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## Rakesh Gehlot

Professor, Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana, India

## Rekha

Assistant Professor, Centre of Food Science and Technology, CCS Haryana Agricultural University, Hisar, Haryana, India

## Sandeep Kumar

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

## Tanu Malik

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

## Partibha

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 composition of mature green mango fruit, mint leaves and chia seeds

Rakesh Gehlot, Rekha, Sandeep Kumar, Tanu Malik, Partibha and Rattan Singh

### Abstract

The mature green mango fruits variety Ramkela, mint leaves and chia seeds were evaluated for various physicochemical characteristics. Data show that average fruit weight and yield of pulp of mature green mango fruits were 208.00 g and 62.33 g/kg fruit. Yield of paste of mint leaves was 77. %. Total soluble solids (TSS), ascorbic acid and acidity of green mango pulp and mint paste were analyzed to be 7.6 and 2.74%, 85.29 and 4.60, and 1.28 and 0.04% respectively, whereas total carotenoids and total chlorophyll were found to be 0.179 and 15.85 mg/100 g, 1.48 and 172.90 mg/100 g respectively. Chia seeds contained protein (16.96%), fat (31.13%) and fibre (23.53%).

**Keywords:** Green mango fruit, mint leaves, chia seeds, physico-chemical, characteristics

### 1. Introduction

Mango is called the king of fruits due to its succulent texture and exotic flavour, and it is widely eaten by consumers at all stages of maturity (Fowomola, 2010; Torres-Leon *et al.*, 2016) [6, 13]. The mature green mango fruit pulp contained TSS 4%, acidity 2.17%, pH 3.21, ascorbic acid 92 mg/100 g, total carotenoids 9.79 µg/100 g, total phenols 11.1 mg/100 g, total sugars 2.74 mg/100 g, reducing sugars 0.86 mg/100 g, pectin 2.35% and browning 0.128 (Malik *et al.*, 2020) [8]. Many studies have shown that fresh mango fruit or its juice is high in micronutrients like vitamins, dietary fibre and biocompounds like ascorbic acid, phenols and carotenoids, all of which can lead to health promoting properties like antioxidant, hypoglycemic and anti-cancer (Sogi *et al.*, 2013) [12].

Mint (*Mentha viridis* L.) has the common name *Pudina* and is a member of Lamiaceae family. Representatives of the *Mentha* species are often used as flavor additives to confectionery, baked goods, chewing gum, and tea (Salehi *et al.*, 2018) [11]. Mint leaves are high in vitamins and minerals, which are important for a healthy body. It is often said to alleviate the effects of indigestion, heartburn, irritable bowel syndrome by calming the muscles in and around the intestine. It is a potent antioxidant that protects the body from the development of cancerous cells; a healthy blood cleanser; and it also aids in the clearing up of skin disorders including acne (Aflatuni *et al.*, 2005) [1].

*Salvia hispanica* popularly known as chia is an ancient seed which was popular among the Aztecs in Mexico (Gazem *et al.*, 2017) [7]. Chia plant is an herbaceous vascular in appearance, semi oval in shape with smooth, glossy peel of black, brown, grey, black spotted or white shading. Chia seeds comprises of oil content 30.21 g/100 g, proteins 25.32/100 g proteins, dietary fiber 37.5 g/100 g and major insoluble fiber 35.06 g/100 g, which reveals the contribution of chia seeds to human nutrition as functional food (da Silva *et al.*, 2017) [5]. It is commercially available and used by a wide range of customers due to its positive health benefits linked to chronic diseases such as obesity, cardiovascular disease, diabetes and cancer (Capitani *et al.*, 2012) [4]. The high quantity of essential fatty acids, dietary fibre, fat, enzymes, vitamins and minerals in chia seeds contribute to these health benefits.

### 2. Materials and methods

#### 2.1 Procurement of raw materials

Mature green mango fruits cv. Ramkela, mint twigs and chia seeds were procured from local market, Hisar (Haryana) for analysing various physico-chemical characteristics. The mature green mango fruits were washed with clean running water thoroughly, peeled off, destoned and sliced.

The stones and peels were discarded, and fruit slices were pressure cooked with equal quantity of water (1:1) for 10 minutes and blended in a mixer to obtain homogeneous pulp. The mango pulp was filled in polypropylene jars and used for analysing various physico-chemical characteristics.

Fresh mint twigs were washed under clean tap water thoroughly for removal of dirt particles. Mint leaves were separated from twigs and ground in mixer grinder by mixing 40 ml water to 1 kg leaves for making smooth paste.

## 2.2 Estimation of physico-chemical characteristics

### 2.2.1 Physical characteristics

#### 2.2.1.1 Pulp weight (g per kg fruit)

Randomly selected mature green mango fruits were weighed on top pan electronic balance. The fruits were peeled off, destoned and the separated pulp was weighed. The pulp weight was expressed in grams per kg of fruit.

#### 2.2.1.2 Paste weight (g per kg of mint twigs)

Paste was prepared by blending mint leaves using 40 ml water per kg mint leaves. It was weighed separately on top pan electronic balance and its average weight was expressed in grams per kg of mint twigs.

#### 2.2.1.3 Yield of mature green mango pulp and mint paste (%)

The yield of mature green mango pulp was calculated by dividing weight of mango pulp with weight of fruit and multiplying by 100. Similarly, yield of mint paste was calculated by dividing weight of mint paste with weight of mint twigs and multiplying by 100. The values were expressed in per cent.

#### 2.2.1.4 Total soluble solids (%)

Total soluble solids (TSS) were estimated by hand refractometer (0-32%) at ambient temperature for mature green mango pulp and mint paste and the values were expressed as per cent TSS.

### 2.2.2 Chemical characteristics

#### 2.2.2.1 Acidity (%)

Acidity was determined as per the method given by Ranganna (2014)<sup>[9]</sup>. Five grams macerated sample was taken and mixed with 50 ml boiled distilled water. It was cooled; filtered and appropriate volume was made. Five ml aliquots from mature green mango pulp and mint paste were titrated against 0.1N sodium hydroxide using 1% phenolphthalein solution as an indicator.

#### 2.2.2.2 Ascorbic acid (mg/100 g or ml)

Ascorbic acid was determined as per the method given by Ranganna (2014)<sup>[9]</sup>. Ascorbic acid was extracted from mango

pulp and mint paste by macerating 5 g or ml of sample with 25 ml of 3% meta-phosphoric acid. Five ml aliquot was titrated against 2, 6-dichlorophenol indophenol dye till the appearance of light pink colour.

#### 2.2.2.3 Total carotenoids (mg/100 g or ml)

Total carotenoids were determined spectrophotometrically with slight modifications as per the method described by Rodriguez-Amaya (2004)<sup>[10]</sup>. The total carotenoids content of each sample was calculated and expressed as mg/100 g or ml.

#### 2.2.2.4 Total chlorophyll (mg/l)

Total chlorophyll was estimated as per the method of Arnon (1949)<sup>[3]</sup>. The supernatant was used for estimation and the absorbance was measured at 652nm.

#### 2.2.2.5 Protein (%)

Protein was estimated using micro-Kjeldhal method (AOAC, 2005)<sup>[2]</sup> with KELPLUS nitrogen estimation system. The distillate was titrated by 0.1N hydrochloric acid and the quantity of ammonia absorbed in boric acid was determined. Conversion factor of 6.25 was used to calculate % protein.

#### 2.2.2.6 Fat (%)

Fat was estimated by Soxhlet extraction apparatus using method of Ranganna (2014)<sup>[9]</sup>. Fat percentage was calculated by dividing weight of ether soluble material with weight of sample and multiplying by 100.

#### 2.2.2.7 Fibre (%)

Fibre was also estimated by the method of Ranganna (2014)<sup>[9]</sup>. The loss in weight of sample represented crude fibre and it was calculated by dividing loss in weight of sample with sample weight and multiplying it by 100.

## 3. Results and Discussion

Mature green mango fruit, mint leaves and chia seeds were analyzed for various physico-chemical characteristics. Data (Table 1) reveal that mango contained fruit weight (208 g), pulp weight (623.3 g/kg fruit), while mint twigs contained leaves weight (760 g/kg mint twigs), paste weight (778.4 g/kg mint twigs). Yield of pulp in mature green mango fruits and yield of paste in mint leaves were 62.33 and 77.84%. The mature green mango fruit had TSS 7.60% and acidity was found out to be 1.28% while in case of mint leaves it was 2.74% and 0.04% respectively. Mature green mango fruit and mint leaves had ascorbic acid content (85.29 and 4.60 mg/100 g), total carotenoids (0.179 and 15.85 mg/100 g) and total chlorophyll (1.48 and 172.90 mg/100 g), respectively. Chia seeds contained protein (16.96%), fat (31.13%) and fibre (23.53%).

**Table 1:** Physico-chemical characteristics of mature green mango fruit, mint leaves and chia seeds\*

Sr. No.	Parameters	Mature green mango fruit	Mint leaves	Chia seeds
1.	Fruit wt. (g)/leaves wt. (g/kg twigs)	208 ±8	760±6	-
2.	Pulp/paste weight (g/kg)	623.3±4.2	778.4±4.4	-
3.	Yield of pulp/paste (%)	62.33 ±1.26	77.84±1.12	-
4.	TSS (%)	7.60±0.0	2.74±0.0	-
5.	Acidity (%)	1.28±0.03	0.04±0.0	-
6.	Ascorbic acid (mg/100 g)	85.29±0.36	4.60±0.14	-
7.	Total carotenoids (mg/100 g)	0.179±0.006	15.85±0.19	-
8.	Total chlorophyll (mg/100 g)	1.48±0.08	172.90±0.70	-
9.	Protein (%)	-	-	16.96±0.11
10.	Fat (%)	-	-	31.13±0.06
11.	Fibre (%)	-	-	23.53±0.15

\*The values are mean ± SD of three replicates

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