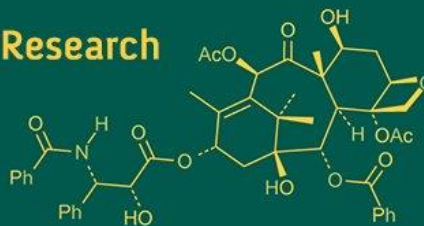


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## Sensory quality evaluation of beetroot (*Beeta vulgaris* L.) and pineapple (*Ananas comosus*) blended ready-to-serve (RTS) beverage

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### Abstract

The present investigation titled “Sensory Quality Evaluation of Beetroot (*Beeta vulgaris* L.) and Pineapple (*Ananas comosus*) Blended Ready-to-Serve (RTS) Beverage” was carried out in the Department of Post-Harvest Management, College of Horticulture and Research Station, Sankarapatan, Durg (C.G.) during the academic year 2024-25. The experiment was conducted under Completely Randomized Design (CRD) with three replications, comprising seven treatments formulated with varying proportions of beetroot and pineapple juices. The treatment combinations included T<sub>0</sub> (100% beetroot juice), T<sub>1</sub> (95% beetroot + 5% pineapple juice), T<sub>2</sub> (90% beetroot + 10% pineapple juice), T<sub>3</sub> (85% beetroot + 15% pineapple juice), T<sub>4</sub> (80% beetroot + 20% pineapple juice), T<sub>5</sub> (75% beetroot + 25% pineapple juice), and T<sub>6</sub> (70% beetroot + 30% pineapple juice). This study aimed to develop beetroot-pineapple RTS beverages, evaluate their sensory attributes, and assess consumer acceptability during storage. Sensory evaluation was conducted by a semi-trained panel using a 9-point hedonic scale over 45 days of storage. Results indicated that T<sub>6</sub> (70% beetroot + 30% pineapple) consistently received the highest scores for colour, appearance, flavour, taste, and overall acceptability, while pure beetroot juice (T<sub>0</sub>) was least preferred. Although sensory scores declined gradually during storage, pineapple-rich blends maintained superior acceptability. These findings indicate that incorporating pineapple juice (20-30%) into beetroot RTS enhances sensory quality and storage stability of beetroot-based RTS beverages, making them more appealing to consumers and confirm the potential of beetroot-pineapple blends as a nutrient-enriched RTS beverage.

**Keywords:** Beetroot, beverage, organoleptic evaluation, overall acceptability, pineapple, RTS, taste

### Introduction

The increasing demand for functional beverages has drawn considerable attention toward the utilization of fruits and vegetables in blended ready-to-serve (RTS) formulations. Consumers today not only expect refreshing taste but also seek drinks that offer additional health-promoting benefits. Beetroot (*Beeta vulgaris* L.) is widely recognized as a rich source of betalain pigments, phenolics, dietary nitrates, and minerals, all of which contribute to its antioxidant, antihypertensive, and hepatoprotective properties (Clifford *et al.*, 2015) [4]. Despite its nutritional superiority, the earthy flavour and intense colour of beetroot often restrict its direct consumer acceptance (Georgiev *et al.*, 2010) [6]. On the other hand, pineapple (*Ananas comosus*) is one of the most popular tropical fruits, appreciated for its refreshing flavour, sweetness, and high vitamin C content (Basu and De, 2014) [2]. The blending of beetroot with pineapple offers a promising strategy to mask the undesirable earthy notes of beetroot while simultaneously enriching the nutritional profile and improving palatability (Singh *et al.*, 2019) [15]. Such combinations not only enhance taste and flavour balance but also provide an attractive colour and better consumer acceptance.

Sensory evaluation is a critical component in the development of any new beverage, as consumer preference is shaped by parameters such as appearance, aroma, flavour, mouthfeel, and overall acceptability (Amerine *et al.*, 1965) [1]. Previous studies on fruit-vegetable blends, such as carrot-mango and carrot-pineapple, have demonstrated improvements in both sensory and nutritional attributes (Lakshmi *et al.*, 2015) [9]. However, limited scientific

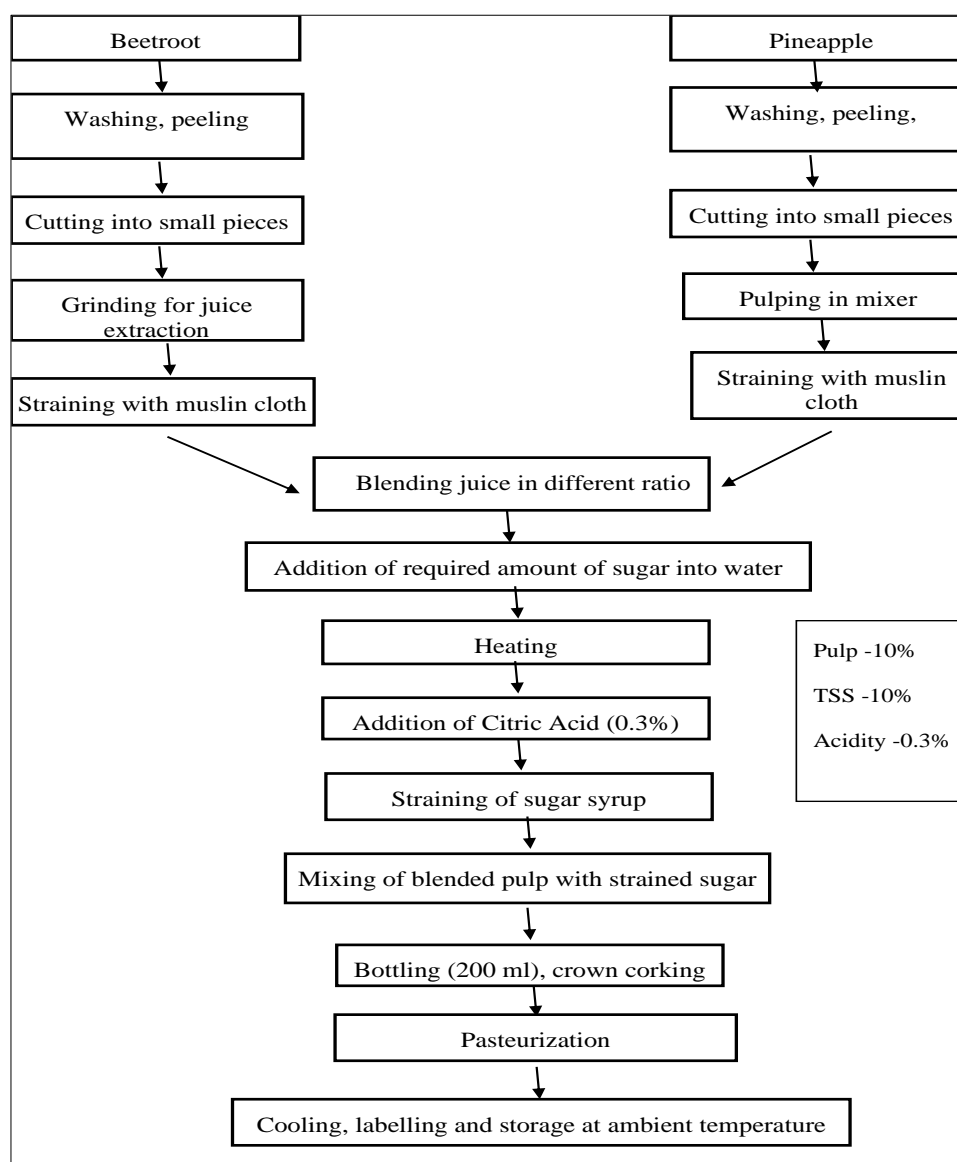
evidence is available on the sensory acceptance of beetroot-pineapple blends, which presents a significant research gap. Therefore, the present investigation was undertaken to characterize the sensory attributes and assess consumer acceptability of a nutrient-enriched beetroot-pineapple blended RTS beverage.

### Materials and method

The specific treatments included in the present study are T<sub>0</sub> (100% beetroot juice), T<sub>1</sub> (95% beetroot + 5% pineapple juice), T<sub>2</sub> (90% beetroot + 10% pineapple juice), T<sub>3</sub> (85% beetroot + 15% pineapple juice), T<sub>4</sub> (80% beetroot + 20% pineapple juice), T<sub>5</sub> (75% beetroot + 25% pineapple juice), and T<sub>6</sub> (70% beetroot + 30% pineapple juice) and was conducted in the 2024-25 academic year in the Processing Laboratory of the Department of Post-Harvest Management, College of Horticulture and Research Station, Mahatma Gandhi Udyanikee Evam Vanikee Vishwavidyalaya, Durg, Chhattisgarh. The experiment was carried out using a Completely Randomized Design (CRD) with three replications.

### Preparation of Beetroot-Pineapple RTS beverage

Fresh, healthy, and uniformly matured beetroot (*Beta vulgaris* L.) and pineapple (*Ananas comosus*) fruits were procured from the local market, while damaged, diseased, or immature fruits were discarded. The selected fruits were thoroughly washed under running tap water to remove adhering dirt and surface contaminants, followed by air drying to minimize surface moisture. Beetroots were peeled, cut into small pieces, and their juice extracted using a mixer-grinder and filtered through a double-layered muslin cloth; a similar procedure was followed for pineapple after peeling and coring. The clarified juices were blended in different proportions according to treatment formulations and thoroughly homogenized. The blends were standardized to 10° Brix total soluble solids (TSS) using cane sugar, acidified with 0.3% citric acid, and preserved with sodium benzoate at 600 ppm. The prepared beverages were hot-filled into pre-sterilized glass bottles (200-250 mL capacity), sealed immediately with airtight closures, and pasteurized in boiling water at 100 °C for 15 minutes. After cooling to room temperature, the bottles were stored under ambient laboratory conditions for 45 days, during which samples were periodically analyzed for sensory parameters (Fig.1).



**Fig 1:** Flow chart for preparing beetroot and pineapple blended RTS beverage.

**Sensory evaluation:** The sensory acceptability of the beetroot-pineapple RTS beverage was evaluated by a semi-trained panel of five judges drawn from different age groups and dietary habits, comprising assistant professors from various departments of the College of Horticulture and Research Station, Sankara-Patan, Durg (C.G.). The evaluation was carried out using the 9-point hedonic scale described by Amerine *et al.* (1965) <sup>[1]</sup>, in which panelists rated each attribute on a scale from 1 to 9, where 1 = dislike extremely, 2 = dislike very much, 3 = dislike moderately, 4 = dislike slightly, 5 = neither liked nor disliked, 6 = like slightly, 7 = like moderately, 8 = like very much, and 9 = like extremely. Each panelist received coded samples of the different treatments along with a score sheet to record their observations. The sensory parameters assessed included taste, colour, appearance, flavour, and overall acceptability. To maintain uniformity, the samples were presented under identical conditions, and drinking water was provided to the panelists between evaluations to cleanse the palate. The recorded scores were statistically analyzed to identify significant differences among treatments and to determine the relative contribution of each sensory attribute to overall product quality.

## Result and discussion

**Colour:** The sensory evaluation of the beetroot-pineapple RTS beverages revealed significant differences in colour scores across treatments and during storage (Table 1; Fig.2). At the initial stage (0 day), the highest colour score (7.9) was recorded in Treatment T<sub>6</sub> (70% beetroot + 30% pineapple), followed by T<sub>5</sub> -75% beetroot + 25% pineapple juice (7.7) and T<sub>4</sub>- 80% beetroot + 20% pineapple juice (7.4), which correspond to “like very much” on the 9-point hedonic scale. The intermediate treatments (T<sub>2</sub> and T<sub>3</sub>) recorded moderate scores, while the lowest acceptability was observed in T<sub>0</sub> (100% beetroot juice, 6.3). The incorporation of pineapple juice enhanced colour acceptability, most likely due to the blending of bright yellow carotenoids from pineapple with the deep red betalains of beetroot, producing a more visually appealing hue. At 15 days, the highest scores were again in T<sub>6</sub>-70% beetroot + 30% pineapple juice (7.8) and T<sub>5</sub> (7.6), whereas T<sub>0</sub> reduced to 6.1, indicating lesser preference. By 30 days, the trend continued with T<sub>6</sub> and T<sub>5</sub> (7.3 each) maintaining superior scores, while T<sub>0</sub> dropped to 5.7, shifting towards “neither like nor dislike.” A gradual decline in colour scores was observed during storage in all treatments. By 45 days, T<sub>6</sub>- 70% beetroot + 30% pineapple juice (6.8) and T<sub>5</sub>- 75% beetroot + 25% pineapple juice (7.0) still retained relatively higher scores, while T<sub>0</sub> decreased to 5.5, indicating lower preference. The decreasing trend can be attributed to the degradation of natural pigments such as betalains and carotenoids, which are highly sensitive to oxygen, light, and temperature (Herbach *et al.*, 2006 <sup>[7]</sup>; Delgado-Vargas and Paredes-López, 2020) <sup>[5]</sup>. Similar findings have been reported in beetroot-pineapple beverages by Singh *et al.* (2019) <sup>[15]</sup> and in mixed fruit RTS beverages by Shukla and Khandelwal (2021) <sup>[14]</sup>. Recent studies also confirm that pigment breakdown is a common cause of declining visual quality during storage (Chauhan *et al.*, 2022; Patel *et al.*, 2023) <sup>[3, 11]</sup>.

**Appearance:** Significant differences in appearance scores were observed among treatments, with scores declining

gradually during storage (Table 2; Fig. 3). At 0 day, the maximum score (7.8) was recorded in T<sub>6</sub>- 70% beetroot + 30% pineapple juice, followed by T<sub>5</sub> - 75% beetroot + 25% pineapple juice (7.5) and T<sub>4</sub> -80% beetroot + 20% pineapple juice (7.4), whereas T<sub>0</sub> (6.2) scored the lowest, indicating “like slightly.” The higher scores in pineapple-incorporated treatments suggest that blending improved brightness, translucency, and clarity, resulting in better overall appearance. By 15 days, T<sub>6</sub>- 70% beetroot + 30% pineapple juice (7.5) and T<sub>5</sub> (7.3) still retained higher acceptability, while T<sub>0</sub> reduced to 6.0. After 30 days, T<sub>6</sub> (7.2) remained the most acceptable, followed by T<sub>5</sub> (7.0), whereas T<sub>0</sub> (5.8) scored the lowest. During storage, appearance scores declined progressively, with T<sub>6</sub>- 70% beetroot + 30% pineapple juice and T<sub>5</sub> maintaining higher acceptability while T<sub>0</sub> reduced to 5.5 by 45 days. The decrease was mainly due to pigment degradation, enzymatic and non-enzymatic browning, turbidity, and precipitation of suspended solids. Betalains in beetroot are particularly unstable under varying storage conditions, while carotenoids in pineapple also undergo oxidative degradation (Stintzing and Carle, 2007 <sup>[16]</sup>; Delgado-Vargas and Paredes-López, 2020) <sup>[5]</sup>. Similar results were reported by Singh *et al.* (2019) <sup>[15]</sup> and Shukla and Khandelwal (2021) <sup>[14]</sup>, who observed that blending fruit juices improved initial appearance but storage invariably reduced clarity.

## Flavour

The flavour of RTS beverages varied significantly among treatments and showed a declining trend over storage (Table 3; Fig. 4). At 0 day, T<sub>6</sub> (7.7) recorded the highest score, followed by T<sub>5</sub>-75% beetroot + 25% pineapple juice (7.3) and T<sub>4</sub>- 80% beetroot + 20% pineapple juice (7.1), all within the “like very much” range. In contrast, T<sub>0</sub> (6.0) received the lowest score, reflecting the earthy aftertaste of pure beetroot juice. Incorporation of pineapple significantly improved flavour by balancing acidity, sweetness, and aroma, thereby masking the earthy geosmin notes of beetroot. After 15 days of storage, flavour scores reduced slightly across treatments. T<sub>6</sub> -70% beetroot + 30% pineapple juice (7.4) remained the most acceptable, while T<sub>0</sub> dropped to 5.8, showing only “like slightly” acceptability. At 30 days, the trend continued with T<sub>6</sub>- 70% beetroot + 30% pineapple juice (7.3) and T<sub>5</sub>- 75% beetroot + 25% pineapple juice (6.9) maintaining higher scores, whereas T<sub>0</sub> declined further to 5.6. During storage, flavour acceptability declined gradually in all treatments, with T<sub>6</sub> maintaining the highest scores (6.8 at 45 days), while T<sub>0</sub> decreased to 5.2, nearing “neither like nor dislike”. Loss of volatile compounds, oxidation of phenolics, and the development of off-flavours were the main reasons for the decline (Sharma *et al.*, 2020; Kumar *et al.*, 2022) <sup>[8, 13]</sup>. Similar improvements in flavour stability due to blending were also observed in fruit-vegetable beverages by Singh *et al.* (2019), Shagiwal and Deen (2022), and Patel *et al.* (2023) <sup>[11, 12, 15]</sup>.

## Taste

Taste scores followed a pattern similar to flavour (Table 4; Fig. 5). At the initial stage, T<sub>6</sub>- 70% beetroot + 30% pineapple juice (7.7) achieved the highest acceptability, followed by T<sub>5</sub> - 75% beetroot + 25% pineapple juice (7.5) and T<sub>4</sub>-80% beetroot + 20% pineapple juice (7.3), all under the “like very much” category. Pure beetroot juice (T<sub>0</sub>) scored the lowest (6.3) due to its earthy and slightly bitter

taste. Incorporation of pineapple improved taste acceptability through its sugar-acid balance and fruity volatiles. With storage, a progressive decline was noted. At 15 days of storage, the overall scores declined slightly; T<sub>6</sub> maintained the highest (7.5) acceptability, while T<sub>0</sub> dropped to 5.9. At 30 days, the same trend was evident, with T<sub>6</sub> - 70% beetroot + 30% pineapple juice (7.2) and T<sub>5</sub> (7.0) showing higher scores, whereas T<sub>0</sub> (5.7) recorded the least preference and by 45 days, T<sub>6</sub> maintained a score of 7.2, whereas T<sub>0</sub> dropped to 5.3, approaching “neither like nor dislike.” Declines in taste were attributed to oxidation of ascorbic acid, sugar degradation, and off-flavour development (Sharma *et al.*, 2020; Kumar *et al.*, 2022) [8, 13]. Similar findings were reported by Singh *et al.* (2019) [15] and Mehta and Bhat (2021) [10], confirming that blending enhances palatability and delays deterioration compared to single-fruit juices. Pineapple’s high sugar content and balanced acidity contributed to improved taste stability compared to beetroot alone. Similar findings were reported by Singh *et al.* (2019) [15] in beetroot-pineapple blends, where higher pineapple ratios enhanced taste and overall acceptability. Overall, it was evident that pineapple incorporation (20-30%) significantly improved the taste of beetroot RTS beverages, with T<sub>6</sub> -70% beetroot + 30% pineapple juice blend consistently receiving the highest scores throughout storage, while T<sub>0</sub> (100% beetroot juice) recorded the lowest acceptability.

**Overall Acceptability:** Overall acceptability scores also showed significant variation across treatments and declined with storage (Table 5; Fig. 6). At 0 day, T<sub>6</sub> (70% beetroot + 30% pineapple), followed by T<sub>5</sub>- 75% beetroot + 25% pineapple juice (7.7) and T<sub>4</sub> 80% beetroot + 20% pineapple juice recorded the highest scores, while T<sub>0</sub> (6.0) was least acceptable. After 15 days, overall acceptability slightly decreased across all treatments. T<sub>6</sub> -70% beetroot + 30% pineapple juice, retained the highest score (7.5) followed by T<sub>5</sub> (7.3), while T<sub>0</sub> dropped to 5.8, entering the “like slightly” category. At 30 days, the decreasing trend continued; T<sub>6</sub> remained superior (7.0) while T<sub>5</sub> scored (7.1) and T<sub>0</sub> reduced further to 5.3. By 45 days, the overall acceptability of T<sub>6</sub>- 70% beetroot + 30% pineapple juice (6.8) and T<sub>5</sub>- 75% beetroot + 25% pineapple juice (6.7) remained relatively higher, while T<sub>0</sub> declined to 5.2, entering the “neither like nor dislike” category, suggesting minimal consumer preference. The decline in acceptability is likely due to combined effects of colour fading, flavour loss, off-taste development, and ascorbic acid degradation (Sharma *et al.*, 2020; Kumar *et al.*, 2022) [8, 13]. Pineapple-rich blends (T<sub>4</sub>-T<sub>6</sub>) consistently out-performed beetroot-only beverages, supporting the role of blending in improving consumer preference. Similar outcomes were reported by Singh *et al.* (2019) and Patel *et al.* (2023) [11, 15], who emphasized that fruit blending improves flavour balance and overall quality in RTS beverages.

**Table 1:** Organoleptic evaluation (colour) of beetroot and pineapple blended RTS during storage period.

Treatments	Colour				
	Storage Period (in days)				
	0	15	30	45	Mean
T <sub>0</sub> (Beetroot Juice (100%))	6.3	6.1	5.7	5.5	5.9
T <sub>1</sub> (Beetroot Juice (95%) and Pineapple Juice (5%))	6.5	6.3	6.1	5.9	6.2
T <sub>2</sub> (Beetroot Juice (90%) and Pineapple Juice (10%))	7.0	6.8	6.6	6.3	6.7
T <sub>3</sub> (Beetroot Juice (85%) and Pineapple Juice (15%))	7.1	7.0	6.9	6.5	6.9
T <sub>4</sub> (Beetroot Juice (80%) and Pineapple Juice (20%))	7.4	7.1	7.0	6.8	7.1
T <sub>5</sub> (Beetroot Juice (75%) and Pineapple Juice (25%))	7.7	7.6	7.3	7.0	7.4
T <sub>6</sub> (Beetroot Juice (70%) and Pineapple Juice (30%))	7.9	7.8	7.3	6.8	7.4
CD at 5%	0.273	0.228	0.267	0.177	-
SE(m)±	0.089	0.075	0.087	0.058	-
SE(d)	0.126	0.105	0.123	0.082	-

**Table 2:** Organoleptic evaluation (appearance) of beetroot and pineapple blended RTS during storage period.

Treatments	Appearance				
	Storage Period (in days)				
	0	15	30	45	Mean
T <sub>0</sub> (Beetroot Juice (100%))	6.2	6.0	5.8	5.5	5.9
T <sub>1</sub> (Beetroot Juice (95%) and Pineapple Juice (5%))	6.5	6.2	6.0	5.8	6.1
T <sub>2</sub> (Beetroot Juice (90%) and Pineapple Juice (10%))	6.9	6.7	6.5	6.2	6.6
T <sub>3</sub> (Beetroot Juice (85%) and Pineapple Juice (15%))	7.0	6.7	6.6	6.5	6.7
T <sub>4</sub> (Beetroot Juice (80%) and Pineapple Juice (20%))	7.4	7.0	6.9	6.7	7.0
T <sub>5</sub> (Beetroot Juice (75%) and Pineapple Juice (25%))	7.5	7.3	7.0	6.8	7.2
T <sub>6</sub> (Beetroot Juice (70%) and Pineapple Juice (30%))	7.8	7.5	7.2	7.0	7.4
CD at 5%	0.177	0.228	0.154	0.222	-
SE(m)±	0.058	0.075	0.05	0.072	-
SE(d)	0.082	0.105	0.071	0.102	-



**Table 3:** Organoleptic evaluation (flavour) of beetroot and pineapple blended RTS during storage period.

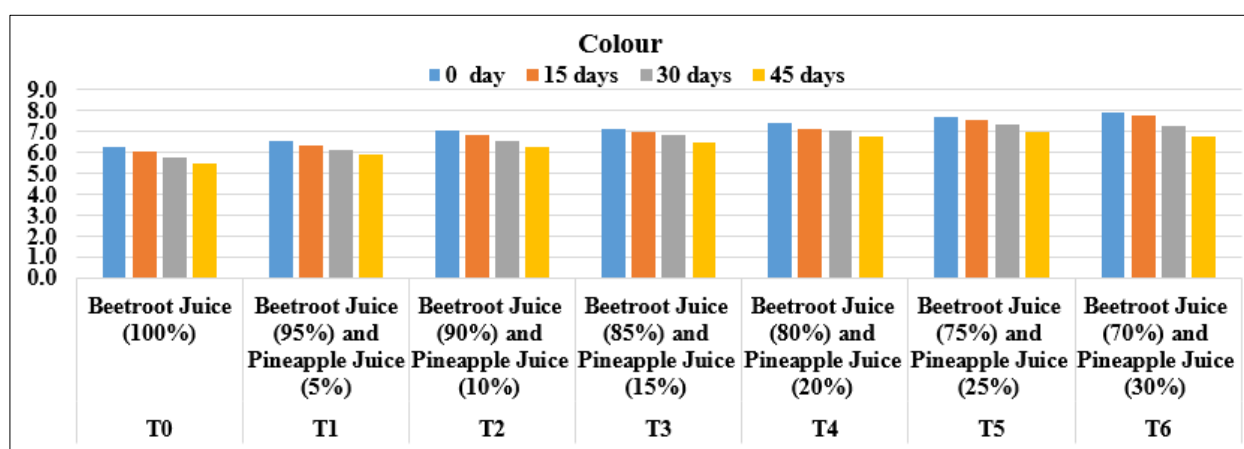
Treatments	Flavour				
	Storage Period (in days)				
	0	15	30	45	Mean
T <sub>0</sub> (Beetroot Juice (100%))	6.0	5.8	5.6	5.2	5.7
T <sub>1</sub> (Beetroot Juice (95%) and Pineapple Juice (5%))	6.2	6.1	5.9	5.7	6.0
T <sub>2</sub> (Beetroot Juice (90%) and Pineapple Juice (10%))	6.7	6.5	6.3	6.0	6.4
T <sub>3</sub> (Beetroot Juice (85%) and Pineapple Juice (15%))	6.8	6.6	6.4	6.2	6.5
T <sub>4</sub> (Beetroot Juice (80%) and Pineapple Juice (20%))	7.1	6.8	6.7	6.6	6.8
T <sub>5</sub> (Beetroot Juice (75%) and Pineapple Juice (25%))	7.3	7.1	6.9	6.7	7.0
T <sub>6</sub> (Beetroot Juice (70%) and Pineapple Juice (30%))	7.7	7.4	7.3	6.8	7.3
CD at 5%	0.358	0.27	0.232	0.168	-
SE(m)±	0.117	0.088	0.076	0.055	-
SE(d)	0.165	0.125	0.107	0.078	-

**Table 4:** Organoleptic evaluation (taste) of beetroot and pineapple blended RTS during storage period.

Treatments	Taste				
	Storage Period (in days)				
	0	15	30	45	Mean
T <sub>0</sub> (Beetroot Juice (100%))	6.3	5.9	5.7	5.3	5.8
T <sub>1</sub> (Beetroot Juice (95%) and Pineapple Juice (5%))	6.4	6.1	6.0	6.1	6.2
T <sub>2</sub> (Beetroot Juice (90%) and Pineapple Juice (10%))	6.7	6.6	6.4	6.2	6.5
T <sub>3</sub> (Beetroot Juice (85%) and Pineapple Juice (15%))	7.0	6.8	6.5	6.5	6.7
T <sub>4</sub> (Beetroot Juice (80%) and Pineapple Juice (20%))	7.3	7.1	7.0	6.6	7.0
T <sub>5</sub> (Beetroot Juice (75%) and Pineapple Juice (25%))	7.5	7.3	7.0	6.8	7.2
T <sub>6</sub> (Beetroot Juice (70%) and Pineapple Juice (30%))	7.7	7.5	7.2	7.2	7.4
CD at 5%	0.291	0.211	0.154	0.345	-
SE(m)±	0.095	0.069	0.05	0.113	-
SE(d)	0.135	0.098	0.071	0.159	-

**Table 5:** Organoleptic evaluation (overall acceptability) of beetroot and pineapple blended RTS during storage period

Treatments	Overall Acceptability				
	Storage Period (in days)				
	0	15	30	45	Mean
T <sub>0</sub> (Beetroot Juice (100%))	6.0	5.8	5.3	5.2	5.6
T <sub>1</sub> (Beetroot Juice (95%) and Pineapple Juice (5%))	6.3	6.2	6.0	5.7	6.1
T <sub>2</sub> (Beetroot Juice (90%) and Pineapple Juice (10%))	6.7	6.4	6.3	6.2	6.4
T <sub>3</sub> (Beetroot Juice (85%) and Pineapple Juice (15%))	6.8	6.7	6.7	6.4	6.7
T <sub>4</sub> (Beetroot Juice (80%) and Pineapple Juice (20%))	7.3	7.0	6.8	6.6	6.9
T <sub>5</sub> (Beetroot Juice (75%) and Pineapple Juice (25%))	7.7	7.3	7.1	6.7	7.2
T <sub>6</sub> (Beetroot Juice (70%) and Pineapple Juice (30%))	7.8	7.5	7.0	6.8	7.3
CD at 5%	0.463	0.636	0.522	0.416	-
SE(m)±	0.151	0.208	0.17	0.136	-
SE(d)	0.214	0.294	0.241	0.192	-

**Fig 2:** Organoleptic evaluation - colour of beetroot and pineapple blended RTS during storage period.

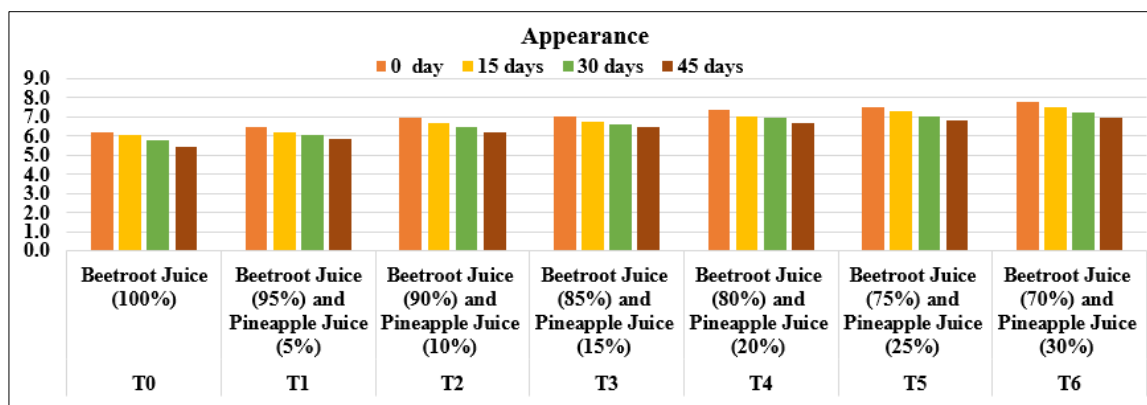


Fig 3: Organoleptic evaluation -appearance of beetroot and pineapple blended RTS during storage period.

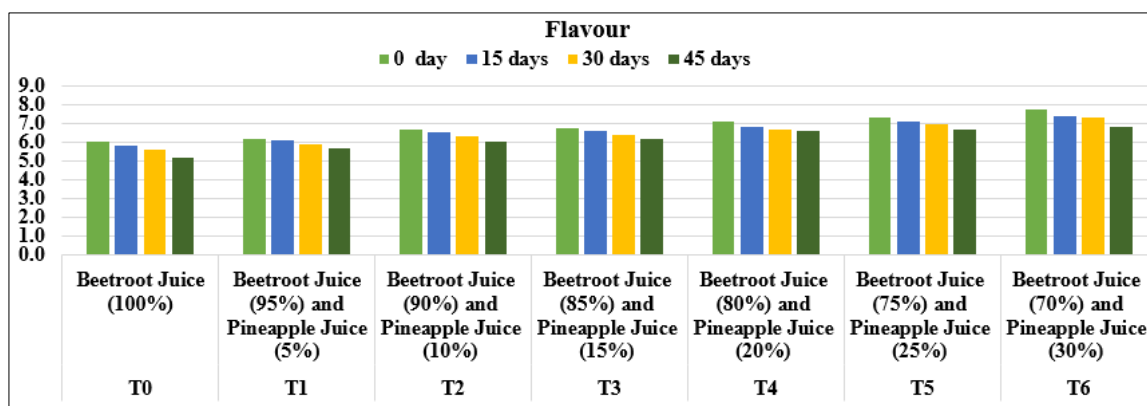


Fig 4: Organoleptic evaluation -flavour of beetroot and pineapple blended RTS during storage period.

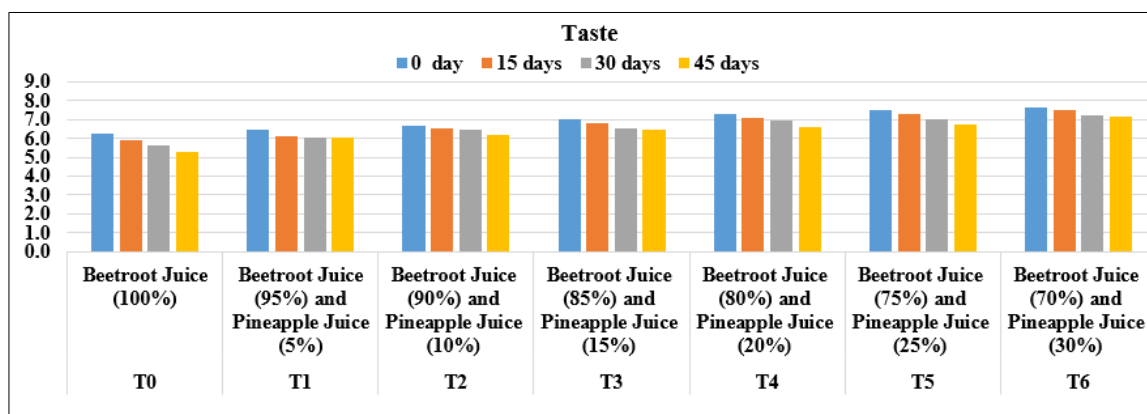


Fig 5: Organoleptic evaluation -taste of beetroot and pineapple blended RTS during storage period.

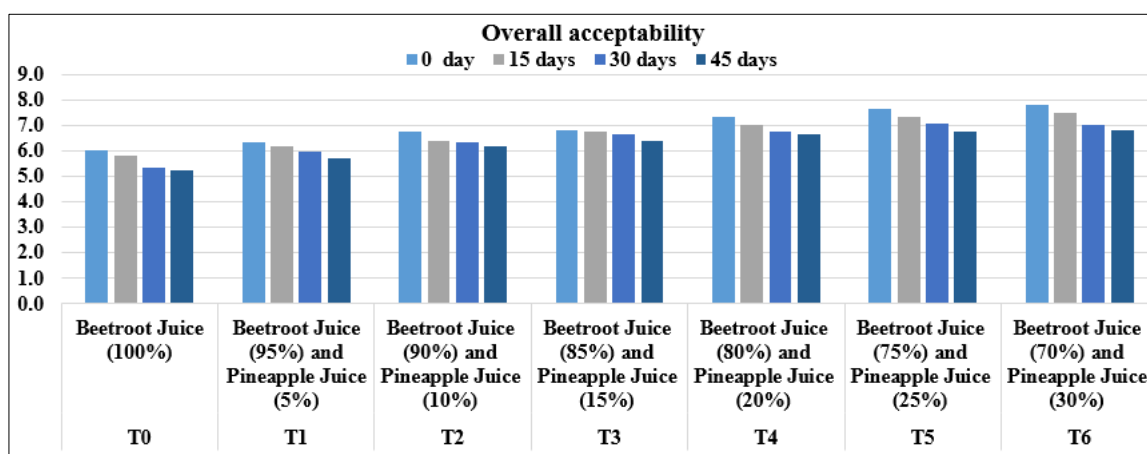


Fig 6: Organoleptic evaluation -overall acceptability of beetroot and pineapple blended RTS during storage period.

**Conclusion:** The sensory evaluation of beetroot-pineapple RTS beverages demonstrated that blending significantly improved colour, appearance, flavour, taste, and overall acceptability compared to pure beetroot juice. Among the treatments, the 70% beetroot + 30% pineapple blend (T<sub>6</sub>) consistently received the highest scores at preparation and throughout storage, followed by the 75% beetroot + 25% pineapple juice blend (T<sub>5</sub>) emerged as the most acceptable blend. In contrast, pure beetroot juice (T<sub>0</sub>) was least acceptable across all parameters. Although all treatments showed a gradual decline in sensory quality during 45 days of storage, blends containing higher pineapple proportions maintained superior acceptability. These findings indicate that incorporating pineapple juice (20-30%) into beetroot RTS enhances sensory quality and storage stability of beetroot-based RTS beverages, making them more appealing to consumers and confirm the potential of beetroot-pineapple blends as a nutrient-enriched RTS beverage.

## References

1. Amerine MA, Pangborn RM, Roessler EB. Principles of Sensory Evaluation of Food. New York: Academic Press; 1965.
2. Basu S, De AK. Development of RTS beverages from pineapple pulp and ginger extract. J Food Sci Technol. 2014;51(12):3623-3629.
3. Chauhan A, Singh S, Kumar R. Influence of storage on sensory and nutritional quality of blended fruit beverages. J Food Sci Technol. 2022;59(4):1423-1431.
4. Clifford T, Howatson G, West DJ, Stevenson EJ. The potential benefits of red beetroot supplementation in health and disease. Nutrients. 2015;7(4):2801-2822.
5. Delgado-Vargas F, Paredes-López O. Natural Colorants for Food and Nutraceutical Uses. Boca Raton: CRC Press; 2020.
6. Georgiev VG, Weber J, Kneschke EM, Denev PN, Bley T, Pavlov AI. Antioxidant activity and phenolic content of betalain extracts from intact plants and hairy root cultures of *Beta vulgaris* L. Plant Foods Hum Nutr. 2010;65(2):105-111.
7. Herbach KM, Stintzing FC, Carle R. Betalain stability and degradation—structural and chromatic aspects. J Food Sci. 2006;71(4):R41-R50.
8. Kumar V, Sharma P, Singh R. Quality changes in fruit beverages during storage: a review. Beverage Food World. 2022;49(8):32-37.
9. Lakshmi KR, Vidhya R, Balasubramanian S. Development and storage studies of mixed fruit and vegetable RTS beverage. Int J Food Ferment Technol. 2015;5(1):93-100.
10. Mehta A, Bhat R. Consumer acceptability of blended tropical fruit beverages during storage. Int J Food Sci Nutr. 2021;72(6):789-797.
11. Patel D, Joshi H, Shah A. Storage stability of mixed fruit RTS beverages: sensory and nutritional evaluation. Beverage Ind J. 2023;13(2):45-53.
12. Shagiwal A, Deen S. Development and quality assessment of strawberry-aloe vera-ginger blended RTS beverage. J Food Process Preserv. 2022;46(5):e16584.
13. Sharma P, Singh S, Verma R. Effect of storage on flavour and nutritional composition of fruit beverages. Indian J Nutr. 2020;37(3):221-227.
14. Shukla A, Khandelwal R. Sensory and storage stability of mixed fruit RTS beverages. Indian J Hort. 2021;78(2):312-318.
15. Singh S, Kumar V, Yadav R, Sharma R. Quality evaluation of beetroot and fruit juice blends for development of RTS beverage. Int J Chem Stud. 2019;7(2):3943-3947.
16. Stintzing FC, Carle R. Betalains emerging prospects for food scientists. Trends Food Sci Technol. 2007;18(10):514-525.