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Nutritional composition, anti-nutritional factors and antioxidant activity of waste seeds (Mango seeds and Tamarind seeds)

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Abstract

It is important to recognize that the by-products of mango and tamarind such as, peels and seeds, hold large amount of different nutritional substances. These by-products might act as sources of natural food ingredients. Recuperation and use of mango and tamarind by-products to create profitable exacerbates will be a paramount test for research. Proximate, antinutrients and antioxidants analysis of mango seeds and tamarind seeds were done by using standard methods. From the analysis, results obtained that both seeds were rich in major nutrients (carbohydrate, protein, fat, etc.) as well as minerals (Calcium, Potassium, Magnesium and phosphorus). These seeds rich in antioxidant properties and also have anti-nutritional substance. This research concluded that the mango and tamarind seeds were good supplement of protein and energy for poor people. These seeds have medicinal properties i.e. enhancing immunity, medication from claiming cancer, etc. because of high antioxidant properties. This research recommends that the utilization of mango seeds and tamarind seeds were beneficial for health as well as economy.

Keywords: by-products, antinutrients, antioxidants, nutritional, mango, tamarind

Introduction

Those waste results including seeds, peels, stalks, stems have numerous significant measure for phenolics and subsequently could a chance to be utilized similarly as shabby wellsprings from claiming characteristic antioxidants for pharmaceutical, cosmetic, also food requisition. Fruits furthermore vegetable waste results including seeds have been showed up for bring higher content about bioactive phytochemicals over the eatable portions (Soong and Barlow 2004) [20].

The peels and seeds of mango comprise 35-60 percent of the absolute fruit weight (Berardini *et al.*, 2005) [3]. During the processing of mango, the seed is one of the capital by-products. The seeds are not currently activated for any bartering purpose and are alone as a decay acceptable a antecedent of pollution. Nevertheless, mango seeds abstract could be acclimated as a source of accustomed antioxidant accretion in food processing (Ribeiro *et al.*, 2007) [16]. Mango belongs to the genus *Angifera*, consisting of abundant species tropical fruiting trees in the beginning bulb ancestors *Anacardiaceae*. The mango is aboriginal to the Indian subcontinent and Southeast Asia (Mango - botany-taxonomy, 2008) [11].

Nutritional Value per 100 g of Mango seed kernel: Carbohydrate - 69.2-80 percent, Protein- 7.5-13 percent, Fiber - 2.0-4.6 percent, Ash - 2.2-2.6, Calcium - 0.21, Phosphorus - 0.22 (Source: Ravindran and Rajaguru, 1985) [15]. Mango seed portion might have been high in potassium, magnesium, phosphorus, calcium also sodium. Antioxidant action about mango seed kernel may be higher "around variety of fruit seeds for example, jackfruit, tamarind furthermore avocado because of its helter skelter polyphenolic substance (Soong and Barlow, 2004) [20]. Phenolic compounds, tannins furthermore flavonoids in mango seed are found will be answerable for antimicrobial property. Mango seed kernel may be used to cures abdominal worm (diarrhea), slaughter blood cholesterol level, furthermore also provided for as an cures for vomiting, looseness of the bowels and hyperacidity (Vatsayan, 2002) [21].

Tamarind or *Tamarindus indica L.* of the *Fabaceae*, subfamily *Caesalpinioideae*, is an importnt aliment in the tropics. It is a multipurpose timberline of which about every parts have some use (Kumar and Bhattacharya, 2008) [9]. Chemical composition of tamarind seed: Moisture - 9.4-11.3, Protein - 13.3-26.9, Fat/oil - 4.5-16.2, Crude fiber - 7.4-8.8, Carbohydrate - 50.0-57.0, Ash - 2.4-4.2 (Morad *et al.* (1978) [12], Ishola *et al.* (1990) [7]. From the chemical composition, it might be seen that tamarind seeds are a great sourball of protein. Mineral composition of tamarind seeds show up to make a great hotspot about various mineral components for example, calcium, phosphorus, first mass of the magnesium and potassium.

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The protein content fixation from claiming tamarind seeds could help the every day protein have about 23.6 g/100 g for grown-ups likewise prescribed by the National Research Council.

Tamarind seeds bring low levels from claiming phytic acid tantamount to that about lima bean. Phytic acids declines bio-availability from claiming specific minerals, might meddle for the usage of proteins because of formation of phytate-protein furthermore phytate-mineral-protein complexes, and also inhibits those digestive enzymes (Siddhuraju *et al.* 1995) [18]. Preparing strategies for example, soaking and autoclaving would viable will dispense with phytate. Tamarind seeds hold 2.8 mg/100 g cyanogens, which is likely a really low should result in any concern since cooking will be referred to decrease cyanogens content altogether. It might have been accounted for that cooking dispenses with more than 98% trypsin inhibitor action.

Medicinal utilization about tamarind would uncountable (Morton, 1987). Tamarind seeds have antioxidant action and anti-inflammatory activity. Rich polyphenol content exists to seeds furthermore fruit from claiming tamarind and they indicates administrative impacts around neurophils (Paula *et al.* 2009). Treats Diarrhea, curing arthritis, helpful for teeth, treats indigestion, enhances immunity, medication from claiming cancer, antibacterial property, cure cough, tonsils Furthermore throat infections, medication about diabetes, heart health, advantageous in crack.

Material and Method

The present investigation was Carried out in the Nutritional Research Laboratory Department of Foods, Nutrition and Public Health, Ethelind College of Home Science, Sam Higginbottom University of Agriculture, Technology & Sciences, Allahabad, UP, India.

The raw materials (Mango seeds and tamarind seeds) for the chemical analysis were obtained from the local markets of Allahabad district of UP, India.

Proximate analysis: Standard methods were used for determination of chemical composition of selected product, that is included estimation of moisture, ash, fat, protein, potassium, calcium, magnesium, phosphorus and crude fiber. Energy and carbohydrate were calculated by difference method. (AOAC, 2007) [1]

Antinutritional analysis: Antnutritional substances namely phytate was estimated by colorimetric as described by Sadasivam and Manickam (1996) [17], and the total oxalate in the form of oxalic acid was estimated by the method of Gupta (2007) [6]. Tannin, saponin and alkaloid contents were determined using the recommended methods of Association of Official Analytical Chemists (AOAC, 1990) [2].

Antioxidant analysis: Total polyphones were estimated as per procedure described by Singleton *et al.* (1999) [19] using folin ciocalteu method. Flavonoid and radical scavenging were estimated as per procedure described under AOAC (1990) [2] method.

Results and Discussion

The data recorded on different aspects as per the methodology have been tabulated and analyzed statistically. The results obtained from the analysis are presented and discussed in this chapter under the following sub headings.

- nutrient composition of selected seeds (mango seeds and tamarind seeds)
- antinutrients composition of selected seeds(mango seeds and tamarind seeds)
- antioxidants composition of selected seeds(mango seeds and tamarind seeds)

Table 1: The average nutrient composition of selected seeds per 100 g.

Nutrients	Chemical Value	
	Mango Seeds	Tamarind Seeds
Moisture (%)	8.13±0.23	9.38±0.16
Energy (kcal)	439.66±8.71	353.52±1.44
Total carbohydrate (%)	69.33±3.37	53.66±1.72
Protein (%)	8.00±0.23	23.06±0.57
Fat (%)	10.28 ±0.32	4.30 ±0.13
Ash (%)	2.06±0.13	2.60±0.08
Crude fiber (%)	2.20±0.16	7.00±0.08
Calcium (mg)	120.66±1.39	285.66±2.21
Potassium (mg)	22.43±0.32	30.53±0.32
Sodium (mg)	21.00±0.46	12.63±0.25
Magnesium (mg)	94.73±0.46	86.43±0.43

Table 1. shows the composition of nutrients, anti-nutritional factors and antioxidants activity of dehydrated mango seeds and tamarind seeds.

The data for mango seeds revealed that every 100 g of dehydrated mango seeds contained 8.13 percent moisture, 439.66kcal energy, 69.33 percent total carbohydrate, 8.0 percent protein, 10.28 percent fat, 2.06 percent ash, 2.20 percent crude fiber, 120.66 mg calcium, 22.43 mg potassium, 21.00 mg sodium and 94.73 mg magnesium.

As per Dhingra and Kapoor (1985) [5] the average content of mango kernel comprises carbohydrates 69.22 percent-79.78 percent, fat (8.35 percent-16.13 percent), protein (5.6 percent-9.5 percent), starch constitutes about 92 percent and a fair amount of fiber (0.14 percent-2.95 percent) and ash content from 0.35 percent to 3.66 percent which is quite similar to the findings of the researcher. In addition to this, as per Kittiphoom (2012) [8] mango seed kernels have a low content of protein but they contain the most of the essential amino acids, with highest values of leucine, valine and lysine which has been highlighted in the findings of the researcher.

Table 1. shows the 100 g of dehydrated tamarind seeds contain 9.38 percent moisture, 353.52 kcal energy, 53.66 percent carbohydrate, 23.06 percent protein, 4.30 percent fat, 2.60 percent ash, 7.00 percent crude fiber, 285.66mg calcium, 30.53mg potassium 12.63mg sodium and 86.43mg magnesium.

Table 2: The average antinutrients composition of selected seeds per 100 g.

Anti-Nutrients	Chemical Value	
	Mango Seeds	Tamarind Seeds
Tannin (mg/100g)	1.02±0.05	20.10±0.01
Trypsin inhibitor (TIU/g)	18.36±0.38	10.72±0.04
Phytate (mg/100g)	1.39±0.10	1.73±0.06
Saponin (%)	0.03±0.00	1.01±0.01
Oxalate (mg/100g)	1.44 ±0.05	0.66 ±0.05
Alkaloid (%)	0.01±0.00	0.23±0.04

Table 2. shows that the mango seed per 100g contained 1.02mg tannin, 18.36TIU trypsin inhibitor, 1.39mg phytate, 0.03 percent saponin, 0.1mg oxalate and 0.01 percent alkaloid. Dhingra and Kapoor (1985) [5] showed that tannins can be effectively removed if the kernels are soaked two to three times in water for 20 min each at 80 °C.

Tamarind seeds per 100g contained 20.10mg tannin, 10.72TIU trypsin inhibitor, 1.73mg phytate, 1.01 percent saponin, 0.66mg oxalate and 0.23 percent alkaloid. Binyam *et al.* (1995) ^[4] reported that tannins were located in seed hull and that dehulling processes might be expected to reduce its levels Ma and Bliss (1979) ^[10].

Table 3: The average antioxidant composition of selected seeds per 100 g.

Antioxidants	Chemical Value	
	Mango Seeds	Tamarind Seeds
Radical scavenging (u/ugdpph)	4.41±0.14	2.36±0.20
Total phenol (mgGAE/g)	116±1.70	94.48±0.98
Flavonoid (mg/100g)	10.81±0.19	12.39±0.16

Table 3. shows that the mango seeds per 100g contained 4.41u/ugdpph radical scavenging, 116 mgGAE total phenol and 10.81 mg flavonoid. Soong *et al.* (2004) ^[20] indicated that mango seed kernel has potent antioxidant activity with relatively high phenolic contents.

Tamarind seeds per 100g contained 2.36u/ugdpph radical scavenging, 94.48 mgGAE total phenol and 12.39 mg flavonoid.

Conclusion

It is concluded that the moisture and ash content is approximately similar in mango seeds as well as tamarind seeds. Crude protein and crude fiber content was lower in mango seeds as compared to tamarind seeds. Total fat, energy and carbohydrate content of mango seeds was high over tamarind seeds. Total calcium and potassium content was lower in mango seeds as compared to tamarind seeds. Sodium and magnesium content was higher in mango seeds over tamarind seeds. Tannin, phytate, alkaloid and saponin content was higher in tamarind seeds as compared to mango seeds. Trypsin inhibitor and oxalate content of mango seeds was high over tamarind seeds. Radical scavenging and total phenol content of mango seeds was higher than tamarind seeds. Flavonoid content of tamarind seeds was high over mango seeds.

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