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Physico-chemical characteristics of fresh banana and guava fruits

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Abstract
The fresh banana and guava fruits were evaluated for various physico-chemical characteristics. Data show that average fruit weight and pulp weight of banana and guava fruits were 144.00 and 121.33 g and 661.00 and 820.66 g/kg fruit. The yield of pulp was 66.10% in banana and 82.06% in guava fruits. Total soluble solids, total sugars, reducing sugars and pectin in banana and guava fruits were 20.20 and 10.70%, 14.60 and 9.12%, 7.97 and 4.36%, and 0.93 and 0.97%, respectively. Specific gravity, acidity, pH and ascorbic acid in banana and guava fruits were found to be 0.95 and 0.96, 0.41 and 0.48%, 4.38 and 4.30, and 5.07 and 123.88 mg/100g, respectively. The banana fruit had total carotenoids (0.68 mg/100 g). Total phenols in banana and guava fruits were recorded as 7.48 and 40.24 mg/100g.

Keywords: Banana, guava, physico-chemical, characteristics, fresh fruit

Introduction
Banana (*Musa paradisiaca* L.) belongs to family Musaceae. It is one of the most widely cultivated fruits in tropical countries. Banana is one of the cheapest, delicious and most nourishing among fruits. It is preferred by people of all ages. It has also several medicinal properties. Pulp of ripe banana contains 18% sugar and is also rich in vitamin A and B (Aurore *et al*., 2009) [5]. According to Adamu *et al*. (2017) [2], it contains moisture (58.24 g/100 g), carbohydrates (30.33 g/100 g), protein (3.5 g/100 g), fat (1.30 g/100 g), crude fibre (3.53 g/100 g) and ash (3.10 g/100 g). Ripe banana is rich in carotenoids (735 mg/100 g), ascorbic acid (12.7 mg/100 g), citric acid and malic acid (Kumar *et al*., 2012) [11]. Potassium (342 mg/100 g) is the most abundant mineral present in edible portion of banana followed by magnesium (30.8 mg/100 g), calcium (4.9 mg/100 g) and phosphorous (30.8 mg/100 g). It is also rich in phenolic compounds and flavonoids, which have antioxidant properties (Alothman *et al*., 2009) [3].

Guava (*Psidium guajava* L.) is a tropical fruit and belongs to family Myrtaceae. Guava fruits are mainly produced in Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra and West Bengal. It is known as poor man's apple because it is available in abundance and at low price during fruiting seasons. Guava makes significant nutritional contribution to human beings for being a cheap source of protective foods. It has about 83% moisture and is an excellent source of ascorbic acid. It contains about four times more amount of vitamin C than orange. It is rich in minerals like phosphorous (23-37 mg/100 g), calcium (14-30 mg/100 g), iron (0.6-1.4 mg/100 g) and vitamins like niacin, pantothenic acid, thiamine, riboflavin, vitamin A and pectin, but has low energy (66 calories/100 g) and only 1% protein content (Bose *et al*., 1999) [7]. Guava is also a good source of dietary fibre and folic acid.

Keeping in view the medicinal and nutritional importance of banana and guava fruits, the work was conducted to study physico-chemical characteristics of fresh banana and guava fruits for its further utilization and processing into different value added products either individually or its pulp blended in different proportions.

Materials and Methods
The present study was conducted in Centre of Food Science and Technology, CCS HAU, Hisar during 2017-18. Banana and guava fruits were collected from local market, Hisar for analyzing its physico-chemical characteristics. Under physical parameters, fruit weight was measured in banana fruit by taking weight of six individual fruits on electronic balance and

average fruit weight was calculated and expressed in grams. For guava, five fruits were selected randomly and replicated thrice. Weight of five guava fruits was taken using electronic balance and average weight per fruit was calculated and expressed in grams.

Pulp weight was also calculated by using electronic balance. Banana and guava fruits were selected randomly and replicated thrice for recording initial weight of fruits. Banana fruits were peeled off and in guava fruits, seeds were removed. The excluded material was weighed on top pan electronic balance and pulp weight was calculated by subtracting excluded material from initial weight of the fruits and expressed in g/kg. The yield of pulp was estimated by taking weight of net screened pulp in comparison to weight of fresh fruit and the value was expressed in per cent.

Total soluble solids (TSS) were estimated at ambient temperature by hand refractometer (0-32%) and the values were expressed as per cent TSS. Total and reducing sugars were estimated by the method of Hulme & Narain (1931) [8]. Pectin (as calcium pectate), acidity, ascorbic acid and browning in fresh fruits were analyzed by the methods of Ranganna (2014) [16]. Total carotenoids were analyzed by Rodriguez-Amaya method (2004) [17], while total phenols were estimated as per the methods given by Amorium *et al.* (1997) [4]. Specific gravity was estimated as per the method suggested by AOAC (2019) [1] and pH of fresh fruit was estimated by Elico digital pH meter. The fruit pulp sample was diluted to 1:10 ratio for pH determination.

Table 1: Physico-chemical characteristics of fresh banana and guava fruits*

Sr. No.	Parameters	Banana	Guava
1.	Fruit weight (g)	144.00 ± 0.82	121.33 ± 1.70
2.	Pulp weight (g/kg fruit)	661.00 ± 0.62	820.66 ± 0.94
3.	Yield of pulp (%)	66.10 ± 0.37	82.06 ± 0.21
4.	Total soluble solids (%)	20.20 ± 0.83	10.70 ± 0.20
5.	Total sugars (%)	16.60 ± 0.07	9.12 ± 0.09
6.	Reducing sugars (%)	7.97 ± 0.16	4.36 ± 0.02
7.	Pectin (%)	0.93 ± 0.07	0.97 ± 0.05
8.	Specific gravity	0.95 ± 0.08	0.96 ± 0.06
9.	Acidity (%)	0.41 ± 0.04	0.48 ± 0.02
10.	pH	4.38 ± 0.08	4.30 ± 0.02
11.	Ascorbic acid (mg/100 g)	5.07 ± 0.05	123.88 ± 0.02
12.	Total carotenoids (mg/100 g)	0.68 ± 0.09	_
13.	Total phenols (mg/100 g)	7.48 ± 0.03	40.24 ± 0.02

*The values are mean ± S.D. of three replicates

Results and Discussion

The fresh banana and guava fruits were analyzed for various physico-chemical characteristics. The data reveal that average fruit weight and pulp weight in banana fruits were 144.00 g and 661.00 g/kg fruit. The yield of pulp was 66.10% in banana fruits. Total soluble solids, total sugars, reducing sugars and pectin in banana fruits were observed to be 20.20%, 16.60%, 7.97% and 0.93%, respectively. Specific gravity, acidity, pH and ascorbic acid in banana fruits were found to be 0.95, 0.41%, 4.38 and 5.07 mg/100 g, respectively. The banana fruit had total carotenoids (0.68 mg/100 g) and total phenols (7.48 mg/100 g). Similar results were also reported by Tapre & Jain (2012) [21], Babu *et al.* (2012) [6], Kayshar *et al.* (2014) [10], Patil *et al.* (2015) [14], Siji & Nandini (2017) [20] and Shwe & Win (2019) [19] in different cultivars of banana fruit.

The average fruit weight, pulp weight and yield of pulp in guava fruits were 121.33 g, 820.66 g/kg fruit and 82.06%. Total soluble solids, total sugars, reducing sugars and pectin in guava fruits were observed to be 10.70%, 9.12%, 4.36% and 0.97%, respectively. Specific gravity, acidity, pH and ascorbic acid content in guava fruits were found to be 0.96, 0.48%, 4.30 and 123.88 mg/100 g, respectively. Total carotenoids in guava fruits could not be detected and total phenols in guava fruits were 40.24 mg/100 g. The physico-chemical characteristics regarding guava fruits are in conformity with the findings of Patel *et al.* (2011) [13], Joshi *et al.* (2011), Mahour *et al.* (2012) [12], Sahoo *et al.* (2017) [18], Joshi *et al.* (2018) [9] and Rana *et al.* (2018) in different varieties of guava fruit.

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