International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(3): 1098-1100

Received: 28-03-2020
Accepted: 30-04-2020

Sandeep Kumar
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, (Haryana), India

Rakesh Gehlot
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, (Haryana), India

Rekha
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, (Haryana), India

Ritu Sindhu
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, (Haryana), India

Rattan Singh
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, (Haryana), India

Corresponding Author:
Rattan Singh
Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana, India

Physico-chemical characteristics of fresh guava and papaya fruits

Sandeep Kumar, Rakesh Gehlot, Rekha, Ritu Sindhu and Rattan Singh

DOI: https://doi.org/10.22271/chemi.2020.v8.i3n.9348

Abstract
The fresh guava and papaya fruits were evaluated for various physico-chemical characteristics. Data show that average flesh firmness, fruit weight and pulp weight of guava and papaya fruits were 9.40 and 5.20 kg/cm^2, 132.48 and 3281.68 g, and 731.24 and 773.36 g/kg fruit. Physico-chemical constituents in guava and papaya fruits such as total soluble solids (TSS), total sugars, reducing sugars and acidity were analyzed to be 9.00 and 11.40%, 6.46 and 8.72%, 4.04 and 5.02%, and 0.61 and 0.17%, whereas pectin, ascorbic acid, total carotenoids and total phenols were found to be 1.05 and 0.86%, 176.64 and 66.24 mg/100 g, 0.72 and 3.69 mg/100 g and 114.04 and 65.02 mg/100 g, respectively.

Keywords: Guava, papaya, physico-chemical, characteristics, fresh fruit

Introduction
Guava (*Psidium guajava* L.), popularly known as "poor man's apple", is available in plenty at low price during fruiting seasons (Zamir *et al.*, 2007). The fruits are rich in dietary fibre and vitamin C (150 to 250 mg/100 g), with moderate levels of folic acid. It contains fair amount of other vitamins like A, B and minerals like Fe, Ca and P. The fruit contains carbohydrates (14.5%), protein (1.5%), fat (0.2%), calcium (0.01%), phosphorus (0.04%), iron (1.00%), vitamin B_1 (30 mg/100 g) and vitamin B_2 (30 mg/100 g). Fresh guava juice contains TSS (8.70°Bx), reducing sugars (2.68%), non-reducing sugar (4.78%), total sugars (7.84%), pH (4.21) and titratable acidity (0.44%) as reported by Ginat *et al.* (2013) [6]. Having a generally broad, low calorie profile of essential nutrients, a single fruit contains about four times more amount of vitamin C than orange. All parts of this tree, including fruits, leaves, bark, seeds and roots have been used for treating respiratory and gastrointestinal disorders, and as an antispasmodic, anti-inflammatory, as a cough sedative, anti-diarrheic, in the management of hypertension, obesity and in the control of diabetes mellitus. It also possesses anticancer properties. The seeds are used for antimicrobial, gastrointestinal, anti-allergic and anti-carcinogenic activity.

It increasingly became a crop of commercial significance in several countries due to its hardy nature, prolific bearing, high remuneration with less maintenance and high vitamin C. The high ascorbic acid content of guava makes it a powerhouse in reducing free radicals and oxidation, responsible for causing degenerative diseases. Of late, guava cultivation has become prevalent due to its nutritional value and value added products. It is popular in India due to its delightful taste, pleasant flavour, high palatability and good digestive value. Guava fruits are highly perishable in nature; hence, low cost processing technology of guava fruits is urgently required to utilize the surplus produce.

Papaya (*Carica papaya* L.) belongs to family Caricaceae. It is a common man's fruit due to its reasonable price and high nutritive value. It is also regarded as "the wonder fruit of the tropics and subtropics". Owing to increased demand for fruits and papain, the area and production of papaya have increased quickly during the last few decades. It comes early in bearing than any other fruit crops and produces fruits in less than a year. It is an excellent source of vitamin A (2020 IU/100 g) and also rich source of other vitamins (Addai *et al.*, 2013) [2]. Apart from β-carotene, it is a rich source of minerals like potassium and magnesium, and nutrients such as vitamins B, vitamins C, vitamin E, flavonoids, folate, pantothenic acid and fibre (Ramachandran & Nagarajan, 2014) [13]. It has anti-inflammatory, anti-tumour, anti-fungal, anti-bacterial and wound healing medicinal properties (Aravind *et al.*, 2013) [4].

All parts of papaya, including seeds, roots, rind and fruits have positive effects on general health preventing diseases. In terms of digestion, the latex and juice of fruit aid in dyspepsia. Intestinal irritation, habitual constipation, chronic diarrhoea, bleeding piles, enlarged spleen and liver can also be improved (Abas *et al.*, 2006) [1]. The ripe papaya fruit is usually eaten raw, without skin and seeds. The unripe green fruit can be eaten cooked, usually in curries, salads and stews. Traditionally, papaya fruit has been used in preparation of salads, juice, ready-to-serve drink, nectar, squash, sherbets, jam and confections like tutti-frutti and candy slices. However, consumer trend towards papaya products emphasize the need of its value enhancement with fortification of novel ingredients and promote it as a high valued product.

Blends of pulp/juice from two or more fruits could be utilized profitably for processing, which separately may not otherwise have favourable characteristics like colour, flavour, aroma, taste, mouthfeel and overall acceptability of its processed products. The fresh guava and papaya fruits have limited shelf life. Blending of guava and papaya could be an economic alternative to consume these profitably.

Keeping in view the medicinal and nutritional importance of guava and papaya fruits, the work was conducted to study physico-chemical characteristics of fresh guava and papaya 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 2018-19. Ripe guava fruits cv. Hisar Safeda was procured from Experimental Orchard of Department of Horticulture, CCSHAU, Hisar and ripe papaya fruits were procured from local market, Hisar for collecting pulp for analyzing its physico-chemical characteristics. Five fruits (guava and papaya) were selected randomly and penetrometer was used to pierce the fruits to observe the flesh firmness. The procedure was replicated thrice. Average flesh firmness was then calculated and expressed in kg/cm^2. Fruit weight and pulp weight were calculated by direct weighing with an electronic balance. Five fruits were selected randomly, weighed and replicated thrice for recording observations. Initial weight of randomly selected fruits was recorded on top pan electronic balance. These fruits were peeled off (for papaya) and seeds were separated (for guava and papaya) from the pulp and it was weighed on top pan electronic balance. Pulp weight was calculated by the following formula:

Pulp weight of guava (g) = [Initial weight of fruit (g) – weight of seeds (g)]

Pulp weight of papaya (g) = [Initial weight of fruit (g) – {weight of peel (g) + weight of seed (g)}]

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) [7]. Acidity, ascorbic acid and pectin (as calcium pectate) in fresh fruits were analyzed by the methods of Ranganna (2014) [14]. Total carotenoids were analyzed by Rodriguez-Amaya method (1999) [15], while total phenols were estimated as per the methods given by Amorim *et al.* (1997) [3].

Results and Discussion

The fresh guava and papaya fruits were analyzed for various physico-chemical characteristics. Flesh firmness, fruit weight and pulp weight in guava were 9.40 kg/cm^2, 132.48 g and 731.24 g/kg fruit, respectively. Total soluble solids, total and reducing sugars, acidity, ascorbic acid, total carotenoids (considered as β-carotene), pectin and total phenols in guava were 9.50%, 6.46%, 4.04%, 0.61%, 176.64 mg/100 g, 0.72 mg/100 g, 1.05% and 114.04 mg/100 g, respectively. Comparable results were recorded by Patel *et al.* (2011) [12], Husamelin *et al.* (2014) [8] and Basha *et al.* (2018) [5] in guava fruit.

In papaya, flesh firmness, fruit weight and pulp weight were 5.20 kg/cm^2, 3281.68 g and 773.36 g/kg fruit respectively. TSS, total and reducing sugars, acidity, ascorbic acid, total carotenoids (expressed as β-carotene), pectin and total phenols in papaya were 11.40%, 8.72%, 5.02%, 0.17%, 66.24 mg/100 g, 3.69 mg/100 g, 0.86% and 65.02 mg/100 g, respectively. Similar results were recorded by Ikram *et al.* (2015) [9], Im *et al.* (2016) [10] and Kumar *et al.* (2017) [11] in papaya fruit.

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

Sr. No.	Parameters	Mean±S.D.*	
		Guava	Papaya
	Flesh firmness (kg/cm^2)	9.40±0.20	5.20±0.12
	Fruit weight (g)	132.48±6.12	3281.68±110.33
	Pulp weight (g/kg fruit)	731.24±5.31	773.36±6.12
	Yield of pulp (%)	73.12±0.53	77.33±0.61
	Total soluble solids (%)	9.50±0.04	11.40±0.05
	Total sugars (%)	6.46±0.78	8.72±0.84
	Reducing sugars (%)	4.04±0.12	5.02±0.14
	Acidity (%)	0.61±0.02	0.17±0.01
	Pectin (%)	1.05±0.08	0.86±0.07
	Ascorbic acid (mg/100 g)	176.64±4.52	66.24±2.42
	Total carotenoids (mg/100 g)	0.72±0.02	3.69±0.04
	Total phenols (mg/100 g)	114.04±2.20	65.02±2.10

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

References

1. Abas F, Lajis NH, Israf DA, Khozirah S, Umi Kalsom Y. Antioxidant and nitric oxide inhibition activities of selected Malay traditional vegetables. Food Chemistry. 2006; 95(4):566-573.
2. Addai ZR, Abdullah A, Mutalib SA, Musa KH, Eqbal MA. Antioxidant activity and physico-chemical properties of mature papaya fruit (*Carica papaya* L. cv. Eksotika). Advance Journal of Food Science and Technology. 2013; 5(7):859-865.
3. Amorim HV, Dougall DK, Sharp WR. The effect of carbohydrate and nitrogen concentrations of phenol synthesis in plant scarlet rose cells grown in tissue culture. *Physiologica Plantarum*, 1997; 39:91-95.
4. Aravind G, Debjit B, Duraivel S, Harish G. Traditional and medicinal use of *Carica papaya* L. Journal of Medicinal Plant Studies. 2013; 1(1):7-15.
5. Basha SK. Effect of storage period on physico-chemical properties of guava fruit leather. International Journal of Current Microbiology and Applied Sciences. 2018; 7(04):1738-1751.

6. Ginat ES, Alghamdi E. Influence of Drying Methods on Physico-chemical Constituents of Guava Juice. Journal of American Science, 2013, 9(11).
7. Hulme AC, Narain R. The ferricyanide method for determination of reducing sugars. A modification of Hagedom-Jensen-Hanes technique. Biochemistry Journal. 1931; 25(4):1051-1061.
8. Husamelin HM, Peter TS. Physical screening in fruits of guava (*Psidium guajava* L.) genotypes. Journal of Emerging Trends in Engineering and Applied Science. 2014; 5(2):135-144.
9. Ikram EHK, Stanley R, Netzel M, Fanning K. Phytochemicals of papaya and its traditional health and culinary uses: A review. Journal of Food Composition and Analysis 2015; 41:201-211.
10. Im SY, Jang KH, Farooq M, Lee DJ. Physico-chemical Properties and Antioxidant Potential of Papaya (*Carica papaya*). Journal of Herbs, Spices & Medicinal Plants. 2016; 22(4):327-336.
11. Kumar B, Pandey CS, Rangare NR. Effect of various recipes on chemical characteristics of mixed mango-papaya fruit toffee. International Journal of Chemical Studies. 2017; 5(2):274-279.
12. Patel RK, Maiti CS, Deka BC, Deshmukh NA, Roy D. Variability studies in guava (*Psidium guajava* L.) genotypes for growth, yield and quality attributes at mid-hills of Meghalaya. Indian Journal of Hill Farming. 2011; 24(1&2):24-28.
13. Ramachandran P, Nagarajan S. Quality characteristics, nutraceutical profile and storage stability of aloe gel-papaya functional beverage blend. International Journal of Food Science. 2014; 3:460-461.
14. Ranganna S. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Tata McGraw Hills Publishing Co. Ltd., New Delhi, 2014.
15. Rodriguez-Amaya, D.B. *A Guide to Carotenoids Analysis in Foods*. p. 63, ILSI Press, Washington, 1999.