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A Study on Tamarind Seed Uses and Health Benefits

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Abstract: ***The tamarind scientifically known as Tamarindus indica L, globally it is found in major part of world, especially in countries such as Africa, Asia, and America, the tamarind is specially known for its treatment as herb. The tamarind seeds play vital role in healing wounds. The gum made from tamarind seed extract used as binder polymer in many industries to name few textile, pharmaceutical and food sectors. Apart from this Skin elasticity will also improves after applying the tamarind paste which acts as natural herbal treatment for various skins cares. Tamarind seeds are very useful in the cosmetic industries especially for face toners, serums and especially in gels makers as tamarind seeds are rich in water-soluble properties. Further, the crude protein in tamarind seed kernel flour accounts for about 16.2% followed by crude fibre and fats accounts for nitrogen-free extract with 57.88 per cent and 1.16% of ash.***

Keywords: protein content, Amino acid, tamarind seed, fatty acid

1. Introduction

Tamarind fruits are used for food industry especially it consumption will be in the form of , fresh or processed, depending upon the spice or seasoning. Tamarind contains good amount of malic, and citric acids in addition to some sugars and it is rich for pod pulp which accounts for 40 per cent and it is rich in Vitamin C content (Mayuri Bagula et al.,2015).

Tamarind seeds are basically flattened with glossy, and orbicular to rhomboid. They are 3-10 cm x 1.3 cm in size. They are dicotyledonous. Seeds are hard in nature; color in red nature to purple brown. Seed are having chambers which are lined with thin membrane with a parchment. Futher, the Cotyledons are found to be thick in nature. Seed size varies between 320-700 g per kg of fruit. Tamarind seed has seed coat which accounts for 20-30% and the endosperm about 70-75% (Shankaracharya et al., 1998). Seed portion in tamarind is about 40% of the total weight. the tamarind fruit are used many purposes, as it known as by-product of both commercial or non- commercial use. This waste product mainly from commercial utilization can serve as good source for tamarind seed.

At present, globally the tamarind is cultivated in 54 countries, among them around 18 countries are having in its inherent range and around in 36 other countries tamarind was been introduced. In India, the tamarind products are largely producer and it is globally producer of it which comes from of Bihar, Andhra Pradesh, Karnataka, Madhya Pradesh, Tamil Nadu and West Bengal. India has traditionally exported processed tamarind pulp especially to Western countries such as Australasia, Western Europe and North America and mainly Middle East Arab countries and the European and more freshly to the States of America. (Ashvini V Joshi et al., 2023). Thus present review focus on tamarinds seeds for health benefits which have huge potential to be explored in terms of food, industrial, pharmaceutics and other benefits.

However, regarding statistics related to export and production, Tamarind contribute for very less proportion but steady segment of the total 3777.76 lakh tonnes which was projected by national horticulture and spices. It thrives best in dryland farming. Through the Mission for Integrated Development of Horticulture (MIDH) Tamarind is supported as key spice crop. India holds 3rd ranks globally in exports for the tamarind and contributing to global market share contributing around 17%. The processed powder of tamarind is widely exported to countries like Bangladesh, China, and Vietnam. India has largest supply which accounts for over 75% of the world's raw material, whereas the powder acts as a natural binding material and thickening agent for various industries such as cosmetics manufacturing, pharma, textile sizing, and oil-drilling operations (NHB, 2024). The Karnataka state area of tamarind was 7.56 (000ha) and production was 20.67 (000 MT) and productivity was 2.73 (MT/ha).

2. Nutritional Characterization of Tamarind seeds

Chemical composition:
The tamarind seed are rich sources of protein which are basically found in seeds and seed kernel among which the oil comprise about 4.5-16.2 per cent of total composition. The unpolished fiber percentage is very less in whole seed when compared to the seed coat which are rich in fiber accounts for 20 per cent and tannins accounts for 20 per cent and rest 50 percent to 57 percent accounts for carbohydrate. (Mayuri Bagula et al., 2015).

Amino acid profile:
From the chemical composition, it evident from the studies, that tamarind seeds are known as a good source of protein. However, the Amino acid contents in tamarind conveys that the proteins consists of purely stable essential amino acid levels. Except a few, all the amino acids such as Lycine, Leucine, Isoleucine, Methionine, Valine and Phenylalanin content which are considerably found high in seed. (Mayuri Bagula et al., 2015; Ashvini V Joshi et al., 2023).

Fatty Acid Profile:
The fatty acids are rich in Tamarind seed. It also contains linoleic acid about 2 mg/g dry weight (Glew et al., 1997). Tamarind seeds have a greater proportion of unsaturated accounts for 55.6 per cent fatty acids than saturated about 44.4 per cent fatty acids (Singh, 1973). Linoleic acid, present in tamarind seed oil, is one of the most important acids of polyunsaturated in nature which helps in reduction of CVD i.e.cardio vascular diseases (Ajayi et al., 2006).

Mineral Composition:
The mineral elements are also found in good amount such as calcium, phosphorus, magnesium and potassium in the tamarind seeds. The mineral K has highest concentration found in the study conducted by Siddhuraju et al. 1995, with the trace value of mineral copper which were also relatively high (Glewet al., 1997). The potassium was also found in high concentration and significant nutrition in nature by playing a key role in neurological function (Ajayi et al., 2006).

3. Tamarind Seed benefits for health

1) **Teeth:** acts as remedy for all teeth related difficulties and cleans especially patches of nicotine found in the teeth. Seed powder is used to teeth cleaning process (Mayuri Bagula et al., 2015).
2) **Indigestion:** The juice of Tamarind seed helps as natural remedy to increase bile production and also to cure indigestion. Its lowers cholesterol due to rich nature of dietary fiber. This helps in a great natural appetizer which helps in digestion. This is also useful to treat relieve constipation and stomatitis (Ashvini V Joshi et al., 2023).
3) **Arthritis:** The half spoon of consumption of roasted tamarind power 2 times a day with water helps and cures the bones joint lubrication which soothes pain and acts as anti-inflammatory property to reduce the joint pains (Hivrale et al., 2013).
4) **Heart disease and blood pressure:** linoleic acid is rich in nature apart from preventing disorders for cardiovascular such as heart diseases especially coronary, is also associated with reducing the high blood pressure (Ajayi et al., 2006).
5) **Diarrhea:** To cure diarrhea and dysentery effectively tamarind seed are used. The excellent substitute for fruit pectin and hence can be used effective remedy against dysentery, diarrhea, and colitis (Mishra and Malhotra et al., 2009).
6) **Immunity booster:** The Immunity boosting properties of tamarind seeds which helps to protect from many disorders and diseases. TSP prophylactically enhanced haemoglobin (Hb), red blood cells (RBCs), white blood cells (WBCs), and platelets (Aravind et al., 2012).
7) **Cancer:** The seed juice helps in protection from anti-tumor activity to colon cancer and immune modulatory activity of tamarind seeds which helps and prevents the cancer causing agents in the body. The Seed extract helps in delays cell carcinoma and its incidence on oxidative stress makers (Chabetty et al., 2012; Sano et al., 1996).
8) **Gelling agent:** In the food processing industry, gel is used as vital perseveration techniques especially for fruits, the tamarind seeds contains about 46-48 per cent of gel forming partials which is known as jellose which is polysaccharide in nature. The pectin gels used in jellies and jams and other preservatives which has capacity to form gel over wide pH rage. These gel properties can be obtained in nature way compared to others (Santosh Singh et al., 2011).
9) **Food additive:** xyloglucan in tamarind is known as 'tamarind gum'. In food items, gum is used as thickening, stabilizing, and gelling as natural agent which is used in food additives such as a stabilizer in mayonnaise, ice cream, and cheese. The gum is useful in jam, jellies which has lower water activity. It is served as a food ingredient for refining the texture and viscosity of processed foods. It improves the thickness and crispness of biscuits (Shankaracharya et al., 1998; Mishra and Malhotra et al., 2009).
10) **Natural binder:** It can be used as an effective binder for tablet formulations. Seeds are used as a carrier for colon targeted drug delivery, buccal and ophthalmic drug release modifiers (Sahoo et al., 2010).

4. Discussion

The anti-nutritional factors in tamarind seeds and kernels which are high in protein content, while the fiber and tannins are rich in seed coat. The amino acids present in tamarind seeds helps in addressing the protein malnutrition which can address the food security related issue especially in developing countries. Besides a good source of fatty acids protein, they are rich in few essential minerals, such as Ca, Mg P, and K (Mayuri, Bagula.,2015). The usage of seed protein of tamarind, mineral and fatty acid is still limited. Industrial survey is needed to determine possible quantity and quality of tamarind seed by-product for its further usage. Recent studies showed that tamarind seed act as powerful natural coagulant. Polysaccharides in the seeds bind to microplastic and clump them together, making it easier to filter them out of contaminated water. So 90% removal rate from the experimental study revealed that using processed tamarind seed powder can successfully bind and remove up to 90% of micro plastic from water samples. Tamarind seed powder (rich in Tamarind gum) acts as magnetic microplastic removal ("Plas-Stick") acting as Eco-friendly Coagulant by Vivaan, Ariana, Avyana, Deccan chronicles 2026.

5. Conclusion

Tamarind is primarily used as a functional food. In view of its multiple uses, more molecular activity work and other structural studies are needed to explored for future benefits. Tamarind seeds are used for both commercial and residential purposes. Enhanced research efforts are necessary to process tamarind seeds. For additional research might be needed, the best possible use of tamarind products need to be explored. The information presented in this review would be helpful in promoting basic needs for research which aims for the development of novel agents for biological application and other agro industries based on pure natural products derived from plants based products.

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