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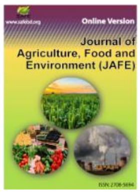

Original Article

Evaluation of physical characteristics and nutritional status of market available Guava (*Psidium guajava* L.) of Noakhali district in Bangladesh

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A B S T R A C T

Guava is a popular, export-promising, fast-growing fruit crop in Bangladesh that encompasses an important demand within the local market. We conducted a study of four types of guavas, specifically Thai guava, Strawberry guava, Kazi guava, and Deshi guava, by observing various parameters. The aim of this investigation to explore the physiochemical characteristics of the guava varieties procured from the local market of Noakhali district of Bangladesh. Physical characteristics such as weight, size, length, diameter, shape, and color were determined, as well as the nutritional status of guava varieties, including their non-reducing, reducing sugar , total sugar contents, vitamin C content, and the relationship between total sugar and vitamin C content, was assessed. According to the results, Kazi guava showed the highest fruit weight (220 gm), length (5.96 cm), and breadth (6.6 cm) compared to the other guava varieties available on the market. All the guava varieties had a similar color (green to pale green), while strawberry guava was red in color. Statistically significant variations were found among the chemical characteristics such as total sugar, reducing sugar, non-reducing sugar, total sugar, reducing sugar and the vitamin C content of various varieties. The highest value of reducing sugar (6.19%), non-reducing sugar (2.02%), and total sugar (8.55%) was found in Thai guava. Vitamin-C content was highest in Deshi guava (74.73 mg/100gm), whereas Kazi guava had the lowest value (61.20 mg/100 gm) of vitamin C content. However, this research explored that Thai guava had comparatively higher nutrition than others, but physical parameters were found to be best in the Kazi guava variety.

Introduction

Guava (*Psidium guajava* L.), a berry-like fruit, is a member of the Myrtaceae family. Although it was first cultivated in the tropics of America, today the top ten guava-producing countries are all located in Asia: the United States, China, Malaysia, India, Pakistan, Thailand, Bangladesh, Mexico, Peru, Taiwan, Cuba, and Taiwan (from Mexico through Peru). Due to its widespread availability, guava has gained the title "poor man's apple of the tropics" (Hassan *et al.*, 2012). As a result of its popularity and the health benefits it provides, it has become an important and widely consumed fruit in Bangladesh. After mangoes, bananas, jackfruit, pineapples, and melons, it is said to be Bangladesh's most valuable fruit in terms of both land area and yield. In Bangladesh, it may be found in every backyard garden, with or without attention, but it is only grown commercially in the cities of Chittagong, Dhaka, Khulna, Rajshahi, Natore, Rangpur, Sylhet and Barisal. BBS (2021) reports that Bangladesh harvested 2,43,957 metric tons of guava fruits in this fiscal year. The expanding demand for tropical fruits and their products can be attributed to the increasing awareness among consumers of the many health advantages connected with their distinctive tastes, substantial nutritional value, and abundant phytochemical content. It has a high market value because of the high quality of its aroma and taste. Next to Amla (600 mg/100 gm), guava is rich in vitamin C (260 mg/100 g) content (Hossen *et al.*, 2009). Water accounts for 83% of a guava fruit, while carbohydrates account for 15%, protein accounts for 2.58%, crude fiber accounts for 2.8%-5.5%, fat accounts for 0.6%, and ash accounts for 0.7%. Micronutrients such as Ca (23 mg/100 gm), P (42 mg/100 gm), Fe (0.09 mg/100 gm), and vitamin A (200–400 IU/100 g) are also abundant in the fruit (Flores *et al.*, 2015; Kadam *et al.*, 2012). Fruits high in vitamins A and C are promoted as "superfruits" in marketing. The vitamin C content of an apple guava is significantly higher than that of an orange. As a point of interest, a 100mg portion of "strawberry guava" has just 30–40 mg of vitamin C. Studies in pharmacology have shown its efficacy in treating a wide variety of medical conditions, including diarrhea, diabetes, infections, hepatitis, allergies, spasms, inflammation, and plasmodium (Upadhyay *et al.*, 2019; Gupta *et al.*, 2018). Tannins, phenols, triterpenes, flavonoids, essential oils, saponins, carotenoids, lectins, vitamins, fiber, and fatty acids are a few of the nutrients that may be present in guava. The ascorbic acid content of guava (60–1000 mg/100 gm) is second only to that of acerola cherries among fruits. Carotenoids, which are found in yellow, red, and orange pigments, have been linked to many health advantages due to their antioxidant properties. The overall sugar content of a fruit often rises at the start of ripening before falling when the fruit achieves full maturity. Different guava tree varieties can pick up the flavor component at different times, resulting in a wide variety of scents and tastes when the fruit is mature. Guava is commercially processed into a variety of value-added products in addition to its fresh state, including wine, guava leather, juices, jam, jellies, freeze-dried and dehydrated slices. There is no guava storage policy in Bangladesh, and no guava-based economy has developed. This is why all production eventually turns into market supply. The rich and the poor people both enjoy guava as a fruit, owing to the fruit's inexpensive price compared to others, high nutritional content, and delicious flavor (Mitra and Sanyal, 2004). Guava is also widely available in Bangladesh's coastal areas. It is by far the most prevalent fruit in the Noakhali district of Bangladesh. The most popular varieties are Desi guava (also known as Desi peyara), Thai guava, Strawberry guava, and Kazi guava. The Noakhali market has such guavas for sale. Since guavas are readily accessible and inexpensive, they have mostly replaced imported varieties. Producing guavas in Noakhali helps meet the dietary needs of the local population. However, there is a lack of data describing their physiochemical and nutritional characteristics. In order to determine their value in the marketplace, fruit cultivars must be characterized according to their physicochemical, biochemical, and nutraceutical properties (Kyriacou *et al*, 2020; Ulhaq *et al.*, 2013). Additionally, physicochemical evaluations are crucial for transport, customer acceptance, and packaging. A variety of nutraceutical products may be created using it because of its nutritional value and health benefits (Ho *et al.*, 2012). In order to determine whether or not certain guava varieties from a specific market in Noakhali are technologically and nutritionally suitable for use as fresh or processed products on the domestic and international markets, a thorough evaluation of their physical, chemical, and nutritional quality characteristics at maturity has been conducted.

Methodology

This study was conducted collaboratively at the Laboratory of Agriculture Department of, Noakhali Science and Technology University and the Biochemistry and Molecular Biology Department of Bangladesh Agricultural University, Mymensingh-2202. All of the guava varieties used in this study were from the Noakhali district local market. In this experiment, four guava varieties were used: Thai guava, Strawberry guava, Kazi guava, and Deshi guava. The guavas were carefully selected to acquire the best mature stage since it has the highest concentration of pectin, sugar, and citric acid. Additionally, pertinent materials needed for the tests were obtained from the laboratory stocks.

Methods used for studying the parameters of fruit

Physical parameters

Ripe guavas were obtained from the local village market, and immediately after collection, the weight of the fruits was taken. The electrical balance was used to measure the weight of the fruits in grams (g). Fruits were measured manually with a slide caliper to determine their length and width in centimeters (cm). The skin color was determined at the adult stage by comparing it to a color chart, and was then categorized in terms of light green, yellow green, yellow, red, etc.

Nutritional parameters

Total sugar content (%)

The total sugar (%) of the guava fruit was determined using the anthrone calorimetric method (Jayaraman, 1981).The total sugar content was calculated using the following chemicals:

Anthrone reagent

2 gm of anthrone were dissolved in 1 liter of concentrated H_2SO_4 to make the reagent.

Standard glucose solution

By mixing 10 mg of glucose with 10 ml of distilled water, a standard glucose solution was made.

Sugar extraction from guava fruit

The method (Loomis and Shull, 1937) used to extract sugar from guava pulp is as follows:

5 gm of guava pulp were cut into small pieces and added to boiling ethyl alcohol and allowed to boil for 5 to 10 minutes (10 to 20 ml of alcohol were used per gm of pulp). The extract was re-extracted for 3 minutes in hot 80% alcohol using 2 to 3 ml of alcohol per gm of tissue after being filtered through two layers of cloth. With the second extraction, alcohol was completely removed using the appropriate materials. After cooling, the extract was run through two layers of cloth. Whatman No. 1 filter paper was used to filter both extracts. Over a steam bath, the extract's volume was evaporated to roughly 25% of its original volume, and then chilled. A volumetric flask (100 ml) was filled to the appropriate level with distilled water after the extract's reduced volume was placed there.

Procedure

Pipetting 1 ml of pulp extract as an aliquot into test tubes, then adding 4 ml of anthrone reagent and thoroughly mixing each solution. Each test tube was topped with a glass marble to prevent the evaporation of water. After 10 minutes in a boiling water bath, the tubes were removed and allowed to cool. By mixing 4 ml of anthrone reagent and 1 ml of water in a tube, a blank reagent was made and handled similarly. A colorimeter was used to measure the blue-green solution's absorbance at 620 nm. In order to make the glucose solutions, test tubes containing 0.0, 0.1, 0.2, 0.4, 0.6, 0.8, and 1.0 ml of standard glucose solution were filled with distilled water to a volume of 1 ml. The test tubes were then filled with 0.0, 10, 20, 40, 60, 80, and 100 g of glucose, respectively. Anthrone reagent (4 ml) was then added to each test tube and thoroughly mixed. The same methodology was used to treat each of these solutions. Anthrone reagent, 1 ml of water, and 4 ml of blank were used to test the absorbance at 620 nm. The standard curve of glucose was used to determine how much total sugar was present in the extract (Figure 1).The following formula was used to determine the final percentage of total sugar:

$$\%\text{Total Sugar} = \frac{\text{Amount of sugar obtained}}{\text{weight of sample(g)}} \times 100$$

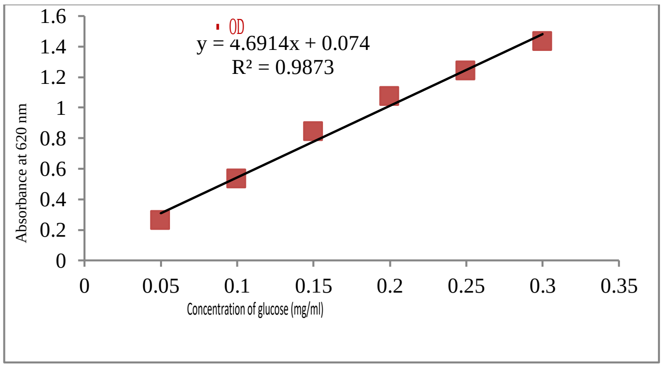

Figure 1: Standard curve of glucose for estimation of total sugar.
OD = Optical Density

Determination of reducing sugar

In order to calculate the reducing sugar content of guava fruit, the dinitrosalicylic acid method was used (Miller *et al.*, 1972).

Reagents

Dinitrosalicylic acid (DNS) reagent

Simultaneously 1g of DNS, 200 ml of crystalline Phenol and 50 mg of sodium sulphite were placed in a beaker and mixed with 100 ml of 1% NaOH by stirring. When storage was required, sodium sulphite was then added right before use.

Rochelle salt (40% solution)

It was prepared by dissolving 40 g of sodium potassium-tartarate with100 ml of distilled water in 100 ml volumetric flask.

Extraction of sugar from guava pulp

The same method was used to remove the sugar from the guava pulp as was previously detailed.

Procedure

A sample of 1 ml of the extract was pipetted into each test tube, and 3 ml of DNS reagent was then added and thoroughly mixed with each of these solutions. The test tube was heated in a boiling water bath for 5 minutes. 1 ml of 40% rochelle salt was added to the contents of the tubes after color development while they were still warm. The test tubes were then cooled using running water from the tap. By mixing 3 ml of distilled water with 3 ml of DNS reagent in a tube, a reagent blank was made and treated similarly. In a colorimeter, the solution's absorbance was determined at 575 nm. The glucose standard curve was used to calculate the amount of reducing sugar. The formula below was used to calculate the amount of reducing sugar in the guava pulp:

$$\%\text{ Reducing Sugar }\left(\frac{\text{g}}{100\text{g}}\text{of sample}\right) = \frac{\text{Amount of sugar obtained}}{\text{weight of sample(g)}} \times 100$$

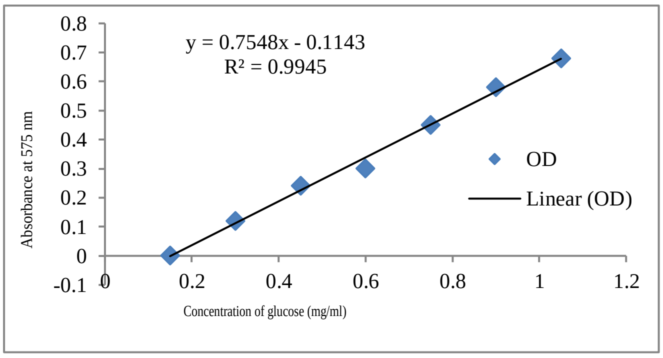

Figure 2: Standard glucose curve for reducing sugar estimation.
OD = Optical Density

Estimation of non-reducing sugar (%)

Non-reducing sugar = % total sugar - % reducing sugar

Determination of Vitamin C content

For the estimation of vitamin C content, the following reagents were used.

Reagents

3% Metaphosphoric acid (HPO_3)

The sticks of HPO_3 were dissolved in distilled water to make it.

Standard ascorbic acid solution

Ascorbic acid was dissolved in a 3% solution of metaphosphoric acid to make ten milligram percent (10 mg%) L-ascorbic acid solution.

Dye solution

It was made by dissolving 260 mg of the sodium salt of 2, 6-dichloroindophenol in a liter of distilled water that also contains 210 mg/liter of sodium bicarbonate.

The following steps were followed for estimation of vitamin C

Standardization of dye solution

5 ml of standard ascorbic acid solution and 5 ml of metaphosphoric acid (HPO_3) were added to a conical flask, which was then shaken. The dye solution was poured into a micro burette. The dye was then added to the combined solution using phenolphthalein indicator solution, which produced a pink color at the end point that continued for at least 15 seconds. The following formula was used to determine the dye factor:

$$\text{Dye factor} = \frac{\text{Titre}}{0.5}$$

Preparation of sample

In a 100 ml beaker, 10 gm of fresh pulp and 50 ml of 3% metaphosphoric acid were added, and the mixture was blended with the same volume of metaphosphoric acid. It was blended, then filtered before being transferred to a 100 ml volumetric flask and being adjusted to the proper consistency using 3% metaphosphoric acid.

Titration

A conical flask was used to measure the amount of 2, 6-dichlorophenol indophenol dye in five milliliters of the aliquot. The indicator, phenolphthalein, which produced a pink end point and lasted for at least 15 seconds, was utilized. The following formula was used to determine the samples' ascorbic acid content:

$$\% \text{ Titratable acidity} = \frac{T \times N \times V1 \times E}{V2 \times W \times 1000} \times 100$$

Where,
T= Titre
D= Dye factor
V1= Volume made up (ml)
V2= Aliquot of extract taken for estimation (ml) and
W= Weight of sample for estimation (g)

Measuring the amount of vitamin C in a colored sample (Strawberry guava)

Since a strongly colored test solution makes it difficult to see the end point, 1 ml of chloroform is added to the reaction mixture, and the end point is determined when the inorganic phase exhibits a persistent pink tint. The vitamin-C content is determined using the same procedures for the test and blank.

Analysis of data

To test the significant correlation between total sugar and vitamin C, Pearson correlation coefficient is measured for all four varieties of guavas. To test the significant mean difference among different varieties of guava, analysis of variance (ANOVA) was performed for total sugar and vitamin C separately. As a post–hoc analysis Least Significant Difference (LSD) test was performed to find the most sugar content and vitamin C content variety. All the statistical analysis was conducted in SPSS version 25.

Result and Discussion

Physical parameters

The weight of fruits among the selected varieties of guava fruit showed a considerable variation at the mature stage. Fruit weight ranged from 145 to 220 gm, with the Kazi guava having the highest fruit weight (220 gm) and the Strawberry guava having the lowest fruit weight (145 gm). The weight of Thai guava and Deshi guava was 200 gm and 175 gm, respectively. Fruit length ranged from 4.12 cm (in Strawberry guava) to 6.96 cm (in Kazi guava) among the four selected varieties. The variation in the fruit breadth ranged from 3.73 cm (in Strawberry Guava) to 5.65 cm (in Kazi Guava), presenting remarkable differences in the diversely selected varieties. This study showed similarities with the results of Ullah (1992) and Nag (1998). Ullah et al., (1992) carried out a study at RARS (Regional Agricultural Research Station), Akbarpur, and Moulavibazar on the physico-chemical properties of the fruits of nine guava cultivars. From the experiment, it was found that Kazi guava was the largest in size and weight (9.5 cm x 8.95 cm and 446.3 gm) among the guava varieties. The remaining fruits ranged in weight from 68.8 to 165.6 gm and measured 4.95 cm x 4.65 cm to 6.35 cm x 6.35 cm. The number of seeds per fruit ranged from 222.2 to 426.8. Kazi piara had the highest edible portion (98.23%) and Syedi had the lowest (96.65%). Nag (1998) conducted an experiment on the physico-chemical characteristics of 4 varieties guava during different stages of ripening. The highest fruit weight was obtained from Kazi Piara (226.4 gm), followed by the local variety (230.8 gm), Mukundapuri (166.0 gm), and Swarupkathi (115.2 gm). Bogha *et al.* (2020) discovered that guava weighed 166.43 gm, measured 8.53 cm in length, 6.76 cm in diameter, and had a specific gravity of 1.04 percent; it was rounded and oval in shape and yellowish white and green in color. Consumers are drawn to fruit mostly because of its color. The fruit looks better with a pleasing color, which increases its value in both home and international markets.
All guavas are green, with the exception of the strawberry guava.

Table 1: Physical parameters of different varieties of guava.

Guava varieties	Weight (gm)	Fruit length (cm)	Fruit breadth (cm)	Color
Thai guava	200	5.36	5.12	Pale Green
Strawberry guava	145	4.12	3.73	Red
Kazi guava	220	6.96	5.65	Green
Deshi guava	175	4.96	4.20	Green

*Each value is the average of representative samples

Chemical parameters

Reducing sugar content in guava varieties

The data on the reduced sugar content (%) of the market-available guava varieties are presented in Figure 3. Regarding the reducing sugar content (%), there were noticeable differences between the treatments was found. Thai guava had the highest reducing sugar content (6.19%), while Strawberry guava had the lowest (5.23%). The Kazi guava and Deshi guava contents reduced sugar by 5.39% and 5.93%, respectively. Meena *et al.*, (2016) carried out a study on the fruit quality of guava and stated that maximum reducing sugar (8.85%), non-reducing sugar (2.24%) and total sugar (11.14%) were recorded. According to this study, Thai guavas have the highest amount of reducing sugar (6.19%).

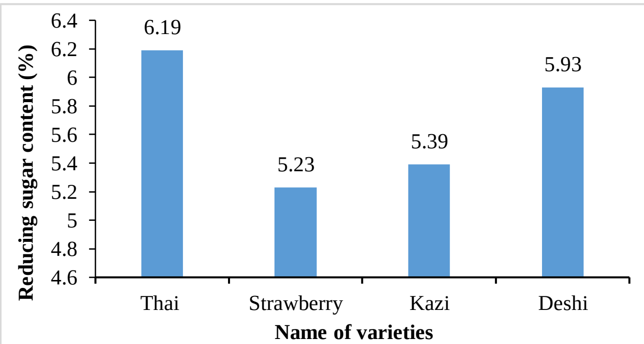

Figure 3. Reducing sugar content of different varieties of guava fruit.

Non-reducing sugar content in guava varieties

Thai guava contain most non-reducing sugar and that was 2.02%, followed by Kazi guava (1.34%) and Deshi guava (1.33%), and strawberry contained the least amount of non-reducing sugar, at 0.81% (Figure 4). According to Meena *et al.* (2016), the non-reducing sugar content is 2.24 percent.

Only Thai guava has the most similar amount of non-reducing sugar to the other three varieties, at 2.02%.

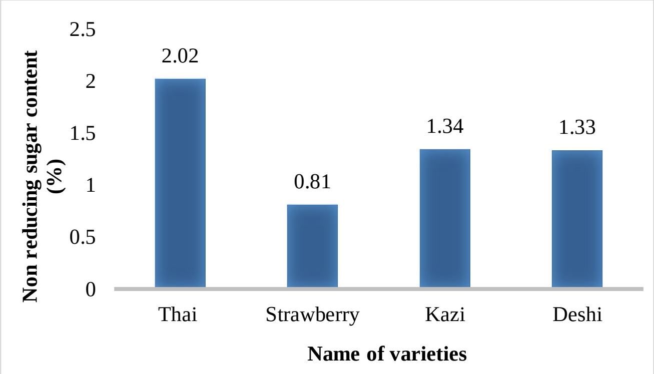

Figure 4. Non-reducing sugar content of different varieties of guava fruit.

Total sugar content in guava varieties

The total sugar content of the selected varieties of guava varied (Figure 5). Among the varieties named Thai, strawberry, Kazi, and Deshi guava, more total sugar was contained by Thai guava than by others, and the percentage was 8.55%. Thai possessed the most total sugar of all the samples. Deshi had a slight underline over Thai in terms of total sugar content, and the amount was 7.26%. The least amount of total sugar is contained in strawberry guava; it is only 6.04%. Kazi guava had slightly more than strawberry, at around 6.73%. According to Kahlon *et al*. (1997), total sugar in guava ranged from 4.81 to 8.77% during the rainy season and from 5.24 to 9.29% during the winter season. This study's findings are most similar to Kahlon's. The total sugar content of four varieties ranges from 6 to 10%.

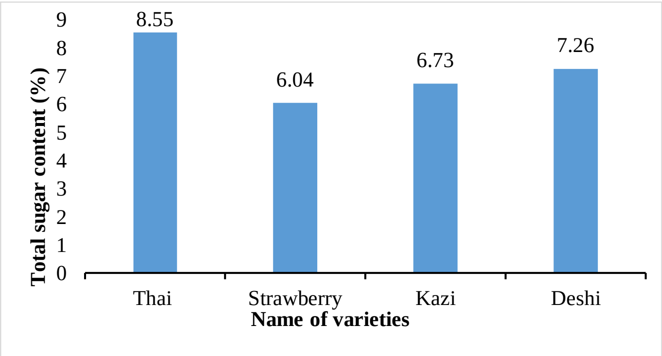

Figure 5: Total sugar content of different varieties of guava fruit.

Vitamin C content in guava varieties

Guava varieties were analyzed for vitamin-C content. Deshi guava contains more vitamin C than the other three varieties. Vitamin-C content in guava varieties is shown in Figure 6. A highly significant variation was noticed in relation to vitamin-C content among all the varieties. Vitamin-C content was highest in Deshi guava (74.73 mg/100 gm), while the lowest vitamin-C content was found in Kazi guava (61.2 mg/100 gm). Along with Thai and Strawberry guava, it contains Vitamin-C (69.53 mg/100 gm) and (71.53 mg/100 gm). Similarly, Gull *et al*., (2012) observed variation in vitamin-C content among different guava varieties. They observed lower values for vitamin C concentration in the Bhakkar variety of guava fruit, with values ranging from 73.1 to 129.5 mg/100 gm.

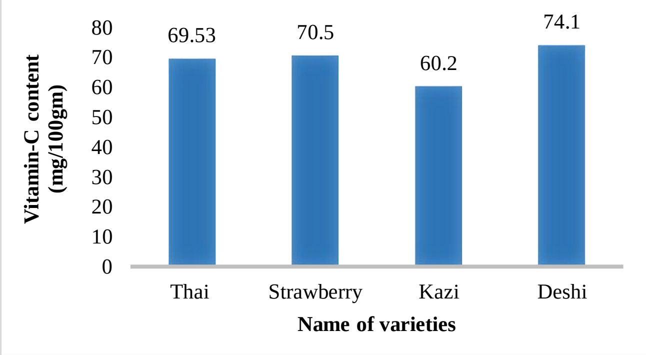

Figure 4: Vitamin C content of different varieties of guava fruit.

Relationship between total sugar and vitamin C in different varieties of guava

Table 2 revealed the Pearson correlation of total sugar and vitamin C content in different varieties of guava in Bangladesh. The table shows no significant correlation in total sugar and vitamin C in each variety of guavas. Table 3 shows an ANOVA table of total sugar and vitamin C content in various guava types. The table shows that the p-value for total sugar is 0.000, indicating that there are substantial differences between the means of total sugar in the various guava varieties. The p-value of vitamin C is also 0.000 which reveals that the means of vitamin C in different varieties are significantly different. In table 4 we calculate significant mean differences (based on LSD) of different varieties of guavas for total sugar and vitamin C. We found mean difference of total sugar of each variety combinations are significant at 5% level of significance. Form the above table we observed that Thai guava has maximum sugar content and the minimum sugar content is found in Strawberry guava. The mean differences of all the guava variety combinations for vitamin C are significant at the 5% level of significance except the mean difference of Thai guava and Strawberry guava. The multiple comparison table represents Deshi guava contain maximum vitamin than other guava variety and minimum vitamin C content is found in Kazi guava. Total sugar and Vitamin C are important guava characteristics with is valuable for human diet. We have analyzed total sugar and vitamin C in four different guava genotypes in Bangladesh. Total sugar was found to be significant (p 0.05) within genotypes. The same result was found in the case of vitamin C within groups (p 0.05). According to multiple comparison analysis, each genotype differs from others in both traits of interest (p 0.05). Different factors may affect the biochemical compound contents of guava fruit (Rajkumar *et al*., 2000). Total sugar and vitamin C content may be affected mostly by environmental factors. However, agronomic conditions also contribute to the total sugar and vitamin C contents of guava (Kondakova *et al*., 2009). Total sugar may increase in guava during storage. At this time, starch started to convert into simple sugar molecules. During storage and collection time, there is some water loss in fruit. This may lead to sugar levels increasing in guava (Javed *et al*., 2015). Sugar, which increases by reducing starch, has a certain level after which it tends to decrease. Because there are limits to how much starch can be converted, the sugar begins to form other organic acids after a certain trade-off limit. However, our result on total sugar content is in similar agreement with Mahajan *et al*., (2011), who found that total sugar content significantly differed from genotype to genotype. Javed et al. (2015) have found that storage time increased sugar content as it allowed starch to reduce sugar when water availability was less. The genotypes are significantly different from each other in terms of total sugar content. Total sugar content is dependent on not only genetic factors but also environmental factors, agronomic factors, and storage time. Genes control the production of sugar in guava, but mostly other factors influence the amounts in guava (Hakim *et al*., 2012). The vitamin-C content of different guava genotypes varied significantly as well. This may lead one to conclude that vitamin C content is mostly influenced by other factors than genetic control. During fruit processing and storage conditions, vitamin C degrades due to oxidation (Veltman *et al*., 2000). Our results are similar to the study of Mahajan *et al*., (2011), who found that vitamin C content is significantly different from genotype to genotype. They also emphasized that biochemical compounds are mostly controlled by different factors such as agronomic, environmental, and management rather than genetic potential.

Table 2: Pearson correlation of total sugar and vitamin C in different varieties of guava.

Variety Names	Thaiguava	Strawberry guava	Kazi guava	Deshi guava
Pearson Correlation	0.982	-0.549	-0.5	-0.581
p-value	0.121	0.63	0.667	0.606

* Correlation is significant at the 0.05 level.

Table 3: ANOVA of total sugar and vitamin C in different varieties.

Parameter	Source of Variation	Sum of Squares	df	Mean Square	F	p-value
Total Sugar	Between Groups	10.141	3	3.38	2216.721	0.000
	Within Groups	0.012	8	0.002		
	Total	10.154	11			
Vitamin C	Between Groups	300.49	3	100.163	85.245	0.000
	Within Groups	9.4	8	1.175		
	Total	309.89	11			

Table 4: Multiple comparison tests (Least significant difference: LSD).

Parameter	Variety (I) (Mean)	Variety(J) (Mean)	Mean Difference (I-J)	Std. Error	p-value	95% Confidence Interval	
Total Sugar	Thai guava	Strawberry guava	2.510*	0.0319	0.000	2.4365	2.5835
		Kazi guava	1.820*	0.0319	0.000	1.7465	1.8935
		Deshi guava	1.290*	0.0319	0.000	1.2165	1.3635
	Strawberry guava	Kazi guava	-.690*	0.03189	0.000	-0.7635	-0.6165
		Deshi guava	-1.220*	0.03189	0.000	-1.2935	-1.1465
	Kazi guava	Deshi guava	-.5300*	0.03189	0.000	-0.6035	-0.4565
Vitamin C	Thai guava	Strawberry guava	-2	0.8851	0.054	-4.041	0.041
		Kazi guava	8.333*	0.8851	0.000	6.2924	10.3743
		Deshi guava	-5.200*	0.8851	0.000	-7.241	-3.159
	Strawberry guava	Kazi guava	10.333*	0.8850	0.000	8.2924	12.3743
		Deshi guava	-3.200*	0.8850	0.007	-5.241	-1.159
	Kazi guava	Deshi guava	-13.533*	0.88506	0.000	-15.5743	-11.4924

* At the 0.05 level, the mean difference is significant.

Conclusion

Wide substantial differences were observed among the different guava fruits in terms of quantitative parameters such as fruit size and fruit weight. Kazi guava showed maximum fruit weight (220 g), length (5.96 cm), and breadth (6.6 cm). Chemical characteristics including vitamin-C content, total sugar, reducing sugar, and non-reducing sugar all showed statistically significant differences. The highest reducing sugar (6.19%), non-reducing sugar (2.02%), and total sugar (8.55%) are found in Thai guava. The highest vitamin-C (74.1 mg/100 gm) content was observed in the fruit of the Deshi guava. Studying the results on several guava varieties has shown that there is variety with regard to various morphological, physical, and chemical qualities. The chemical properties of various varieties of guava differed significantly. Based on the analysis, it was determined that Deshi and Thai guavas were superior to other types in terms of many physiochemical fruit characteristics. The other varieties, i.e., strawberry and Kazi guava, were also superior in some of their characteristics as compared to the other varieties. So locally grown or market-available varieties have industrial and market value as well as high nutritive value for human consumption, and they can also be used as raw materials in food industries. To verify the results of the current investigation, the experiment should be repeated.

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Conflict of interest statement

The authors have done this research and written the article, and there is no conflict of interest, including any financial, personal, or other relationships with other people or organizations.

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