

## STUDIES ON GUAVA LEAF BASED HERBAL TEA

Y.P. BHOOMIKA<sup>1</sup>, KIRANKUMAR GORABAL<sup>2</sup>, ANIL ISHWAR SABARAD<sup>3</sup>,  
V. KANTHARAJU<sup>4</sup> AND SACHINKUMAR T. NANDIMATH<sup>5</sup>

<sup>1,2</sup>Department of Postharvest Management, K R C College of Horticulture, Arabhavi, Karnataka, India

<sup>3</sup>Department of Fruit Science, KRC College of Horticulture, Arabhavi, Karnataka, India.

<sup>4</sup>Department of Plant Pathology and Head, ICAR – AICRP on fruits, KRC College of Horticulture, Arabhavi, Karnataka, India

<sup>5</sup>Department of Social and Allied Sciences, KRC College of Horticulture, Arabhavi, Karnataka, India

(Received 24 September, 2023; Accepted 20 November, 2023)

*Key words:* Guava leaf powder, Spice mixture, Months after storage (MAS)

**Abstract**– In the present investigation the guava leaf based herbal tea was prepared by using 8 recipes which consisted, two levels of guava leaf powder (30 and 40 %), ginger powder (20 and 25 %), spice mixture (20 and 25 %) and three levels of lemongrass powder (15, 20 and 25 %). The green tea (*Camellia sinensis*) was used as a reference sample as a check. Significant differences were observed with respect to physico-chemical and organoleptic quality parameters between the treatments. The chemical constituents *viz.*, ascorbic acid, total phenolic content, total antioxidants and total flavonoids decreased from 105.54 to 96.82 mg/100g, 124.11 to 120.70 mg GAE/g, 90.19 to 89.43 per cent and 1301.80 to 1248.91 mg QE/100 g, respectively during the six months of storage period. The mean organoleptic scores decreased significantly from an initial value of 8.05 to 7.76 for colour and appearance, 7.83 to 7.54 for flavour, 7.70 to 7.42 for taste and 7.95 to 7.67 for overall acceptability with the advancement of storage period. The results of the organoleptic evaluation indicated that the guava leaf based herbal tea prepared with recipe containing 30 per cent guava leaf powder + 20 per cent ginger powder + 25 per cent lemongrass powder and 25 per cent spice mixture was found superior in their acceptability than other treatments.

### INTRODUCTION

Guava (*Psidium guajava* L) is a perennial fruit crop of the Myrtaceae family. It originated in tropical America and gradually became a commercially major crop in several other countries due to its hardiness, prolific bearing and high recompense with little care. It is the fourth most widely grown fruit crop in India. The area under guava is about 2.03 lakh hectares, producing 22.7 lakh MT of fruit (Anon., 2023). Guava's popularity seems not just from the fruit's health benefits, but also from the leaves and roots. Because of its astringency, the roots, leaves and fruits are used to treat a variety of stomach disorders (Rajan and Hudedamani, 2019). Guava leaves include antioxidants such as quercetin, ferulic acid, protocatechuic acid, guavin B, asiatic acid and  $\beta$ -carotene (Liang *et al.*, 2007). Guava leaf extract powder mostly comprises flavonoids derived from quercetin, which are

hydrolyzed in the body to produce glyconequercetin, which is responsible for the leaf's spasmolytic effect. The majority of guava leaf flavonoids are quercetin derivatives, such as quercetin, avicularin, guaijaverin, isoquercetin, hyperin, quercitrin, quercetin3-O-gentiobioside and quercetin4-glucuronide. They have 82.47 per cent moisture, 3.64 per cent ash, 0.62 per cent fat, 18.53 per cent protein, 12.74 per cent carbohydrates, 103 mg ascorbic acid and 1717 mg gallic acid equivalents (GAE)/g total phenolic compounds.

In a developing country like India where most people are engulfed in poverty and cannot afford expensive food products and suffer from various deficiency diseases, a need to identify cheap and easily available sources rich in micronutrients is essential. Through this study, the less utilized leaves of guava which are rich in micronutrients are taken but are mostly discarded or go to waste. In light of this, the present study is designed to explore the

(<sup>1</sup>P G Scholar, <sup>2</sup>Assistant Prof. and Head, <sup>3</sup>Assistant Prof., <sup>4</sup>Professor, <sup>5</sup>Assistant Prof.)

potential of Guava leaves as herbal tea.

## MATERIALS AND METHODS

An experiment was carried out during 2022-23 in the laboratory of the Department of Postharvest Management, K R C College of Horticulture, Arabhavi, (UHS, Bagalkot) of Belgaum district in Karnataka state of India. Guava leaves were collected from guava plants of variety Lucknow-49 between December and January. Food ingredients (Ginger, Cumin, Pepper, Cardamom, Cinnamon powder, etc.) were purchased from the local market. The old leaves free from dirt and damage were harvested and it was washed, then the drained leaves were spread on trays uniformly and dried under the shade till the desired moisture content was reached. The dried leaf was pulverized in a mixer. Then the obtained guava leaf powder was mixed with ginger powder, lemongrass powder and spice mixture (cumin, pepper, cardamom and cinnamon powder) as per recipes mentioned in the treatment details. Then, herbal tea powder was stored in the aluminum pouches under ambient storage conditions for further work. While organoleptic evaluation, herbal tea was prepared by dissolving 1g of herbal tea powder mix in 100 ml of boiling water.

### Treatment details

- T<sub>1</sub> – 30 per cent GLP + 20 per cent GP + 20 per cent LP + 30 per cent spice mixture
- T<sub>2</sub> – 30 per cent GLP + 20 per cent GP + 25 per cent LP + 25 per cent spice mixture
- T<sub>3</sub> – 30 per cent GLP + 25 per cent GP + 20 per cent LP + 25 per cent spice mixture
- T<sub>4</sub> – 30 per cent GLP + 25 per cent GP + 25 per cent LP + 20 per cent spice mixture
- T<sub>5</sub> – 40 per cent GLP + 20 per cent GP + 15 per cent LP + 25 per cent spice mixture
- T<sub>6</sub> – 40 per cent GLP + 20 per cent GP + 20 per cent LP + 20 per cent spice mixture
- T<sub>7</sub> – 40 per cent GLP + 25 per cent GP + 15 per cent LP + 20 per cent spice mixture
- T<sub>8</sub> – 40 per cent GLP + 25 per cent GP + 20 per cent LP + 25 per cent spice mixture
- T<sub>9</sub> – 100 per cent green tea (*Camellia sinensis*) powder (Reference sample)

**Note:** GLP – Guava leaf powder GP- Ginger powder LP- Lemongrass powder

The following nutritional parameters of tea decoction were recorded at initial and bimonthly

intervals for a period of 6 months. The total phenol content in the sample was estimated as per the Folin Ciocalteu Reagent (FCR) method (Sadasivam and Manickam, 2005). The percentage of 2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging activity of the samples was determined by a method described by Eghdami and Sadeghi (2010). The total flavonoid content was determined by the aluminum chloride colorimetric method. The Anno (1990) technique was used to calculate the ascorbic acid content of guava leaf powder-based tea. The organoleptic characters like colour and appearance, flavour, taste and overall acceptability were evaluated by a panel of semi- trained judges consisting of teachers and post-graduate students of KRC College of Horticulture, Arabhavi, on a nine-point hedonic scale and the mean scores given by panelist were used for statistical analysis (Ranganna, 2010). The data recorded on the nutritional and organoleptic parameters were subjected to statistical analysis in Completely Randomized Design (CRD). The interpretation of data was carried out in accordance with Panse and Sukhatme (1985). The level of significance used in 'F' test was p=0.01.

## RESULTS AND DISCUSSION

The mean ascorbic acid content was decreased from 105.54 to 96.82 mg/100g during the storage period (Table 1). The reduction in ascorbic acid content during storage can be attributed to various factors, including the presence of residual air within the packaging material leading to oxidation, or potential involvement of a non-enzymatic anaerobic process (Brocle *et al.*, 1998). At initial, 2, 4 and 6 MAS, the maximum ascorbic acid was found in T<sub>6</sub> *i.e.*, 40 per cent guava leaf powder + 20 per cent ginger powder + 20 per cent lemongrass powder + 20 per cent spice mixture (127.44, 123.83, 119.49 and 117.47 mg/100g, respectively) due to its elevated guava leaf powder content and an equal proportion of ginger and lemongrass, which are known for their ascorbic acid content. Similar decrease in ascorbic acid has been reported by Vyshali (2022) in guava leaf powder.

The mean score for total phenols was decreased gradually over the storage period, from 124.11 to 120.70 mg GAE/g by the end of storage period (Table 1). This phenomenon of reduction in the phenolic contents might be associated with processes like deglycosylation, polymerization or photooxidation affecting the phenolic compounds. The maximum phenolic content was found in T<sub>6</sub> *i.e.*,

40 per cent guava leaf powder + 20 per cent ginger powder + 20 per cent lemongrass powder + 20 per cent spice mixture (129.09, 128.17, 127.81 and 122.74 mg GAE/g) at initial, 2, 4 and 6 MAS, respectively. The incorporation of components like guava leaf powder, lemongrass powder and diverse spice mixtures in the other tea blends played a role in the conversion of tannins into fundamental phenolic compounds. Similar results are shown by Vyshali (2022) in guava leaf powder based herbal tea; Manikant *et al.*, 2023 in tulsi-drumstick herbal tea.

The average score for total antioxidant content seems to decrease over the storage period, from 90.19 to 89.43 per cent (Table 1). This phenomenon might be attributed to the entry of oxygen into the packaging through the packaging material, leading to the oxidation of the antioxidants. Among the different recipes, maximum total antioxidant content was noticed in T<sub>6</sub> *i.e.*, 40 per cent guava leaf powder + 20 per cent ginger powder + 20 per cent lemongrass powder + 20 per cent spice mixture (90.46, 90.11, 89.88 and 89.68 %) at initial, 4 and 6 MAS, respectively. This is primarily attributed to the inclusion of various leaf powders and spice mixtures in herbal teas, which are known for their substantial antioxidant activity. Similar results shown by Ubashana *et al.* (2020) in curry leaf based herbal tea; Manikant *et al.* 2023 in tulsi-drumstick herbal tea.

The mean flavonoid content of the herbal tea was decreased from 1301.80 to 1248.91 mg QE/100g during the storage (Table 1). Both temperature and moisture content affected the degradation of catechin (natural polyphenolic compound belonging to the flavonoid family). Similarly, (Komatsu *et al.* (1993) noticed that, increasing relative humidity led to increased rate of catechin degradation in green tea powder during storage. At initial, 2, 4 and 6 MAS, maximum (1319.80, 1310.47, 1294.47 and 1262.47 mg QE/100 g, respectively) total flavonoid content was noticed in T<sub>6</sub> (40 % guava leaf powder + 20 % ginger powder + 20 % lemongrass powder + 20 % spice mixture). Herbal tea combinations have greater flavonoid content than green tea due to the presence of different leaf powder and spice mixture which possessed highest flavonoid content. Similar results shown by Friedman *et al.* (2009) in green tea powder.

Significant differences were noticed in flavour and taste of the guava leaf powder based herbal tea during the storage period of 6 months in all the treatments (Table 2). Among all treatments, highest

**Table 1.** Effect of different blends on nutritional and chemical properties of guava leaf based herbal tea

Treatments	Ascorbic acid (mg/100g)			Total phenolic content (mg GAE/g)			Total antioxidants (%)			Total flavonoid content (mg QE/100 g)						
	Initial	2	4	Initial	2	4	Initial	2	4	Initial	2	4				
													Months after storage			
T <sub>1</sub>	106.88	104.29	101.42	100.53	122.46	121.68	120.94	119.27	90.25	89.94	89.68	89.33	1297.47	1288.80	1254.13	1243.80
T <sub>2</sub>	104.59	102.25	99.64	97.77	122.78	121.54	121.04	118.56	90.02	89.94	89.66	89.45	1309.80	1295.80	1254.80	1251.13
T <sub>3</sub>	117.80	110.69	104.34	101.36	121.61	120.69	120.33	119.23	90.02	89.90	89.60	89.39	1287.80	1274.13	1262.13	1249.47
T <sub>4</sub>	106.55	103.30	101.37	99.57	122.75	121.93	121.50	120.37	89.89	89.64	89.47	89.13	1287.47	1267.13	1249.47	1247.80
T <sub>5</sub>	101.52	98.25	96.25	95.76	122.81	122.28	121.89	120.76	90.30	89.94	89.58	89.41	1287.80	1275.47	1258.47	1250.80
T <sub>6</sub>	127.44	123.83	119.49	117.47	129.09	128.17	127.81	122.74	90.46	90.11	89.88	89.68	1319.80	1310.47	1294.47	1262.47
T <sub>7</sub>	127.18	122.83	118.28	117.39	127.03	125.83	125.33	121.93	90.23	90.00	89.65	89.45	1314.47	1299.47	1291.13	1255.80
T <sub>8</sub>	108.23	104.56	100.37	98.55	124.48	123.98	123.17	122.03	90.21	90.13	89.58	89.41	1301.47	1281.80	1238.47	1229.47
T <sub>9</sub>	52.90	47.53	44.70	42.93	124.02	122.81	122.42	121.43	90.36	90.05	89.72	89.60	1310.13	1302.47	1259.80	1249.47
Mean	105.54	102.31	98.43	96.82	124.11	123.21	122.72	120.70	90.19	89.96	89.61	89.43	1301.80	1288.39	1262.54	1248.91
S.Em±	0.83	0.90	0.86	0.76	0.34	0.24	0.12	0.21	0.07	0.08	0.07	0.08	1.51	3.13	2.21	1.59
C.D.@1%	2.48	2.66	2.54	2.26	1.36	0.98	0.49	0.84	0.30	0.34	0.30	0.31	6.15	12.75	9.01	6.49

**Table 2.** Effect of different blends on organoleptic parameters of guava leaf based herbal tea

Treatments	Colour and appearance						Flavour						Taste						Overall acceptability					
	Initial		2		4		6		Initial		2		4		6		Initial		2		4		6	
	Months after storage																							
T <sub>1</sub>	8.17	8.17	8.17	8.08	8.08	8.00	8.17	8.17	8.08	8.00	7.92	7.92	7.83	7.92	7.92	7.83	7.92	7.92	7.92	7.83	7.92	7.83	7.92	
T <sub>2</sub>	8.17	8.17	8.17	8.08	8.08	8.00	8.17	8.17	8.00	7.92	8.00	8.00	7.92	8.00	8.00	7.92	8.14	8.10	8.10	8.06	8.06	8.06	8.00	
T <sub>3</sub>	8.00	8.00	8.00	7.92	7.92	7.83	7.92	7.92	7.83	7.58	7.92	7.83	7.67	7.83	7.83	7.58	8.06	7.98	7.98	7.87	7.87	7.77	7.77	
T <sub>4</sub>	8.00	8.00	8.00	7.92	7.92	7.83	7.92	7.92	7.83	7.50	7.83	7.67	7.58	7.83	7.83	8.00	7.83	7.87	7.87	7.79	7.79	7.66	7.66	
T <sub>5</sub>	8.00	8.00	8.00	7.83	7.83	7.67	7.83	7.75	7.58	7.50	7.67	7.50	7.33	7.67	7.67	7.91	7.83	7.83	7.70	7.70	7.60	7.60	7.60	
T <sub>6</sub>	8.00	8.00	8.00	7.92	7.92	7.83	7.92	7.75	7.58	7.50	7.67	7.50	7.33	7.67	7.67	7.87	7.77	7.77	7.66	7.66	7.54	7.54	7.54	
T <sub>7</sub>	8.00	8.00	8.00	7.92	7.92	7.83	7.92	7.75	7.58	7.50	7.67	7.50	7.33	7.67	7.67	7.83	7.83	7.83	7.73	7.73	7.60	7.60	7.60	
T <sub>8</sub>	7.92	7.83	7.83	7.75	7.75	7.50	7.83	7.83	7.67	7.58	7.67	7.58	7.58	7.58	7.58	7.87	7.80	7.80	7.68	7.68	7.56	7.56	7.56	
T <sub>9</sub>	8.17	8.08	7.83	7.83	7.83	7.75	7.00	7.00	6.92	6.83	7.17	7.08	7.00	7.00	7.00	7.64	7.56	7.56	7.43	7.43	7.37	7.37	7.37	
Mean	8.05	8.00	7.89	7.89	7.89	7.76	7.83	7.74	7.65	7.54	7.70	7.61	7.50	7.42	7.42	7.95	7.87	7.87	7.77	7.77	7.67	7.67	7.67	
S.E.m±	0.10	0.07	0.11	0.11	0.11	0.10	0.08	0.08	0.07	0.10	0.08	0.09	0.09	0.10	0.10	0.06	0.04	0.04	0.04	0.04	0.04	0.04	0.04	
C.D.@1%	NS	NS	NS	NS	NS	NS	0.34	0.32	0.30	0.39	0.32	0.36	0.38	0.42	0.42	0.25	0.18	0.18	0.15	0.15	0.14	0.14	0.14	

score (8.17, 8.17, 8.08 and 8.00, respectively) for flavour was recorded in T<sub>1</sub> (30 % guava leaf powder + 20 % ginger powder + 20 % lemongrass powder + 30 % spice mixture) initial, 2, 4 and 6 MAS, respectively and highest score for taste was recorded in T<sub>2</sub> (30 % guava leaf powder + 20 % ginger powder + 25 % lemongrass powder + 25 % spice mixture) at initial and 2 MAS. The variations in the guava leaf powder utilized in the herbal tea powder mixture, as well as the utilization of diverse spice/spice mixture proportions, strongly impact the flavour and taste of the end product. Similar findings were reported by Swami *et al.*, 2014; Many (2014) in different powder-based products. Among the different treatments, treatment combination T<sub>1</sub> (30 % guava leaf powder + 20 % ginger powder + 20 % lemongrass powder + 30 % spice mixture) and T<sub>2</sub> (30 % guava leaf powder + 20 % ginger powder + 25 % lemongrass powder + 25 % spice mixture) exhibited superior overall acceptability, likely due to the lower guava leaf powder concentration and the higher proportions of lemongrass and spice mixture.

## CONCLUSION

Guava leaves are abandoned and squandered during pruning operations, yet they are highly beneficial to health since they are nutritious, anti-inflammatory and aid in keeping good dental health. Hence, better quality herbal tea could be prepared from guava leaf powder with recipe consisting 40 per cent guava leaf powder + 20 per cent ginger powder + 20 per cent lemongrass powder + 20 per cent spice mixture and can be stored up to six months without much deterioration in nutritional and sensory quality.

## ACKNOWLEDGEMENT

I owe my heartfelt gratitude to chairman, members of the advisory committee, all teaching and non-teaching staff of KRCCH, Arabhavi for their constant and consistent support during my research work.

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