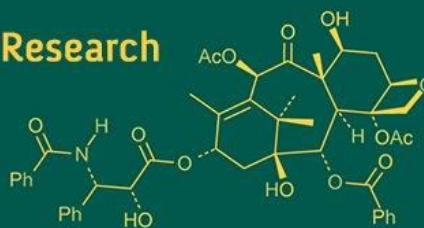
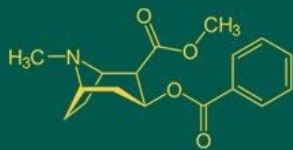


International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating (2025): 5.29
IJABR 2025; SP-9(8): 461-463
www.biochemjournal.com
Received: 12-05-2025
Accepted: 15-06-2025

Aaisha Nasim
Ph.D. Scholar, Department of
Fruit Science, COA, IGKV
Raipur, Chhattisgarh India

GL Sharma
Professor and Head
Department of Fruit Science,
COA, IGKV Raipur,
Chhattisgarh India

Deepti Patel
Scientist, Department of Fruit
Science, COA, IGKV Raipur,
Chhattisgarh India.

Faruk Ansari
Food Technologist, College of
Food Technology, IGKV
Raipur, Chhattisgarh India

Priyanka P
M.Sc. Scholar Department of
Fruit Science, COA, IGKV
Raipur, Chhattisgarh India.

K Hita
Ph.D. Scholar, Department of
Fruit Science, COA, IGKV
Raipur, Chhattisgarh India

Jagdish Chawla
Ph.D. Scholar, Division of
Fruits and Horticultural
Technology, IARI, New Delhi
India

Michi Tani
Ph.D. Scholar, Division of
Fruits and Horticultural
Technology, IARI, New Delhi
India

Corresponding Author:
Aaisha Nasim
Ph.D. Scholar, Department of
Fruit Science, COA, IGKV
Raipur, Chhattisgarh India

Biochemical composition and nutritional characterization of selected fruits and ginger

Aaisha Nasim, GL Sharma, Deepti Patel, Faruk Ansari, Priyanka P, K Hita, Jagdish Chawla and Michi Tani

DOI: <https://www.doi.org/10.33545/26174693.2025.v9.i8Sh.5192>

Abstract

Biochemical composition of strawberry, sweet orange and ginger was evaluated out at the Horticulture Processing Laboratory, Department of Fruit Science, IGKV, Raipur (C.G.) during the year 2023-2024 and 2024-2025. Strawberry and sweet orange total soluble solids ($^{\circ}$ Brix), acidity (%), ascorbic acid (mg/100 g), total sugars (%), reducing sugar (%) and non-reducing sugar (%) was examined, and ginger total soluble solids ($^{\circ}$ Brix), acidity (%), ascorbic acid (mg/100 g) was evaluated, this will be useful further formulations.

Keywords: Strawberry, total soluble solids (Brix), ascorbic acid (mg/100 g), total sugars (%)

Introduction

Strawberry (*Fragaria x ananassa* Duch.), is a significant temperate fruit crop that can also thrive in sub-tropical climates. Strawberry is a good source of bioactive compounds because of its high levels of ascorbic acid, folate, and phenolic content (Proteggente *et al.* 2002) [14] most of which express relevant antioxidant capacities (Scalzo *et al.* 2005) [18]. However, strawberries are economically and commercially important and widely consumed fresh or in processed forms, such as jams, juices, and jellies. Sweet orange (*Citrus sinensis* L. Osbeck) comes under citrus group, and a major source of vitamins, especially vitamin C, sufficient amount of folacin, calcium, potassium, thiamine, niacin and magnesium (Angew, 2007). Ginger (*Zingiber officinale* Roscoe) is widely used rhizomatous herb. The ascorbic acid content in ginger contributes to antioxidant properties.

Material and Methods

The current investigation was carried out at Horticulture Processing Laboratory, Department of Fruit Science, IGKV, Raipur (C.G.) during the experimental year 2023-2024 and 2024-2025. Biochemical parameters of strawberry, sweet orange and ginger was evaluated.

Total soluble solids (TSS)

TSS of fresh and processed juices was determined by hand refractometer of 0-32 and was expressed as $^{\circ}$ Brix and also analyzed with digital refractometer.

Titrateable acidity (%)

Titrateable acidity was estimated by titrating a known value of sample against standard NaOH using phenolphthalein as an indicator. Three replication were taken for each sample and the mean value was reported. The titrateable acidity was expressed as per cent citric acid (AOAC, 2004) as per given formula:

$$\text{Titrateable acidity (\%)} = \frac{\text{Titre value} \times \text{Normality of alkali} \times \text{Volume made up} \times \text{Eq. Weight of dominating acid}}{\text{Weight of sample} \times \text{Volume of aliquot} \times 1000} \times 100$$

Ascorbic acid

Ascorbic acid content was determined as per AOAC (2004) method using the visual titration method for 2, 6-dichlorophenol-indophenol.

Three percent meta-phosphoric acid was used to create the samples, and an aliquot was titrated with dye until it reached the end point of pink.

The results expressed as mg/ 100 g of sample and calculated by using below formula:

$$\text{Ascorbic acid (mg/100 g)} = \frac{\text{Titre value} \times \text{*Dye factor} \times \text{Volume made up}}{\text{Aliquot of extract taken} \times \text{Weight of the sample}} \times 100$$

$$\text{*Dye factor} = 0.5/\text{Titre value}$$

By titrating standard L-ascorbic acid produced in 3% metaphosphoric acid 2, 6-dichlorophenol-indophenol dye to a pink color end point, the dye factor titration value was determined.

Sugars (%)

Reducing and total sugars in fresh and processed juice were determined by Lane and Eynon Method (1923) [9]. In Lane and Eynon method after neutralizing a known value of the sample with NaOH, 45% lead acetate was added and allowed to sit for ten minutes. Then add 2 milliliters of potassium oxalate (22 percent) to a 250 milliliter volumetric flask, excess lead acetate was eliminated. In order to estimate the reducing sugars by titrating against a known quantity of Fehling's A and Fehling's B solutions, the solution was diluted to the proper level, filtered, and the clear filtrate was obtained using methylene blue as an indicator. By mixing 5 g of citric acid with 50 ml of a calibrated sample (made for reducing sugars) and heating it for 10 minutes, the total sugars were calculated. NaOH was added to the sugar samples to completely invert them, and a final volume of 250 ml was created.

$$\text{Reducing sugars (\%)} = \frac{\text{*Factor} \times \text{Dilution}}{\text{Titre value} \times \text{Weight/Volume of sample}} \times 100$$

$$\text{Total sugars (\%)} = \frac{\text{*Factor} \times \text{Dilution} \times \text{Dilution}}{\text{Titre value} \times \text{Weight/Volume of sample}} \times 100$$

$$\text{*Factor} = 0.05$$

Non-reducing sugar (%)

Non-reducing sugar was determined by subtracting reducing sugars (%) from total sugars (%)

Calculation

Non-reducing sugar (%) = (%) of total sugars - (%) of reducing sugars

Results and Discussion

Biochemical composition of strawberry

The data obtained on biochemical content of strawberry fruits showed that, the average Total Soluble Solids (12.67 & 13.21°Brix), acidity (0.82 & 0.79%), ascorbic acid (65.78 & 63.97 mg/100 g), Total sugars (6.89 & 6.95%), reducing sugar (5.32 & 5.37%), non-reducing sugar (1.57 & 1.58%), during both the years has been presented in Table 1. These results were closely reported with Belakud *et al.* (2015) [4], Chandrakar *et al.* (2018) [6], Ayesha *et al.* (2011) [3], Lakshmikanth *et al.* (2018) [8], Kumar *et al.* (2015) [11], Borthakur *et al.*, (2025) [15].

Biochemical composition of sweet orange

The data demonstrated on biochemical composition of sweet orange revealed that total soluble solids (9.5 & 10.2°Brix), acidity (0.19 & 0.24%), ascorbic acid (43.98 & 48.54 mg/100 g), total sugar (4.14 & 4.32%), reducing sugar (3.11 & 3.26%), non-reducing sugar (1.03 & 1.06%), during both the experimental years has been depicted in Table 2. The outcome were similar with the findings of Khan *et al.* (2021) [10], Frances *et al.* (2023) [7].

Biochemical composition of ginger

The data evaluated on biochemical composition of ginger revealed that total soluble solids (6.0 & 6.4), acidity (0.6 & 0.5), ascorbic acid (8.5 & 9.2 mg/100 g), during both the experimental years has been displayed in the Table 3. These outcomes closely matched the conclusions of Akhtar *et al.* (2013) [1], Mane *et al.* (2018) [12], P. R. and Prakash (2010) [13].

Table 1: Biochemical parameters of strawberry

S. No.	Characters	Mean value	
(A.)	Biochemical composition	2023	2024
1.	Total soluble solids (° Brix)	12.67	13.21
2.	Acidity (%)	0.82	0.79
3.	Ascorbic acid (mg/100 g)	65.78	63.97
4.	Total sugar (%)	6.89	6.95
5.	Reducing sugar (%)	5.32	5.37
6.	Non-reducing sugar (%)	1.57	1.58

Table 2: Biochemical composition of sweet orange

S. No.	Characters	Mean value	
(A.)	Biochemical composition	2023	2024
1.	Total soluble solids (° Brix)	9.5	10.2
2.	Acidity (%)	0.19	0.24
3.	Ascorbic acid (mg/100 g)	43.98	48.54
4.	Total sugar (%)	4.14	4.32
5.	Reducing sugar (%)	3.11	3.26
6.	Non-reducing sugar (%)	1.03	1.06

Table 3: Biochemical composition of ginger

S. No.	Characters	Mean value	
(A.)	Biochemical composition	2023	2024
1.	Total soluble solids (° Brix)	6.0	6.4
2.	Acidity (%)	0.6	0.5
3.	Ascorbic acid (mg/100 g)	8.5	9.2

Conclusion

Strawberry exhibited high levels of ascorbic acid, anthocyanins, and total phenolic compounds, making it a potent antioxidant-rich fruit with potential health benefits. Sweet orange also showed substantial ascorbic content, along with moderate levels of sugars and organic acids, indicating its refreshing nature and immunity-boosting qualities. Ginger have therapeutic potential.

References

1. Akhtar A, Dash PK, Mannan A. Physico-chemical characterization and product development from ginger (*Zingiber officinale*) germplasm available in south western region of Bangladesh. IOSR Journal of Agriculture and Veterinary Science. 2014;5(6):53-62.
2. Angew ON. Functional foods. Trends in Food Science and Technology. 2007;30:19-21.

3. Ayesha R, Fatima N, Ruqayya M, Qureshi KM, Hafiz IA, Khan KS, Kamal A. Influence of different growth media on the fruit quality and reproductive growth parameters of strawberry (*Fragaria* × *ananassa*). Journal of Medicinal Plants Research. 2011;5(26):6224-6232.
4. Belakud B, Bahadur V, Prasad VM. Performance of strawberry (*Fragaria* × *ananassa* Duch.) varieties for yield and biochemical parameters. The Pharma Innovation Journal. 2015;4(10A):5-8.
5. Borthakur U, Terangpi H, Maibangsa M, Baruah N, Bathari M. Performance of strawberry varieties in different planting dates under agro-climatic conditions of hill zone of Assam. International Journal of Advanced Biochemistry Research. 2025;9(3):209-212.
6. Chandrakar S, Singh P, Kumar H, Paikra S. Effect of foliar feeding of calcium and micro-nutrients on quality parameters of strawberry (*Fragaria* × *ananassa* Duch.) cv. Nabila under net tunnel. International Journal of Chemical Studies. 2018;6(1):658-661.
7. Frances EC, Johnson OO, Enoch NN, Eziamaka AEC, Ann MO. Comparative analysis of nutritional and vitamin content of sweet orange, watermelon and pineapple fruits. Asian Journal of Research in Crop Science. 2023;8(3):138-145.
8. Lakshmikanth H, Madaiah D, Sudharani N. Effect of different pot culture media on biochemical and quality parameters of strawberry in vertical system. International Journal of Current Microbiology and Applied Sciences. 2020;9(8):678-684.
9. Lane JH, Eynon L. Methods for determination of reducing and non-reducing sugars. Journal of Food Science. 1923;42(1):32-37.
10. Khan MAH, Rahim MA, Robbani M, Hassan MF, Haque MA, Alam Z. Physical and chemical properties of sweet orange genotypes available in Bangladesh. 2021.
11. Kumar R, Collis JP, Singh S, Moharana D, Rout S, Patra S. Effect of different levels of NPK in combination with FYM on quality of strawberry (*Fragaria* × *ananassa* Duch.) cv. Chandler. International Journal of Agriculture and Food Science. 2015;5(3):92-97.
12. Mane RP, Kshirsagar RB, Sawate AR, Patil BM, Kale RG. Studies on evaluation of physicochemical and nutritional properties of fresh turmeric rhizome. Journal of Pharmacognosy and Phytochemistry. 2018;7(2):2895-2897.
13. Prakash J. Chemical composition and antioxidant properties of ginger root (*Zingiber officinale*). Journal of Medicinal Plants Research. 2010;4(24):2674-2679.
14. Proteggente AR, Pannala AS, Paganga G, Van Buren L, Wagner E, Wiseman S, *et al.* The antioxidant activity of regularly consumed fruits and vegetables reflects their phenolic and vitamin C composition. Free Radical Research. 2002;36(2):217-233.
15. Ranganna S. Analytical methods and FPO specification. In: Handbook of analysis and quality control for fruit and vegetable products. 2nd ed. New Delhi: Tata McGraw-Hill; 1986. p. 1-1112.
16. Ranganna S. Handbook of analysis and quality control for fruit and vegetable products. New Delhi: Tata McGraw-Hill; 1997. 1112 p.
17. Ranganna S. Handbook of analysis and quality control for fruits and vegetable products. New Delhi: Tata McGraw-Hill; 2003. p. 11-12.
18. Scalzo J, Mezzetti B, Battino M. Total antioxidant evaluation: critical steps for assaying berry antioxidant features. Biofactors. 2005;23(4):221-227.