Bio. Res. Today 2024, 6(12):499-501

Biotica Research Today

e-ISSN: 2582-6654

December, 2024

Article ID: RT1754

Popular Article

Mangosteen: A Nutrient-Rich Super Fruit

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Conflict of interests: The author has declared that no conflict of interest exists.

How to cite this article?

Kumar, A., Yadav, Y., Ingole, A., *et al.,* 2024. Mangosteen: A Nutrient-Rich Super Fruit. *Biotica Research Today* 6(12),499-501.

Abstract

Mangosteen is one of the most delicious fruit. It has great cultural significance for the people. It is a rich source of nutrients and bioactive compounds. This fruit shares an important contribution to traditional remedies as well as modern medicines. It is rich in xanthones, flavonoids and other phytochemicals. These compounds demonstrate promising bioactivities and blood sugar-regulating properties. This makes mangosteen a better option for diabetes management. Its versatility extends from processed products such as beverages, powders, skincare formulations and natural dyes. Although, the benefits of this remarkable fruit are well identified, further research will unlock its capacity as an amazing fruit that promotes health.

Keywords: Bioactive compounds, Diabetes, Mangosteen, Xanthones

Introduction

Mangosteen (*Garcinia mangostana* Linn) comes under Clusiaceae (Guttiferae) family. It is popular as the "Queen of Fruits" and its original habitat is Southeast Asia. This plant performs best in tropical climates like Indonesia, Thailand, Malaysia, Southern India, Northern Australia, Central America, Hawaii, Brazil and other tropical continents (Bi *et al.*, 2023). The mangosteen tree is evergreen and can grow 6-25 m tall with dense foliage. It grows slowly, producing fruit after planting takes 7-9 years. Mangosteen fruits are generally round to ovoid in shape with red to maroon in color (dark violet) during ripening (Figure 1). Its edible part is known as aril which is sweet, juicy with slightly sour in taste. The fruit has white flesh and a tough rind (Aizat *et al.,* 2019).

Health Benefits of Mangosteen

Various parts of mangosteen, including the fruit pericarp, aril, seed, leaves and stem, contain important bioactive compounds known as xanthones. These compounds include α-mangostin, β-mangostin and γ-mangostin, among others. This plant also contains triterpenoids, benzophenones and flavonoids. Each one of these substances has different kinds of effects on the human body. They protect nerves, reduce pain, fight oxidation, aid in weight loss, alleviate inflammation, facilitate lower blood sugar, kill bacteria, slow cell growth and diminish toxicity (Safaei *et al.*, 2023; Yahyazadeh *et al.*, 2024). People employ various sections of mangosteen plants to heal wounds, sprains and long-lasting ulcers. This plant is also helpful in treatment of skin problems hyperkeratosis, eczema and psoriasis. The plant also helps in solving urinary tract problems, fever, gleet, cystitis, diarrhea and gonorrhea (Bi *et al.*, 2023).

Figure 1: Harvested fruits of mangosteen

Article History

RECEIVED on 21st December 2024 RECEIVED in revised form 29th December 2024 ACCEPTED in final form 30th December 2024

Table 1: Nutritional value of Mangosteen (Matan *et al.*, 2024)

Category	Nutrient/ Compound	Value in Unit
Proximate Composition	Energy	73 kcal
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Proximate Composition	Carbohydrates	15.75 g
	Fat	0.39 g
	Protein	1.29 g
	Ash	0.31%
	Fiber	1.89 g
	Moisture	80.80%
Vitamins	Folate	31 µg
	Vitamin-B_3 (Niacin)	0.286 mg
	Vitamin-B_5 (Pantothenic Acid)	0.032 mg
	Vitamin-B_6 (Pyridoxine)	0.041 mg
	Vitamin-B_2 (Riboflavin)	0.054 mg
	Vitamin-B_1 (Thiamine)	0.054 mg
	Vitamin-A	35 IU
	Vitamin-C	6 mg
Minerals Content	Ca (Calcium)	12 mg
	Cu (Copper)	0.069 mg
	Fe (Iron)	0.315 mg
	Mg (Magnesium)	27.5 mg
	Mn (Manganese)	0.325 mg
	P (Phosphorus)	21.11 mg
	K (Potassium)	112 mg
	Na (Sodium)	5.3 mg
	Zn (Zinc)	0.375 mg
Bioactive Compounds	Total Phenolic Content	49.5 mg GAE/ 100 g
	Total Flavonoids	27.5 mg QE/ 100 g
	Total Carotenoids	20.8 mg/ 100 g
	Antioxidant Activity (ABTS)	81%
	Antioxidant Activity (DPPH)	57%

In Diabetes Management

Extracts from different parts of mangosteen (pericarp, rind, leaves, seed and stem bark) demonstrated antidiabetic effects. Bioactivity consists of reduction of blood glucose, betterment of insulin resistance and increases the insulin levels in plasma amongst other things. Its bioactive compounds are quite beneficial in the inhibition of its enzymatic activity especially regarding α-amylase as well as α-glycosidase. Its apart from these enzymes catalysis degrades the starch into low molecular weights of sugars. It further encompasses the reduction of activities of pancreatic lipase plus its regeneration of islets of Langerhans (Safaei *et al.*, 2023).

Nutritional Value

Mangosteen is a rich source of vitamins, mineral nutrients along with several bioactive compounds. Also, fruits are rich in carbohydrate, protein, fiber and high in energy (73 kcal). It possesses extensive range of vitamins (water-soluble as well as fat-soluble) and minerals, as provided in table 1. Mangosteen exhibits remarkable antioxidant activity (81% ABTS and 57% DPPH) (Matan *et al.*, 2024) along with other significant bioactive compounds such as total flavonoid, carotenoid and total phenolic content.

Economic Value and Processed Products

- *Food and Functional Food Products*: The unique mangosteen fruit taste leads to the development of jam, mangosteen peel extract drinks, fruit juices and fortified products such as yogurt, chocolate and ice cream.
- *Mangosteen Powder*: Dried mangosteen is ground into powder, which can be added to smoothies, teas, or used in cooking.
- *Mangosteen Supplements*: Mangosteen extracts are encapsulated into supplements.
- *Mangosteen Skincare Products*: Due to its antioxidant properties, mangosteen is incorporated into skincare items like creams and lotions, aiming to promote skin health and combat signs of aging.
- *Peel Waste*: Utilized as a green absorbent to separate economical metals like gold and silver from electronic waste.
- *Natural Dye*: Fruits peels of mangosteen are valuable for natural dye preparation in traditional way.
- *Animal Feed Supplementation*: Application improved digestion, microbiome composition and rumen fermentation in animals.
- *Food Shelf Life*: Various compounds of mangosteen have shown anti-browning activity against food spoilage.
- *C-Dots for Bioimaging*: Helpful in biosensory analysis (Aizat *et al.*, 2019).

Conclusion

Mangosteen is a super fruit which is known for its unique properties in health benefits and their applications in different fields. However, existing research indicates its therapeutic properties, critical investigations are required to reveal its role in promoting human health. Clinical trials will be required in future endeavours to evaluate its biological activity and estimate its advantages in lifestyle-related diseases. Such advancements could greatly increase its global appeal and influence in health and wellness.

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