Development of Blend beverages from Guava (*Psidium guajava* L.), Strawberry (*Fragaria ananassa*Duch.) and Ginger (*Zingiberofficinale* Roscoe)

ABSTRACT

The present investigationwas carried out at Post Graduate Laboratory, Department of Post HarvestManagement, College of Horticulture & Forestry, Acharya Narendra Deva University of Agriculture andTechnology, Kumarganj, Ayodhya-224229, U.P. India during 2023.The results show that,palatable RTS blend beverages can be developed from 10% blend comprising 50 % guava pulp + 25 % strawberry pulp + 25 % ginger juice adjusted to 13% Total soluble solids, 0.30% acidity and incorporated with 120 ppm Benzoic Acid. During the storage period TSS, acidity, reducing sugars and total sugars increased whereas, ascorbic acid (vitamin-C), non-reducing sugar and organoleptic quality decreased with the advancement of storage period.The developed RTS can be stored for 3 months with acceptable quality at room temperature.

Keywords: RTS, Guava, Strawberry, Ginger, Beverage.

Introduction

A beverage is a liquid intended for human consumption. Beverages are an essential component of the human diet and serve the basic purpose of quenching thirst, but they also have a significant cultural impact. Beverages have a variety of unique medical and health advantages, such as enhancing digestion and immunity, promoting heart health, and boosting energy.Ready-To-Serve is a non-fermented drink made by dissolving sugar and the edible portion of the fruit in water. “The extraction of juice from fruits differs depending on the structure and composition of fruits”. (Shah and Nath, 2006)

Guava (*Psidium guajava* L.), which is native to Tropical America and belong to the Myrtaceae family, is successfully cultivated across India's tropical and subtropical areas.The fruit consists of 20% peel, 50% flesh and seed core (Wilson 1980).Guava is a fair source of ascorbic acid (299 mg/100 g) and pectin (1.15%) and contains 74–84% moisture, 13-26% dry matter, 0.8–1.5% protein, 0.4-0.7% fat, and 0.5–1.0% ash. The fruit contains a sizable amount of vitamins including niacin, thiamine, riboflavin, and vitamin A and minerals like phosphorus (23-37 mg/100 g), calcium (14-30 mg/100 g), iron (0.6-1.4 mg/100 g), and more (Bal *et al.,* 2014).The primary sugars in green mature fruits and completely mature fruits, are fructose (about 59%) and sucrose, respectively (Poonam *et al.*, 2022).

Strawberry (*Fragaria ananassa*Duch.), is a fruit crop which can be successfully cultivated from subtropical to temperate climate. It is part of the Rosaceae family and a good source of fructose, glucose, sucrose, and organic acids, iron, phosphorus, anthocyanin, vitamin C, and other minerals."Attribute of strawberry fruits depends mainly on their appearance, firmness, and chemical composition" (Gunness*et al.,* 2009).The whole strawberry fruit has an energy value of 37 Kcal/100 gram and comprises 89.9% moisture, 0.7% protein, 0.5% fat, 5% total carbohydrates, and 1.3% crude fibre. It includes 0.5% of total minerals and ranges in acidity from 0.52 to 2.26 % citric acid (Chavan 2015).A fruit sold commercially with an abundance of processing potentialand are usedto make purees, preserves, juice, pureed squash, jams, jelly and alcoholic beverages (Sharma *et al.,* 2009).

Ginger (*Zingiberofficinale* Roscoe) is a herbaceous aromatic perennial plant member of the family Zingiberaceae. Which possesses medicinal properties and has anti-inflammatory, antioxidant, and bioactive chemical qualities that make it useful in medicine. "Nutrient composition like protein (2.3%), fat (0.9%), carbohydrates (12.3%), mineral (1.2%), fiber (2.4%) and moisture (80.9%) are the key ingredients in fresh ginger".[23]The main components that give ginger its pungency and scent are gingerols and shoagaols. Zingiberol, zingiberene, pheallndrene, and linalool are other significant components (Hariharan and Mahendran, 2016). The bioactive components of ginger, give it therapeutic benefits (Sanwal*et al.,* 2010). Effective anti- oxidants found in ginger, including gingerols, zingerone, and keep vitamin C, may have the capacity to thin the blood and keep minimum cholesterol levels, which can make it helpful for treating heart disease (Fahlberg, 1969).

"The blend beverages can be made from combination of different fruits and medicinal plants with therapeutic, nutritional, and medical benefits and acceptable flavour" (Males *et al.,* 2022). The development of beverages using combinations of guava, strawberry and ginger would offer options for the optimum utilization of these raw ingredients while also making palatable drinks with therapeutic benefits available to customers. The market is seeing a rise in demand for natural beverages over synthetic ones because consumers are more aware of health and attentive to their fitness. The present investigation, therefore, conducted to develop blend beverages carrying the quality of guava, strawberry and ginger.

Materials and Methods

Raw materialsused for beverages preparation

Raw materials for blend RTS made from guava, strawberry, and ginger, were purchased from different places. Guava (Local variety) purchased from local market Kumarganj, Strawberry purchased from sabjee mandi at Ayodhya district headquarter and ginger (Local Variety) purchased from local market Kumarganj.

Extraction of guava pulp, strawberry pulp and ginger juice:

The methods which are used for the extraction of guava pulp, strawberry pulp and ginger juice are shown in Fig.-1, Fig.-2, and Fig.-3, respectively.

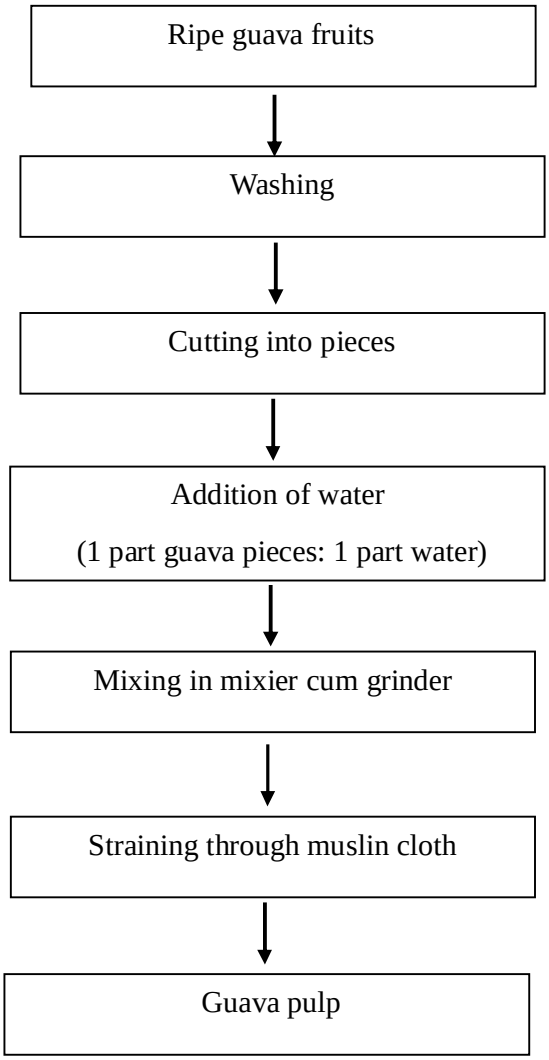
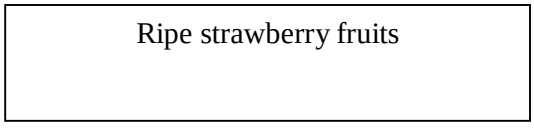


Fig.-1: Flow chart of pulp extraction from guava fruits



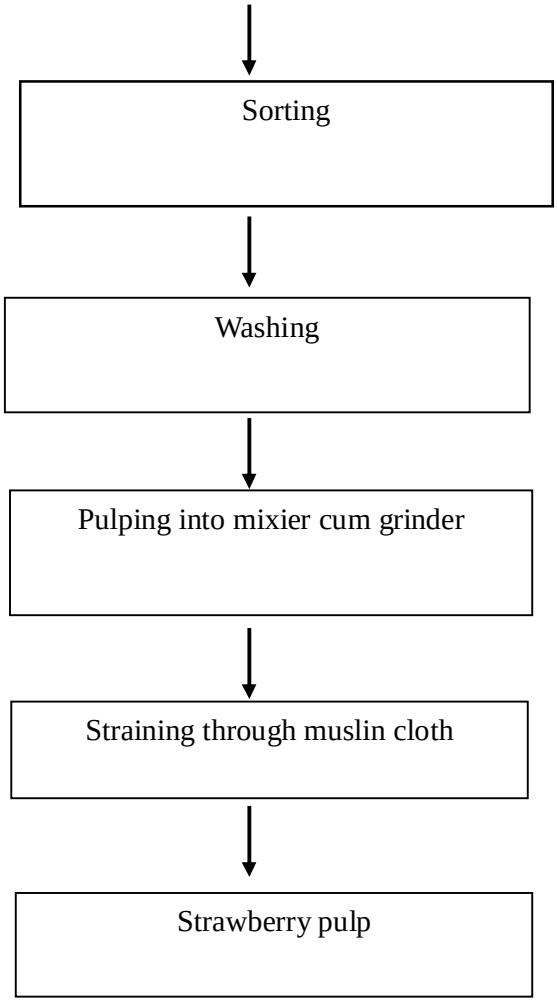


Fig.-2: Flow chart of pulp extraction from strawberry fruits

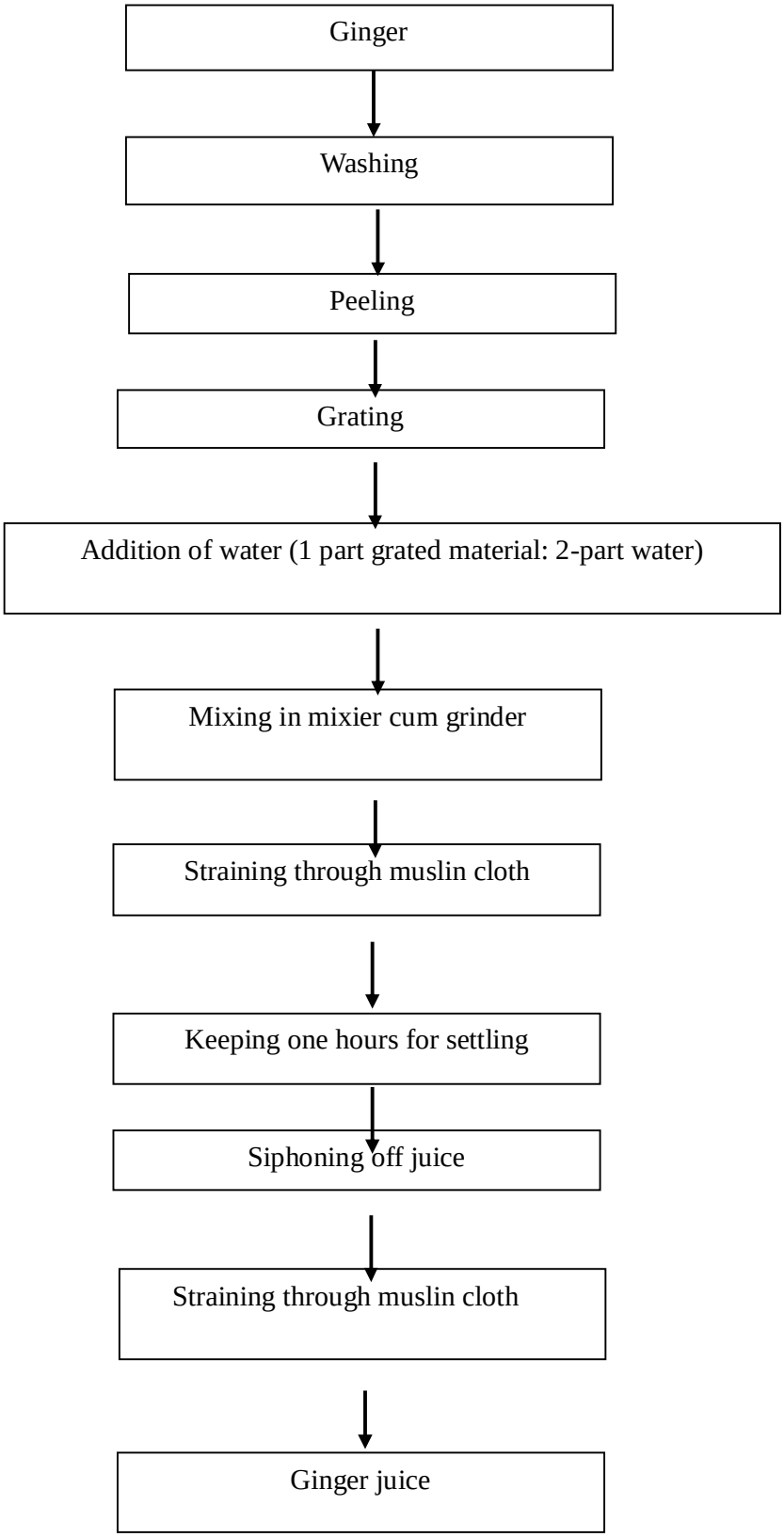

Ginger
Washing
Peeling
Grating
Addition of water (1 part grated material: 2-part water)
Mixing in mixier cum grinder
Straining through muslin cloth
Keeping one hours for settling
Siphoning off juice
Straining through muslin cloth
Ginger juice

Fig.-3: Flow chart of ginger juice extract

Standardization of blends for RTS

The RTS was prepared from following each combination (Treatment) of guava pulp, strawberry pulp, and ginger juice to obtain best combination for palatable RTS beverage:

T_1 - 10 % blend comprising 100 % Guava pulp + 0 % strawberry pulp + 0 % ginger juice with 13 % TSS, 0.3% acidity and 120ppm Benzoic Acid.

T_2 - 10 % blend comprising 0 % Guava pulp + 100 % strawberry pulp + 0 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T_3 - 10 % blend comprising 0 % Guava pulp + 0 % strawberry pulp + 100 % ginger juice with 13% TSS, 0.3% acidity and 120ppm Benzoic Acid.

T_4 - 10 % blend comprising 33.33 % Guava pulp + 33.33 % strawberry pulp + 33.33% ginger juice with 13% TSS,0.3 % acidity and 120ppm Benzoic Acid.

T_5 - 10 % blend comprising 40 % Guava pulp + 30 % strawberry pulp + 30 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T_6 - 10 % blend comprising 50 % Guava pulp + 25 % strawberry pulp + 25 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T7 - 10 % blend comprising 60 % Guava pulp + 20 % strawberry pulp + 20 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T_8 - 10 % blend comprising 70 % Guava pulp + 15 % strawberry pulp + 15 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T_9 - 10 % blend comprising 80 % Guava pulp + 10 % strawberry pulp + 10 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid.

T_{10} - 10 % blend comprising 90 % Guava pulp + 05 % strawberry pulp + 05 % ginger juice with 13 % TSS, 0.3 % acidity and 120ppm Benzoic Acid

Preparation of RTS

The RTS prepared from each combination and were organoleptically evaluated on 9-point Hedonic scale to find out the best combination of blend for large scale preparation.The technique used for RTS making is shown in Fig-4.

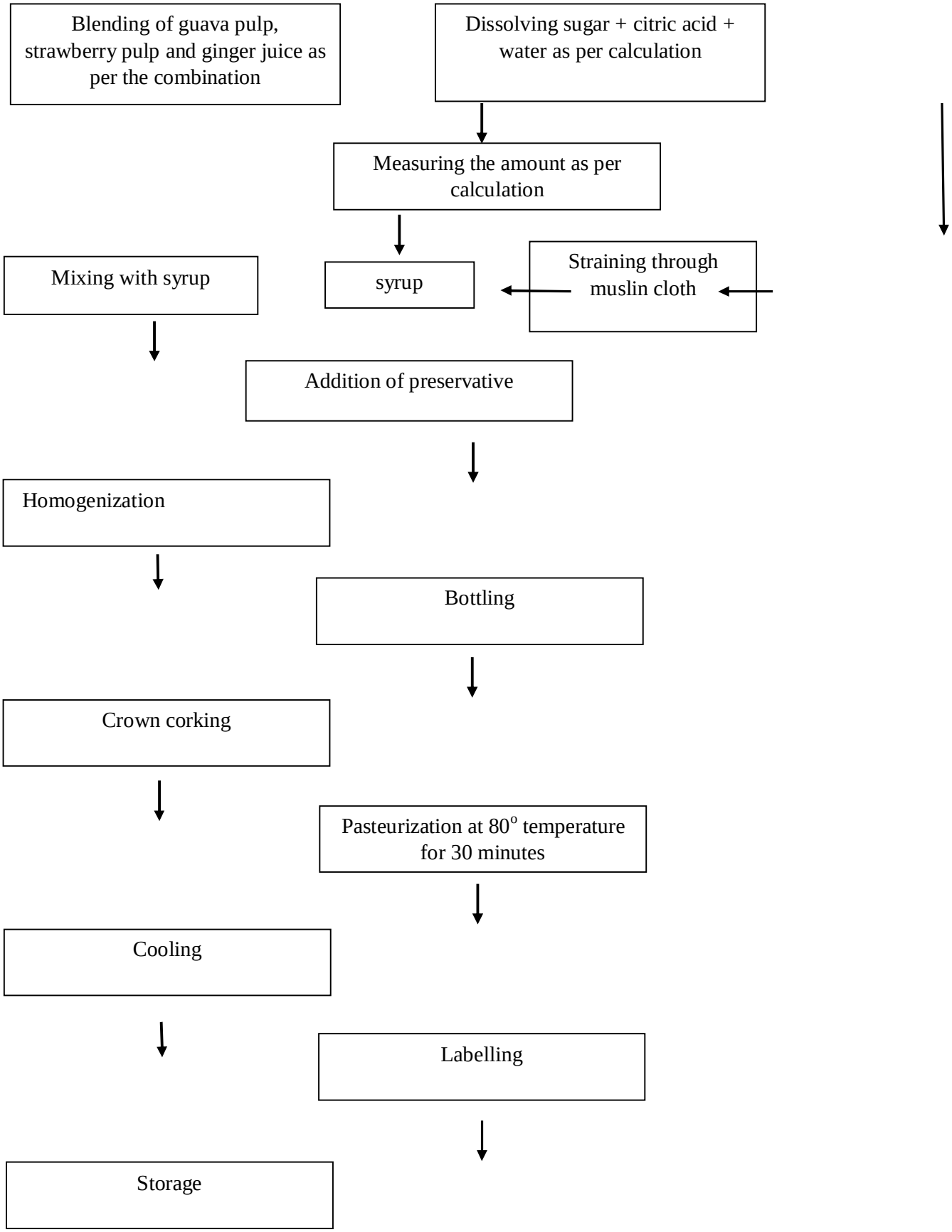

Blending of guava pulp, strawberry pulp and ginger juice as per the combination
Dissolving sugar + citric acid + water as per calculation
Measuring the amount as per calculation
Straining through muslin cloth
syrup
Mixing with syrup
Addition of preservative
Homogenization
Bottling
Crown corking
Pasteurization at 80° temperature for 30 minutes
Cooling
Labelling
Storage

Fig.-4: Flow chart of guava, strawberry, and ginger blend RTS preparation.

Methods of Storage Studies

The best combination was used to prepare 10 liters of RTS drink, which were then filled into 200 mL capacity bottles with 2.5 cm headspace, and sealed with a crown cap and put for storage.During storage observation on changes in TSS, acidity, ascorbic acid (vitamin C), reducing sugars, non-reducing sugar, total sugars, and organoleptic quality were recorded at monthly intervals till the product was fit for consumption.

"The TSS of the sample was determined by using hand refractometer (Erma Inc. Tokyo Japan, 0-32% and 28-62%) and the TSS recorded at ambient temperature were corrected to 20^{o} C with the help of reference table and the mean value of the sample was expressed as per cent TSS content (Ranganna, 2010). The acidity was estimated by titrating known quantity of sample against standard N/10 NaOH solution using 2-3 drops of phenolphthalein indicator and expressed in per cent anhydrous citric acid. Ascorbic acid (vitamin-C) content was determined by preparing sample in 3% HPO_3 (metaphosphoric Acid) solution then titrated against 2, 6-dichlorophenol indophenol dye solution till the appearance of light pink colour (Ranganna, 2010). The reducing, non-reducing and total sugars were estimated by using Fehling's solution A and B and methyl blue as an indicator in boiling stage" (Ranganna, 2010). "For the evaluation of organoleptic quality of RTS a semi trained panel of 9 judges was conducted organoleptic test who scored on the 9.0point Hedonic Rating Scale to assess the colour, flavour and texture of the beverages"(Amerine*et al.*,1965).

Statistical Analysis

The experiments were conducted in 3 replications and the observations were recorded at monthly intervals. The statistical analysis of the data was done by computer software in completely randomized design (CRD) that described by Panse and Sukhatme (1985).

Results and Discussion

Chemical attributes of guava pulp, strawberry pulp and ginger juice:

The data recorded on the chemical attributes of guava pulp, strawberry pulp and ginger juice are presented in Table 1**.** The Total Soluble Solids of guava pulp, strawberry pulp and ginger juice were recorded 11.02 percent, 7.02 percent and 2.18 percent, respectively. The acidity of

guava pulp, strawberry pulp and ginger juice were recorded 0.52 percent, 1.26 percent, and 0.32 percent, respectively. The vitamin C content of guava pulp, strawberry pulp and ginger juice were recorded 189.5 mg/100g, 57.20 mg/100g, and 1.94 mg/100g, respectively. The reducing, non-reducing and total sugars content in guava pulp were recorded 3.38 percent, 1.97 percent, and 5.35 percent, respectively. Whereas strawberry pulp contained 3.14 percent reducing sugars, 2.65 percent non-reducing sugar and 5.79 percent total sugar and ginger juice contained 0.62 percent reducing sugars, 1.16 percent non-reducing sugar and 1.78 percent total sugars. Overall guava pulp contains a higher amount of vitamin C and TSS,whereas strawberry pulp contains a higher amount of acidity and sugars. The quality and chemical attributes of raw materialsinfluencesthe sensory attributes of processed products.

S. No.	Chemical attributes	Mean values		
		Guava pulp	Strawberry pulp	Ginger Juice
1	Total soluble solids (%)	11.02	7.02	2.18
2	Acidity (%)	0.52	1.26	0.32
3	Vitamin-C (mg/100 g)	189.5	57.20	1.94
4	Reducing sugars (%)	3.38	3.14	0.62
5	Non-reducing sugar (%)	1.97	2.65	1.16
6	Total sugars (%)	5.35	5.79	1.78

Table 1: Chemical attributes of raw materials

Standardization of the blends:

The RTS was prepared using various combinations (treatments) of guava pulp, strawberry pulp, and ginger juice blends. The data recorded on the organoleptic quality of RTS prepared from different combination are furnished in Table-2. Results show that the treatment no. 06 comprising 50 % guava pulp + 25 % strawberry pulp + 25 % ginger juice was found to be best over other treatments for development of palatable quality RTS blend beverage and the organoleptic score secured significantly varied with other treatments. Therefore 10% blend comprising 50 % guava pulp + 25 % strawberry pulp + 25 % ginger juice adjusted to 13%

Total soluble solids, 0.30% acidity and incorporated with 120 ppm Benzoic Acid used to develop quality palatable RTS beverage for storage study.

Changes during storage of RTS

“Data recorded onchanges in RTS during storage is tabulated in Table3, which observes that TSS of RTS increased from 13.00% to13.51%. An increase in TSS content in RTS, product prepared from guava, strawberry and ginger blend might be due to the conversion or hydrolysis of polysaccharides into simple sugars. Similar results that an increase in total soluble solids (TSS) content during storage of products were reported in sweet orange RTS” (Bharati *et al.*, 2023), in strawberry ginger and aloe vera RTS (Shagiwal and Deen, 2022), in mango, kagzi lime, aloe vera and ginger based blended RTS(Harendra and Deen, 2021)and in aloe vera, ginger, sweet lime and amla RTS drinks (Mishra and Sangma, 2017). These reports are in support of findings achange in TSS during storage of RTS in present investigation. Acidity content in RTS increased from 0.30% to 0.83%. An increase in the acidity content might be due to degradation of pectic substances and formation of organic acid. Similar results that an increase in acidity content during storage of products were reported by Kumar *et al.* (2024) in RTS,Shagiwal and Deen (2022) in RTS from strawberry, ginger and aloe vera, Harendra and Deen (2021) in mango, kagzi lime, aloe vera and ginger based blended RTS and Khalid *et al*. (2019) in strawberry and dates blend ready to serve drink.Vitamin-C content of RTS prepared from guava, strawberry and ginger blends gradually decreased up to the end of storageand content was found to be significantly reduced from 10.76 mg/100ml to 9.84 mg/100ml. “The depletion in ascorbic acid (vitamin- C) content might be due to oxidation of ascorbic acid into dehydro-ascorbic acid by oxygen (O_2) trapped into containers and intramolecular space of the product. The present results on changes in vitamin-C content during storage of beverage” are also supported by the findings of Bharati*et al.* (2023) in sweet orange and guava RTS, Shagiwal and Deen (2022) in strawberry, ginger and aloe vera andHarendra and Deen (2021) in mango, kagzi lime, aloe vera and ginger based blended RTS. The reducing sugars content of RTS increased continuously from 0.90% to 1.47%. The increase in reducing sugars of products might be due to conversion of non-reducing sugar into reducing sugars. The published works of Kumar*et al*. (2024) in RTS, Bharati *et al.* (2023) in sweet orange and guava RTS, Shagiwal and Deen (2022) in strawberry, ginger and aloe vera and Harendra and Deen (2021) in mango, kagzi lime, aloe vera and ginger based blended RTS are also in support of present results. The non-reducing sugar content of RTS showed gradual decreasing from 12.22% to 11.90%.The reduction in non-reducing sugar

might be due to conversion of non-reducing sugar. The results are similar with the prior results of Shagiwal and Deen (2022) in strawberry, ginger and aloe vera, Harendra and Deen (2021) in mango, citrus, aloe vera and ginger RTS, Khalid *et al.* (2019) in strawberry and dates blended RTS and Mehta *et al.* (2018) inRTS. The total sugars content of RTS increased gradually from 13.09% to 13.37%. A rise in total sugars of product might be due to inversion of non-reducing sugar into reducing sugars. The trend is similar to findings of different fruits-based beverages Kumar *et al.* (2024) in RTS, Bharati *et al*. (2023) in sweet orange and guava RTS, Shagiwal and Deen (2022) in strawberry, ginger and aloe vera, Harendra and Deen (2021) in mango, kagzi lime, aloe vera and ginger based blended RTS, Khalid *et al.* (2019) in strawberry and dates blended RTS and Mehta *et al.* (2018) inRTS. RTS's organoleptic quality steadily declined during the course of storage. It dropped from 8.23 to 7.18, which may be related to the impact of temperature on biochemical alterations that cause beverages to get discolored and acquire an off flavor. The reduction in organoleptic quality are also reported in previous studies performed by Kumar *et al.* (2024)in RTS, Bharati *et al.* (2023) in sweet orange and guava RTS, Shagiwal and Deen (2022) in strawberry, ginger and aloe vera, Harendra and Deen (2021) in mango, kagzi lime, aloe vera and ginger based blended RTS, Khalid *et al.* (2019) in strawberry and dates blended RTS and Mehta *et al.* (2018) in blended RTS.

Table 2: Organoleptic quality of RTS prepared from different blends of guava Pulp, strawberry pulp and ginger juice

Treatments	**Differentcombinationof blends**			**Organolepticquality**	
	Guava pulp (%)	**Strawberrypulp(%)**	**Gingerjuice(%)**	**Score**	**Rating**
T1	100	Nil	Nil	7.71	Likemoderately
T2	Nil	100	Nil	8.11	Likevery much
T3	Nil	Nil	100	7.17	Likemoderately
T4	33.33	33.33	33.33	7.41	Likemoderately
T5	40	30	30	7.11	Likemoderately
T6	**50**	**25**	**25**	**8.23**	**Likevery much**
T7	60	20	20	7.82	Like moderately
T8	70	15	15	7.75	Likemoderately
T9	80	10	10	7.64	Likemoderately

T10	90	5	5	7.00	Likemoderatel y
S.Em ±				0.03	
CD at5%				0.08	

Table 3: Changes during storage of RTS

Storage period(Months)	TSS(%)	Acidity (%)	Vitamin-C(mg/100ml)	ReducingSugars(%)	Non-reducing sugar(%)	Total sugars(%)	Organoleptic	
							Score	Rating
0	13.00	0.30	10.76	0.90	12.22	13.09	8.23	LVM
1	13.11	0.56	10.15	1.20	12.05	13.25	8.00	LVM
2	13.23	0.68	9.96	1.38	11.98	13.36	7.60	LM
3	13.51	0.83	9.84	1.47	11.90	13.37	7.18	LM
S.Em±	0.03	0.01	0.03	0.01	0.04	0.02	0.02	
CD at5%	0.10	0.03	0.09	0.02	0.13	0.09	0.09	

LVM: Like very much, LM: Like moderately

Conclusion

It is concluded that the above findings that RTS prepared from 10 % blend comprising 50 % guava pulp +25% strawberry pulp + 25 % ginger juice and adjusted to 13 % TSS and 0.30% acidity was found to be best during organoleptic quality and can be stored up to 3 months with acceptable quality. The TSS, acidity, reducing sugars and total sugars was increased, whereas ascorbic acid, non-reducing sugar, and organoleptic quality was decreased during storage.

Acknowledgment

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References

1. Stone, H., Pangborn, R.M. and Ough, C.S., 1965. Techniques for sensory evaluation of food odors. *Advances in food research*, *14*, pp.1-32.
2. Bal, L. M., Ahmad, T., Senapati, A. K. and Pandit, P. S. 2014. Evaluation of quality attributes during storage of guava nectar cv. Lalit from different pulp and TSS ratio. *J Food Process. Technol*. 5(3): 329-334.
3. Bharati, S., Prasad, V. M., Bahadur, V. and Prajapati, P. 2023. Standardization of blended RTS beverages from sweet orange (*Citrus sinensis*), Guava (*Psidium guajava*), and Ginger (*Zingiberofficinale*).*J. Pharm. Innov.* 12(6): 492-495.
4. Chavan, U.D., Pawar, U.B. and Pawar, G.H. 2015. Studies on preparation of mixed toffee from guava and strawberry. *J. Food Sci. Technol*. 52(10): 6791-6797.
5. Fahlberg, 1969. The Pungent principles of ginger and their importance in certain ginger products, *Food Tech, Australia*. 21: 570-571.
6. Gunness, P., Kravchuk, O., Nottingham, S.M., Arcy, B.R. and Gidley, M.J. 2009. Sensory analysis of individual strawberry fruit and comparison with instrumental analysis. *Postharvest Biol. Technol.* 52: 164-172.
7. Harendra and Deen, B. 2021. Preparation and storage of ready-to-serve (RTS) beverage from mango (*Mangiferaindica* L.), citrus (*Citrus aurantifolia*Swingle), aloe

vera (*Aloe barbadensis* Miller.) and ginger (*Zingiberofficinale*Rosc.) blends. *Pharma Innov. J.* 10(7): 381-388.

8. Hariharan, G. and Mahendran, T. 2016. Physico-chemical, sensory and microbial evaluation of ginger-lime ready-to-serve (RTS) functional beverage, sweetened by palmyra sugar candy. Imp. *J. Interdiscip. Res.* 2(5): 1545-1552.
9. Khalid, M., Muneeb, M., Shamrez, B., Muhammad, A., Ayub, M., Durrani, Y. and Ali, S.A. 2019. Preparation and evaluation of strawberry and date blended juice ready to serve drink. *Pure Appl. Biol.* 8(4): 2228-2237.
10. Kumar, A., Singh, K. K., Gupta, S., Singh, R. S., Singh, G., Singh, M., & Pathak, S. 2024. Biochemical Studies of Annatto Coloured Guava Beverages on Storage. *Int. J. Environ. Clim. Chang. 14*(1): 374-379.
11. Mehta, V., Delvadia, D.V., Galav, A. and Sharma, A.K. 2018. Standardization of processing technology for Guava blended guava (*Psidium guajawa* L.) Ev. Lucknow-49 ready-to-serve Beverage. *Int. J. Adv. Sci. Res. Manag.* 1:1-4.
12. Mishra, L.K. and Sangma, D. 2017. Quality attributes, phytochemical profile and storage stability studies of functional ready to serve (RTS) drink made from blend of Aloe vera, sweet lime, amla and ginger. *J. Food Sci. Technol.* 54(3): 761-769.
13. Panse, V.G. and Sukhatme, P.V. 1985. Statistical methods for agricultural workers. 3rd rev, ed Indian Co. Agric. Res. Pub. 87-89p.
14. Poonam, Gurjar, P.K.S., Lekhi, R., Rathour S.S., Bhadoriya, S. and Rajput, P. 2022. Evaluation of Quality Attributes and Storage Studies of Guava Nectar. *Biol. Forum-An Int. Jour*. 14(1): 1772-1778.
15. Ranganna, S. 2010. Analysis and quality control for fruit and vegetable products, Tata Mc Graw-Hill Ltd., New Delhi.
16. Sanwal, S.K., Rai, N., Singh, J. and Buragohain, J. 2010. Antioxidant phytochemicals and gingerol content in diploid and tetraploid clones of ginger (*Zingiberofficinale* Roscoe). *Sci. Hortic*. 124: 280-285.
17. Shagiwal, M.andDeen, B. 2022. Studies on the development of Ready-To-Serv e (RTS) beverage from strawberry (*Fragaria ananassa*Duch), ginger (*Zingiberofficinale*Rosc), and aloe vera (*Aloe barbadensis*Miller) blend. *J Pharm Innov. 1*(3): 6209-6215.
18. Shah, N.S. and Nath, N. 2006. Enzyme assisted production of fruit juices. *Bev. Food World*. 33(6): 39-41.

19. Sharma, S., Josh, V.K. and Abrol, G. 2009. An overview on strawberry [*Fragaria x ananassa*(Weston) Duchesna ex Rozier) wine production technology, composition, maturation anduality evaluation. *Nat. Prod. Radiance*. 8(4): 356-365.
20. Singh, O., Choro, H.K., Kanwar, J, Dwivedi, S.K. and Singh, R. 2017. Formulation, nutraceutical profile and storage stability of aloe gel and ginger juice functional beverage blend. *J. Pharm. Innov*. 6(12): 373-379.
21. Wilson, C.W. 1980. Tropical and Sub-tropical Fruits: composition, properties and uses. AVI publishing Inc West port Connecticut. pp. 279-295.
22. Maleš, I., Pedisić, S., Zorić, Z., Elez-Garofulić, I., Repajić, M., You, L., Vladimir-Knežević, S., Butorac, D. and Dragović-Uzelac, V., 2022. The medicinal and aromatic plants as ingredients in functional beverage production. Journal of Functional Foods, 96, p.105-210.
23. Shagiwal M, Deen B. Studies on development of ready-to-serve (RTS) beverage from strawberry (Fragaria ananassaDuch), ginger (ZingiberofficinaleRosc) and aloe vera (Aloe barbadensis Miller) blend. The Pharma Innovation Journal. 2022;11(7):2308-17.