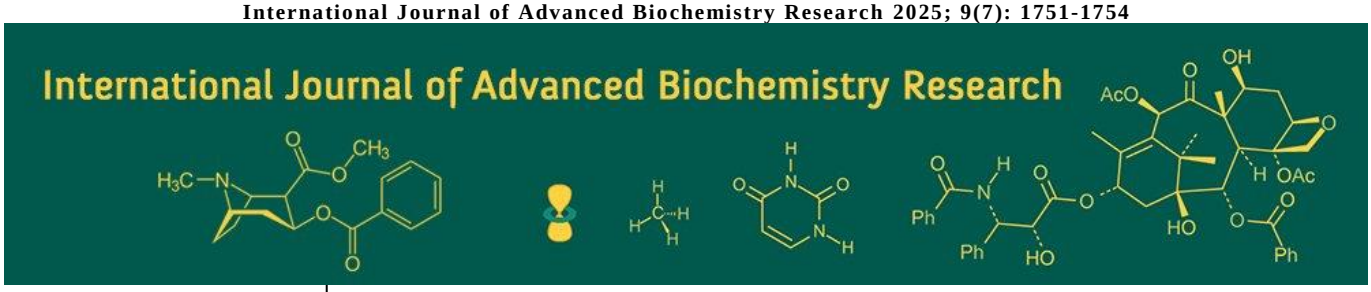

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; 9(7): 1751-1754
www.biochemjournal.com
Received: 07-05-2025
Accepted: 10-06-2025

Deepti Dhruva
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Prabhakar Singh
Professor, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Gunja Thakur
Ph.D. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Nishant Verma
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Princie Tigga
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Khusboo Verma
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Yogeshwar Dhruw
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Yogesh Kumar Chandrakar
Ph.D. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Corresponding Author:
Deepti Dhruva
M.Sc. Scholar, Department of Fruit Science, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya (IGKV), Raipur, Chhattisgarh, India

Standardization of recipe and organoleptic evaluation of fortified guava RTS

Deepti Dhruva, Prabhakar Singh, Gunja Thakur, Nishant Verma, Princie Tigga, Khusboo Verma, Yogeshwar Dhruw And Yogesh Kumar Chandrakar

DOI: https://www.doi.org/10.33545/26174693.2025.v9.i7v.5031

Abstract
The present investigation entitled "Standardization of recipe and organoleptic evaluation of Fortified Guava RTS" was conducted at Horticulture Processing Laboratory, Department of Fruit Science, College of Agriculture, IGKV, Raipur (C.G.) during the year 2024-25. The experiment was carried out in Completely Randomized Design with 7 treatments combinations and 3 replications. Among the different recipes tested the combination of Guava pulp fortified with Aonla and Ginger, *i.e.* the treatment T_5 (guava pulp 80% + Aonla pulp 15% +ginger pulp 5%) was found superior based on organoleptic evaluation. The results indicated that the sensory evaluation were significantly influenced by various treatments.

Keywords: Organoleptic, guava, aonla, ginger, RTS and beverage

Introduction
A significant fruit, guava (*Psidium guajava* L.) is cultivated extensively across tropical and subtropical areas worldwide (Rai *et al.*, 2009) [7]. It is a member of the family Myrtaceae and native of Tropical America. Which is further subdivided into two groups: Myrtoideae, which includes thickset fruits and Leptospermoideae, which has dehiscent capsuled fruits (Wilson *et al.*, 2001) [11]. The most resilient fruiting tree in tropical regions, guava is an annual plant with a high rate of production and the greatest environmental adaptability (Pino *et al.*, 2004) [6]. It was first cultivated in India at the beginning of the 17th century and eventually became a significant crop for trade. It has a distinct musky flavour that significantly diminishes with processing (Ayub *et al.*, 2005) [1].

Aonla (Emblica officinalis) is a subtropical deciduous tree that grows on the Indian subcontinent. The aonla, also known as the Indian gooseberry (Emblica officinalis Gaertn. Syn. *Phyllanthus emblica* L.), is the oldest small fruit in India. It belongs to the Euphorbeaceae family and is native to India, China, Malaysia, and Sri Lanka. Aonla is cultivated in roughly 30 different varieties; some of these include Banarasi, Chakaiya, NA-6, NA-10, L.S.-1, L.S.-6, Anand Aonla II, Kanchan, Krishna, Narendra 4 and others (Athawale and akbari, 2017) [2]. Aonla is extremely hardy, a prolific bearer and highly profitable even in the absence of care, it is among the best sources of vitamin C after barbadose cherry. Usually, aonla fruit is consumed fresh, boiled, or pickled. It tastes astringent and sour. Aonla products, which include murraba, juice, jam, cheese, candies, powder and chutney, are widely consumed by people because to their high content of vitamin C and antioxidants (Goyal *et al.*, 2008) [3].

Ginger is prized for its flavour, aroma, taste, and therapeutic properties. Originating in the Indo-Malayan region, it is currently found in many tropical regions of Asia, Africa, America and Australia. It was domesticated in India and China, which represent the Centre of origin of the species. Ginger has long been recognized for its therapeutic benefits as an immune-stimulating agent, digestive aid, spiritual beverage, aphrodisiac, antiemetic, anticancer, antioxidant and anti-inflammatory (Malhotra and Singh, 2003) [4].

Ginger is herbaceous aromatic perennial plant which possesses medicinal properties due to its bioactive compounds (Sanwal *et al.*, 2010) [8]. The largest producer and user of ginger is India. Madhya Pradesh, Karnataka, Assam, Maharashtra, West Bengal, Orissa, Gujarat, Sikkim, Kerala, Meghalaya and Manipur are the main Indian states that produce ginger (Malhotra and Singh, 2003) [4].

Materials and methods material required

Matured, firm fruits like guava, aonla and ginger were purchased from local market. Nonperishable items such as sugar, citric acid were purchased in bulk from the local market. Glass bottles (capacity 200 ml) with caps were used for storing the prepared Guava, Aonla and Ginger RTS beverage (GAG RTS beverage).

Methods: Guava, Aonla and Ginger were used for the study. The flow chart for the preparation of guava, aonla and ginger RTS beverage is given in (Fig. 1). The guava pulp was blended with aonla pulp and ginger pulp. The fruit pulp was taken in a flat-bottomed vessel and mixed with required amount of water. Sugar was added till 10 0Brix was reached. Citric acid was added. Heated up to 800 C. Filled in sterilized bottles by leaving head space of 2 cm. Brought down to room temperature, Crown corked the bottles immediately. The sealed bottles were processed for 30 min under pressure. Labelled and stored at room temperature.

Table 1: Details of treatments

s.no.	Treatment	Notation used
1	Guava juice 100%	T_0
2	Guava pulp:Aonla pulp:Ginger pulp (60:35:5)	T_1
3	Guava pulp:Aonla pulp:Ginger pulp (60:37.5:2.5)	T_2
4	Guava pulp:Aonla pulp:Ginger pulp (70:25:5)	T_3
5	Guava pulp:Aonla pulp:Ginger pulp (70:27.5:2.5)	T_4
6	Guava pulp:Aonla pulp:Ginger pulp (80:15:5)	T_5
7	Guava pulp:Aonla pulp:Ginger pulp (80:17.5:2.5)	T_6

Results and Discussion

Sensory evaluation of fortified guava RTS

The organoleptic evaluation of fortified guava RTS with Aonla and Ginger were recorded for the following variables i.e. colour and appearance, taste, flavour, aroma and overall acceptability, which has been presented in Table 2 and 3.

Colour and appearance

The present experiment recorded the maximum value of colour and appearance (8.37) at the time of preparation under the treatment (T_5) Guava pulp: Aonla pulp: Ginger pulp (80:15:5), while the minimum colour and appearance (7.44) of fortified guava RTS was seen under T_0 (Guava pulp 100%) at 0 day (time of preparation). The maximum colour and appearance was observed under the treatment T_5[Guava pulp: Aonla pulp: Ginger pulp (80:15:5)] is due to the less non-enzymatic reaction of organic acid with sugar or oxidation of phenols which leads to degradation of colour and appearance. The results of the present study were confirmed with the findings testified by Mehta et al (2018) [5] and Verma and Deen (2024) [10]in guava based RTS. During the storage period the maximum colour and appearance score of fortified guava RTS (8.37) was recorded on treatment T_5 on D1 (0 day of storage), which was found statistically at par with D2, D3 and D4 having the respective colour and appearance score of 8.34, 8.29 and 8.24 at 5% level of significance under the present trial. Likewise, the treatments D5, D6 and D7 with colour and appearance score of fortified guava RTS of 8.17, 8.12 and 8.04 were also shown statistically equivalent with each other under the present experiment. However, the minimum colour and appearance score (8.04) was observed under the treatment D7 (90 days of storage) under the present research. The results of present investigation are parallel with the findings observed by Mehta et al (2018) [5], Selvi *et al.* (2018) [9] and Verma and Deen (2024) [10] in guava based RTS.

Taste

It is evident from result obtained at the time of preparation under the present trial the maximum value of taste (8.18) was verified under the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)], while the minimum score of taste (7.71) of fortified guava RTS was demonstrated under T_0 (Guava pulp 100%) at 0 day (time of preparation).The maximum taste noticed under the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)] is due to the less non-enzymatic reaction of organic acid with sugar or oxidation of phenols under the treatment T_5. The results of present investigation are parallel with the findings observed by Mehta *et al.* (2018) [5] and Verma and Deen (2024) [10] in guava based RTS. During the storage period the maximum taste score of fortified guava RTS (8.18) was recorded on D1 (0 day of storage), which was found non-significant differences with the treatments D2 and D3 having the respective taste score of 8.16 and 8.13 at 5% level of significance under the present experiment. similarly, the treatments D4 & D5 and D6 & D7 with taste score of fortified guava RTS of 8.09 & 8.07 and 8.04 & 8.01 were also shown statistically equivalent with each other under the present research. However, the minimum taste score (8.01) was observed under the treatment D7 (90 days of storage) under the present investigation. Under the present study, the maximum score of taste (8.18) was seen on D1 (0 DAS), however the minimum score was noted under D7 (8.01). The results of the present study were validated with the findings testified by Mehta et al (2018) [5], Selvi *et al.* (2018) [9] and Verma and Deen (2024) [10] in guava based RTS.

Flavor

It is apparent from the result gained at the time of preparation the maximum value of flavor (8.26) was recognized under the treatment (T_5) Guava pulp: Aonla

pulp: Ginger pulp (80:15:5), while the minimum flavor score (7.79) of fortified guava RTS was seen under T_0 (Guava pulp 100%) at 0 day (time of preparation).The maximum flavor score was observed under the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)] is due to the less non- enzymatic reaction of organic acid with sugar or oxidation of phenols which leads to deterioration of flavor. The results of the present study were verified with the findings testified by Mehta *et al.* (2018) [5] and Verma and Deen (2024) [10] in guava based RTS. During the storage period the maximum flavor score of fortified guava RTS (8.26) was demonstrated on D1 (0 day of storage), which was found statistically non-significant D2 having the taste score of 8.21 at 5% level of significance under the present trial. Furthermore, the treatments D3 & D4 and D5, D6 & D7 with flavor score of fortified guava RTS of 8.18 & 8.14 and 8.09, 8.07 & 8.03 were also shown statistically comparable with each other under the present experiment. However, the minimum flavor score (8.03) was noticed under the treatment D7 (90 days of storage) under the present study. Under the present analysis, the maximum score of flavors (8.26) was noted on D1 (0 DAS), however the minimum score was observed under D7 (8.03). The results of the present study were validated with the findings testified by Mehta et al (2018) [5], Selvi *et al.* (2018) [9] and Verma and Deen (2024) [10] in guava based RTS.

Aroma

It is evident from the result found at the time of preparation the maximum value of aroma(8.24) was confirmed under the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)], while the minimum score of aroma (7.77) of fortified guava RTS was recorded under T_0 (Guava pulp 100%) at 0 day (time of preparation).The maximum aroma score perceived under the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)] is due to the less non-enzymatic reaction of organic acid with sugar or oxidation of phenols under the treatment T_5. The results of present investigation are parallel with the findings observed by Mehta *et al.* (2018) [5] and Verma and Deen (2024) [10] in guava based RTS. During the storage period the maximum aroma score of fortified guava RTS (8.24) was recorded on D1 (0 day of storage), which was found statistically parallel with D2, and D3 having the respective aroma score of 8.21 and 8.17 at 5% level of significance under the present experiment. Similarly, the treatments D4 & D5 and D6 & D7 with aroma score of fortified guava RTS of 8.14 & 8.11 and 8.09 & 8.04 were also shown statistically non-significant with each other under the present research. However, the minimum aroma score (8.04) was observed under the treatment D7 (90 days of storage) under the present investigation. Under the current analysis, the maximum score of aroma (8.24) was seen on D1 (0 DAS), however the minimum score was noted under D7 (8.04). The results of the present study were validated with the findings testified by Mehta et al (2018) [5], Selvi *et al.* (2018) [9] and Verma and Deen (2024) [10] in guava based RTS.

Overall acceptability

The highest overall acceptability score was observed at time of preparation the treatment T_5 [Guava pulp: Aonla pulp: Ginger pulp (80:15:5)] is due to the less non-enzymatic reaction of organic acid with sugar or oxidation of phenols. The other possible reasons could be the less loss of volatile aromatic substances responsible for overall acceptability. The results of the present study were substantiated with the findings testified by Mehta *et al.* (2018) [5] and Verma and Deen (2024) [10] in guava based RTS. During the storage period the maximum overall acceptability score of fortified guava RTS (8.30) was demonstrated on D1 (0 day of storage), which was found statistically at par with D2, D3 and D4 having the respective overall acceptability score of 8.28, 8.25 and 8.19 at 5% level of significance under the present trial. However, the treatments D5, D6 and D7 with overall acceptability score of fortified guava RTS of 8.16, 8.11 and 8.06 were also shown statistically equivalent with each other under the present experiment. However, the minimum overall acceptability score (8.06) was noticed under the treatment D7 (90 days of storage) under the present study. Under the present investigation, the maximum score of overall acceptability (8.30) was noted on D1 (0 DAS), however the minimum score was observed under D7 (8.06). The results of the present study were validated with the findings testified by Mehta et al (2018) [5], Selvi *et al.* (2018) [9] and Verma and Deen (2024) [10] in guava based RTS.

Table 2: Organoleptic evaluation of freshly prepared fortified guava RTS

Notations	Treatments	Colour and appearance	Taste	Flavor	Aroma	Overall acceptability
T_0	Guava pulp 100%	7.44a	7.71a	7.79a	7.77a	
T_1	Guava pulp: Aonla pulp: Ginger pulp (60:35:5)	7.98b	7.94b	8.02b	8.00b	8.06b
T_2	Guava pulp: Aonla pulp:Ginger pulp (60:37.5:2.5)	8.00b	7.96b	8.04b	8.02b	8.08b
T_3	Guava pulp:Aonla pulp:Ginger pulp (70:25:5)	8.19bc	8.05c	8.13c	8.11c	8.17c
T_4	Guava pulp:Aonla pulp:Ginger pulp (70:27.5:2.5)	8.21bc	8.07cd	8.15c	8.13c	8.19c
T_5	Guava pulp:Aonla pulp:Ginger pulp (80:15:5)	8.37c	8.18e	8.26d	8.24e	8.31e
T_6	Guava pulp:Aonla pulp:Ginger pulp (80:17.5:2.5)	8.32bc	8.12d	8.20cd	8.18d	8.24d
	SE (m) ±	0.12	0.02	0.03	0.01	0.02
	C.D. at 5%	0.36	0.05	0.08	0.03	0.04

Table 3: Organoleptic evaluation of fortified guava RTS during storage period

Notations	Days of storage	Colour and appearance	Taste	Flavor	Aroma	Overall acceptability
D0	0 Day	8.37d	8.18e	8.26e	8.24d	8.30d
D1	15 Days	8.34d	8.16de	8.21de	8.21cd	8.28cd
D2	30 Days	8.29cd	8.13cde	8.18cd	8.17bcd	8.25cd
D3	45 Days	8.24bcd	8.09bcd	8.14bc	8.14bc	8.19bcd
D4	60 Days	8.17abc	8.07abc	8.09ab	8.11ab	8.16abc
D5	75 Days	8.12ab	8.04ab	8.07a	8.09ab	8.11ab
D6	90 Days	8.04a	8.01a	8.03a	8.04a	8.06a
	SE (m) ±	0.06	0.03	0.02	0.03	0.04
	C.D. at 5%	0.16	0.07	0.06	0.09	0.12

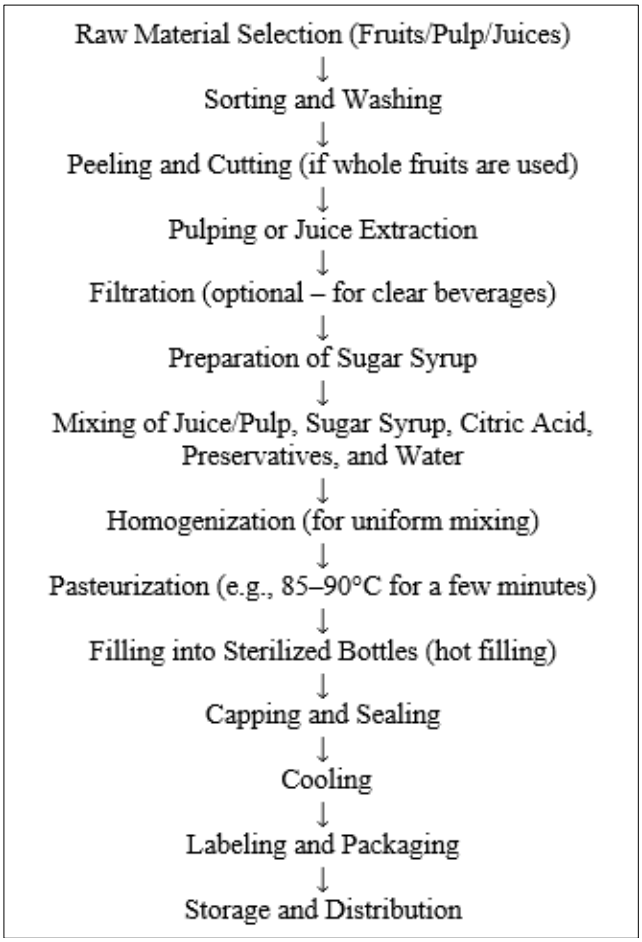

Fig. 1 Flow chart for preparation of RTS

- 10% TSS
- 10% Juice
- 0.3% Acidity

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