

Research Article

Nutritional Evaluation of Kesar Mango Peel Powder

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Abstract

Mango (*Mangifera indica* Linn) is well-known around the world and is national fruit of India. The peel of mango consists around 13.6-21.4 % of the total weight. It can be used as an ingredient to enhance the mineral and antioxidant content of various food products. The studies proximate composition of mango peel powder of Kesar variety of mango revealed that it contains 6.61% moisture, 3.37% fat, 4.65% protein, 4.08 % ash and 81.29 % carbohydrate. The vitamin C content of the peel powder was 5.51 mg/100 g and the total phenolic content of the mango peel powder was 47.02 ± 0.69 mg/100 g.

Keywords: Kesar, Mango peel, minerals, vitamin C, phenolics

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Introduction

Mango (*Mangifera indica* Linn) is well-known around the world and also called the "Peach of the Tropics". It is sweet, refreshing, aromatic and commercially grown in more than 80 countries throughout the world. It is national fruit of India, Philippines and Pakistan and the national tree of Bangladesh. India is the world's largest producer with more than 40% of global production [1]. The edible portion of the pulp makes up 62.3-70.2% of the fresh fruit, while the peel and the kernel amount to 13.6-21.4% and 15.2-20.5% respectively [2].

Mango peel is often referred as total waste and considered a by-product of industrial mango processing units. If, a factory processes 5 tonnes of Totapuri mangoes per hour and said that working for 8 hours a day, will produce about 6 tonnes of peels as waste [3]. This waste is either used as cattle feed or dumped in open areas that increase environmental pollution. The chemical composition of mango peels of several raw and mature mango varieties has a moisture content ranged between 62-83%. The dry matter of mango peel is composed of more than 70% carbohydrates, 1.6-3.7% fat, 1.5-6.6% protein, 1.2-4.2% ash, vitamins and biologically active compounds [4]. The mango peel is also a good source of dietary fibre, hemicellulose, pectin, cellulose, enzymes [5]. Dehydrated mango peel powder can be incorporated in development of various food products which may include biscuits [6], cake, spice mix, soft serve ice cream [7], extruded product etc. to enhance their antioxidant potential. Various types of dryers can be used for the purpose including tray dryer, solar poly tunnel dryer [8], fluidized bed dryer, vacuum dryer etc.

There have been wide variations in the mineral composition of mango peel powder (MPP) reported by various researchers [9-11]. These researchers analyzed peels of mango cultivars from India (Neelum, Barahmasi, Dashehari, Chausa, Langra and Fazli), Pakistan (Chaunsa, Anwar Retold, Langra, Dusehri and Desi) and Malaysia (Golden lily and Chokanan) respectively. However, the compositional characteristics of Kesar variety mango peel have not been reported. The study was aimed to analyse various compositional characteristics of mango peel.

Materials and Methods

Mature, fresh and good quality Mango fruits of cultivar "*Gir Kesar*" having GI tag were procured directly from the direct of Talala area, district- Gir-Somnath, Gujarat, India. Sorting was done to remove infected and damaged fruits as well as washing was done to remove adhering dirt on surface. These fruits were then kept in prewashed plastic crates and brought to the College of Food Processing Technology and Bio-energy for further studies. Dehydration is one of MPP was prepared as per the method reported by [5]. Peel and stones were removed manually using stainless steel knives. The removed mango peel pieces were uniformly distributed across the trays (81×42×3 cm). The drying was carried out at $60 \pm 2^\circ\text{C}$ with constant air circulation for a period of 4 h. The laboratory tray dryer (Make: Narang Scientific Works Pvt. Ltd., New Delhi) was used for drying the peel. The mango peel pieces were spread in single layer for drying in tray dryer. The trays were taken out and the dry mango peel was scraped off. Dry mango peel was then milled using Maharaja white line; Model: Mixer grinder/MX-211 grinder available in college to convert peel into powder form. The obtained powder was sieved through by US mesh No. 16 (1.19 mm). The powdered mango peel was packed in 3 layers metalized laminated with zip lock and stored under refrigerated conditions until further use.

Proximate analysis of mango peel powder (MPP) was carried out for moisture, protein, crude fibre, ash, fat and carbohydrate. Chemical analysis of maize flour and MPP was carried out for total phenolic content vitamin C and various minerals including potassium, manganese, zinc, copper, sulphur, calcium, magnesium, phosphorous and iron. The standard methods of analysis used by various researchers were used for the analysis for proximate, chemical and nutritional analysis [12], [13] and [14].

Estimation of total phenolic content

The total phenolic content of sample (raw materials maize flour, MPP and extruded product was spectrophotometrically analyzed using the Folin-Ciocalteu method as described by [6] with some modification.

Estimation of minerals

The Inductively Coupled Plasma-Optical Emission Spectrometer (ICP-OES) (Model optima 7000 DV, manufactured by Perkin Elmer, US) installed at the Micronutrient Research Centre, Anand Agricultural University.

Results and Discussion

Proximate Composition of Mango Peel Powder

The MPP of Kesar mango contained $6.61 \pm 0.17\%$ moisture, $3.37 \pm 0.24\%$ fat, $4.65 \pm 0.02\%$ protein, $4.08 \pm 0.09\%$ ash, $81.29 \pm 0.78\%$ carbohydrate, 5.51 ± 0.32 (mg/100ml). Similar results for protein, fat, ash in mango peel powder which was in the range of 1.4-6.9%, 1.6-4.4%, and 1.1-4.2% respectively [4].

Vitamin and Phenolics

The MPP of Kesar mango contained 5.51 ± 0.32 (mg/100ml) vitamin C. The total phenolic content of the mango peel powder was 47.02 ± 0.69 (mg/100ml). The results are within the range as reported by [6].

Minerals in Mango Peel Powder

Among all minerals present in MPP of Kesar mango, phosphorous showed highest value of 861.1 ± 2.94 mg/100g, followed by potassium (525.0 ± 3.32 mg/100g), calcium (226.1 ± 1.09 mg/100g), sulfur (174.0 ± 1.29 mg/100g), magnesium (165.5 ± 1.72 mg/100g), iron (126 ± 1.43 mg/100g), zinc (1.68 ± 0.24 mg/100g), manganese (1.01 ± 0.18 mg/100g) and copper (0.63 ± 0.06 mg/100g). The results are within the range as reported by [4].

Conclusion

The mango peel powder of Kesar variety of mango was having significant amount of vitamin C and total phenolics along with various minerals. It can be used to enhance the mineral, vitamin and phenolic content of the developed products. The studies may help in product development studies where incorporation of mango peel powder is being considered.

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Publication History

Received	26.09.2022
Revised	12.12.2022
Accepted	13.12.2022
Online	31.12.2022