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Chemical analysis of tamarind seed and tamarind seed kernel

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Abstract

Tamarind is a versatile fruit plant and fruit's pulp has been utilised as a spice in Asian cuisine, particularly in the southern region of India. Tamarind seed, tamarind kernel and tamarind husk were procured and stored for further evaluation after sun drying. All the samples were first screened for proximate composition (AOAC, 2019). The analyzed percent composition of tamarind seeds, kernel and husk have been shown to contain 91.62%, 93.33% and 5.31% dry matter, respectively. They constitute good source of organic as well as inorganic matter.

Keywords: Tamarind, proximate composition, organic matter, inorganic matter

Introduction

Tamarind (*Tamarindus indica*) belongs to the family Leguminosae, is an evergreen tree growing with lovely spreading crown mainly in the Indian sub-continent for its sour fruits (ICFRE, 1993; Bhattacharya *et al.*, 1994; Rao *et al.*, 1989) [8, 3, 14]. Tamarind fruit may contain up to 6 seeds, which are almost flat and consist of a reddish brown testa and white kernels. Almost every part of the tree is useful in some way as feed, timber and textiles, chemical and pharmaceutical industries (Dagar *et al.*, 1995; George *et al.*, 1997; Pugalenthi, 2005) [5, 7, 12].

Tamarind seeds are glossy and orbicular to rhomboid in shape. They measure 3-10 cm x 1.3 cm. The seeds are firm and range in colour from red to purple brown. A parchment-like membrane lines the seed chambers. Seed size varies between 320-700 g per kg of fruit. Shankaracharya (1998) [19] and Coronel (1991) [4] mentioned that tamarind seed consists of seed coat or testa: 20-30% and the kernel or endosperm: 70-75%.

Nutritive value and chemical composition of tamarind seed kernels was determined by several workers (Bhattacharyya *et al.*, 1994; Patil and Nadagouder, 1997) [3, 11]. The proximate analysis revealed the presence of 16.90% CP, 1.81% EE, 2.6% CF, 72.20% NFE and 3.70% TA in tamarind seed kernel (Rao *et al.*, 2005). Similarly, Ravi *et al.* (2006) reported that tamarind seed kernel contained 90.80% DM, 16.40% CP, 4.70% CF, 4.70% EE, 2.70% CF, 3.70% TA and 72.50% NFE.

Composition of tamarind seed kernel estimated after sun drying was DM - 91.50%, CP - 16.20%, fat - 7.06%, crude fibre - 7.70%, calcium 0.72% and phosphorous - 0.30%. Whereas after dry frying the nutritional composition followed DM - 98.7%, CP - 18.10%, fat - 3.85%, crude fibre - 3.70%, calcium - 0.75%, phosphorous - 0.37% (Ly *et al.*, 2017a).

Materials and Methods

Collection and storage of tamarind seeds

Tamarind seed is an important source of low cost nutrients, especially proteins and is much consumed food in areas of the world where protein malnutrition is a widespread problem.

Tamarind seeds are shiny black in colour and have numerous nutritional and health benefits. Tamarind seeds were collected from Ramanagara, Chikkaballapur, Kolar and Tumakuru; the tamarind grown areas for initial screening and later sufficient amount was procured from Ramanagara district for experimental purpose. The procured tamarind seeds (Plate 1) were dried under sun and were stored for further evaluation.

Procurement of tamarind seed kernel

Sufficient quantity of tamarind seed kernel was procured from M/s KGY Agro Products Pvt. Ltd., Tumakuru.

Thus obtained tamarind seed kernels (Plate 2) were dried again in sunlight to remove moisture if any, and were stored for further use.

Chemical composition analysis of tamarind seed kernel

Tamarind seed kernels were first screened for proximate composition (AOAC, 2019) [1].



Plate 1: Tamarind seeds



Plate 2: Tamarind seed kernels

Results and Discussion

Chemical composition of tamarind seed, kernel and husk

Analyzed chemical composition of tamarind seeds, kernel and husk is presented in the Table 1.

The analyzed percent composition of tamarind seeds, kernel and husk have been shown to contain 8.38, 6.67 and 5.31% moisture; 97.16, 95.03 and 97.40% organic matter, 21.89, 19.95 and 7.49% crude protein, 6.88, 7.55 and 0.32% ether extract, 7.92, 2.73 and 21.13% crude fibre, 2.84, 4.97 and 2.60% total ash and 60.47, 64.80 and 68.46% NFE, respectively.

Table 1: Chemical composition of tamarind seed, kernel and husk

Nutrient%	Tamarind seed	Tamarind seed kernel	Tamarind husk
Dry matter	91.62	93.33	94.69
Organic matter	97.16	95.03	97.40
Crude protein	21.89	19.95	7.49
Ether extract	6.88	7.55	0.32
Crude fibre	7.92	2.73	21.13
Total ash	2.84	4.97	2.60
Nitrogen free extract	60.47	64.80	68.46

According to Panigrahi *et al.* (1989) [10], whole tamarind seed (per kg) had 131.3 g crude protein, 67.1 g crude fibre, 48.2 g crude fat, 56.2 g tannins and a trypsin inhibitor activity (TIA) of 10.8, with sugars accounting for the majority of the carbohydrate. The pulp had a stronger trypsin inhibitor activity than the seed, yet both were heat labile. Purselove (1987) estimated that the seeds contain 63 percent starch and 4.5 – 6.5 percent semi-drying oil. The seed (per 100 g) also contained 47 mg of phytic acid, (Ishola *et al.*, 1990) [9]; which had a minor effect on its nutritional value. In addition, the testa contained 14 – 18 percent albuminoid tannins. Some researchers (Sano *et al.*, 1996; Patil and Nadagoudar, 1997 and El-Siddig *et al.*, 2006) [17, 11, 6] concluded that tamarind seeds were possible source % of food or food ingredients after estimating the content and evaluating their qualities.

Bagul *et al.* (2015) [2] mentioned that whole tamarind seed and seed kernel were rich sources of protein. Seed coat was rich in fiber (20%) and tannins (20%). Seeds contained 4.5 to 16.2% fat / oil and 50 to 57% carbohydrate. Similarly, Richa *et al.* (2018) showed that 100 g of dehydrated tamarind seeds had 9.38 percent moisture, 353.52 kcal calories energy, 53.66 percent carbohydrate, 23.06 percent protein, 4.30 percent fat, 2.60 percent ash, 7.00 percent crude fibre, 285.66 mg of calcium, 30.53 mg of potassium, 12.63 mg of sodium and 86.43 mg of magnesium.

The nutritional parameters of tamarind kernel powder were rich in proteins (24.61%), carbohydrates (62.06%), fiber (3.7%), fats (2.46%), ash (2.5%), calcium (145.2 mg / 100 g), and iron (15.46 mg / 100 g) and energy 3688.2 kcal / kg (Sarkar *et al.*, 2018) [18].

Conclusion

Tamarind seed, tamarind kernel and tamarind husk contains good quantities of organic matter.

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