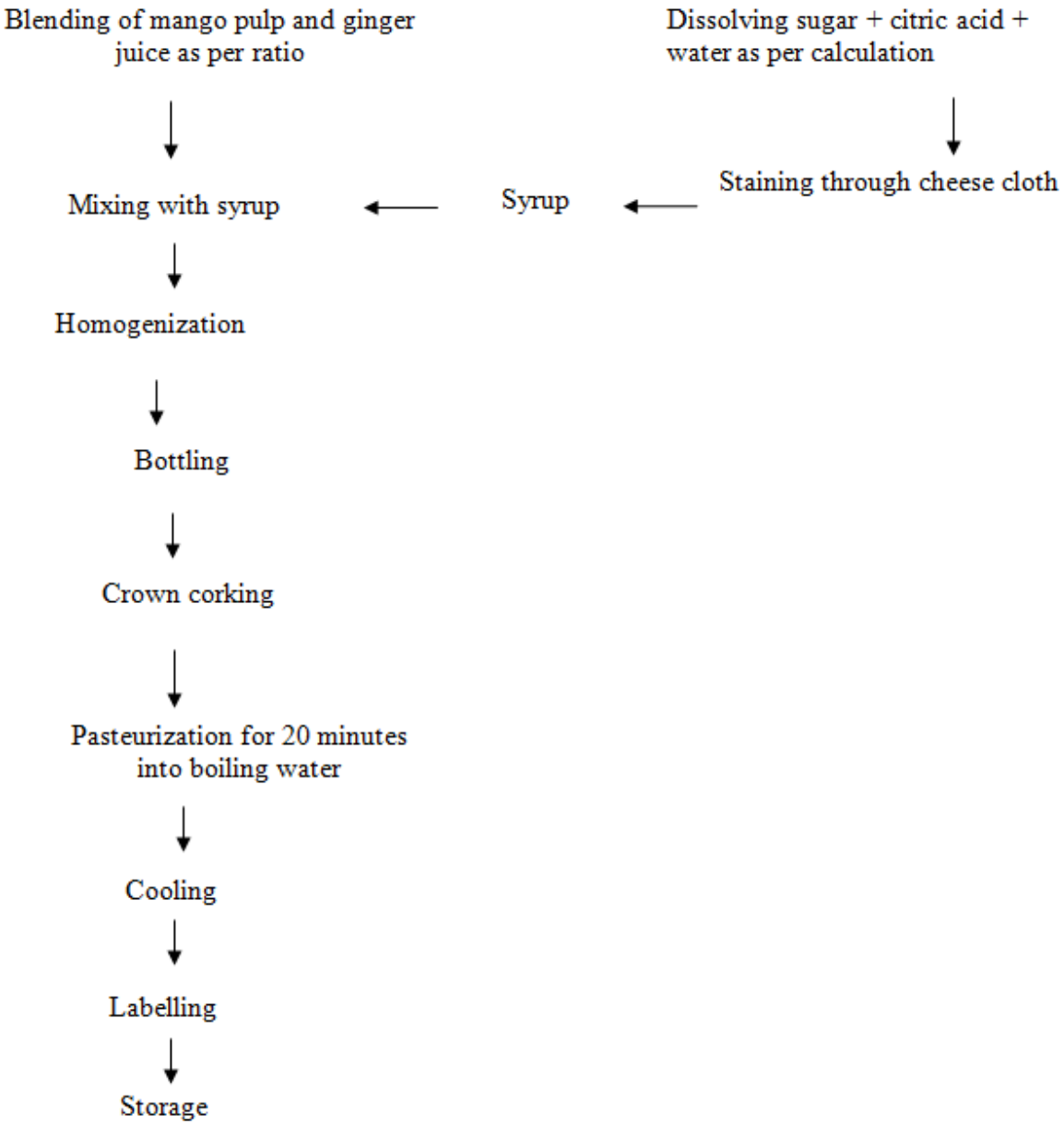

Figure 3: Flow sheet for preparation of mango- ginger blended RTS

RESULTS AND DISCUSSION

The data in table 1 reveals that mango pulp used in beverage development was containing 21.80 per cent TSS, 0.29 per cent acidity and 15.80 mg/100 g pulp vitamin-C whereas ginger juice was containing 1.80 per cent TSS, 0.08 per cent acidity and 1.90 mg/100 ml vitamin-C.

The RTS beverages of different blend constituents are prepared and data on its organoleptic quality are presented in table 2. The blend quantity used in RTS beverage preparation and the ratio of mango and ginger in the blend both influenced the overall acceptability of the beverage. The beverage prepared from 12 per cent of blend B_1 consisting 90 per cent mango pulp and 10 per cent ginger juice was found to be the best followed by 12 per cent of blend B_2 consisting 80 per cent mango pulp and 20 per cent ginger juice.

The observations on changes during storage of beverage are presented in table 3. The TSS, acidity, reducing sugars and total sugars content increased with storage period whereas vitamin-C and non-reducing sugar content showed decreasing trend. The changes were significant except in TSS content. The conversion of polysaccharides into sugar might be the reason of an increase in TSS while it was reported that pectic substances increased the acidity of fruit products (Conn and Stumf, 1976). The findings are in consonance with the earlier studies reported in bael and guava blended RTS (Nidhi *et al*., 2008) and in karonda squash (Deen and Singh, 2012). The increase in total sugars and reducing sugars corresponded with decreasing non-reducing sugar content could be as a result of inversion of non-reducing sugar into reducing sugars. Similar observations on changes in sugars content were reported in blended RTS of phalsa and pineapple (Mandal, 2003) and karonda squash (Deen and Singh, 2012). The decline in vitamin-C content was due to oxidation of vitamin-C and light effect on it.

Table 1: Chemical characteristics of mango pulp and ginger juice

Parameters	Mango pulp	Ginger juice
TSS (%)	21.80	1.80
Acidity (%)	0.29	0.08
Vitamin-C (mg/100ml)	15.80	1.90

Table 2: The organoleptic quality of prepared beverages

Blend	Mango pulp : ginger juice ratio in blend	Blend incorporated in beverage (in per cent)	Organoleptic quality (in score)
B_1	9:1	10	7.28
B_1	9:1	12	8.43
B_2	8:2	10	7.35
B_2	8:2	12	8.25
SEm±			0.05
CD at 5%			0.17

Table 3: Changes during storage of RTS beverage

Storage period (in months)	TSS (%)	Acidity (%)	Vitamin-C (mg/100ml)	Reducing sugars (%)	Non-reducing sugar (%)	Total sugars (%)	Organoleptic quality	
							Score	Rating
0	13.00	0.25	4.18	2.73	8.12	10.85	8.43	Like very much
1	13.07	0.28	3.86	3.15	7.87	11.02	8.15	Like very much
2	13.27	0.29	3.57	3.85	7.60	11.45	7.61	Like very much
3	13.60	0.30	3.23	4.85	7.13	11.98	7.41	Like moderately
4	13.87	0.31	2.93	5.93	6.62	12.55	7.20	Like moderately
SEm±	0.18	0.01	0.04	0.02	0.04	0.04	0.01	-
CD at 5%	0.56	0.02	0.11	0.07	0.12	0.03	0.02	-

The data on organoleptic quality of the beverage evaluated on 9-point Hedonic scale (table 3), showed that beverage was acceptable up to 4 months of storage under ambient conditions however degree of

acceptability decreased with storage period which might be due to undesirable changes occurred into product during storage.

REFERENCES

Amerine MA, Pangborn RM and Roessler EB (1965). *Principles of Sensory Evaluation of Food* (Academic Press) London.

AOAC (2012). *Official Methods of Analysis of AOAC International*, 19th edition, *AOAC International*, Gaithersburg, MD, USA. SMPR 1968.967.21

Conn EE and Stumf PK (1976). *Outlines of Biochemistry* (Wiley Eastern Ltd.) New Delhi.

Deen B and Singh IS (2012). Development of karonda (*Carissa carandas* L.) squash. *Beverage and Food World* **39**(2) 37-39.

Gomez KA and Gomez AA (1984). *Statistical Procedures for Agricultural Research*, 2nd edition (John Wiley & Sons, INC) New York.

Lane JH and Eynon L (1923). Determination of reducing sugars by Fehling Solution with Methylene blue as an indicator. *Journal of the Society of Chemical Industry London* **42** 37-7.

Mandal P (2003). Studies on preparation and preservation of blended beverages from pineapple (*Ananas comosus* L.) and phalsa (*Grewia subinaequalis* D.C.). Thesis (M. Sc. Ag. in Horticulture). N. D. University of Agriculture & Technology, Faizabad (U.P.) India.

Nidhi, Gehlot R, Singh R and Rana MK (2008). Changes in chemical composition of ready-to-serve of bael-guava blended beverage during storage. *Journal of Food Science and Technology* **45**(4) 378-380.

Parthasarathy VA, Shiva KN and Kumar A (2008). Ginger. In: *Spice Crops*, edited by Parthasarathy VA, Bhat AL and Parthasarathy U (Today and Tomorrow's Printers and Publishers) New Delhi **I** 265-385.

Ranganna S (2010). *Handbook of Analysis and Quality Control for Fruit and Vegetable Products* (Tata McGraw-Hill Education Pvt. Ltd.), New Delhi.