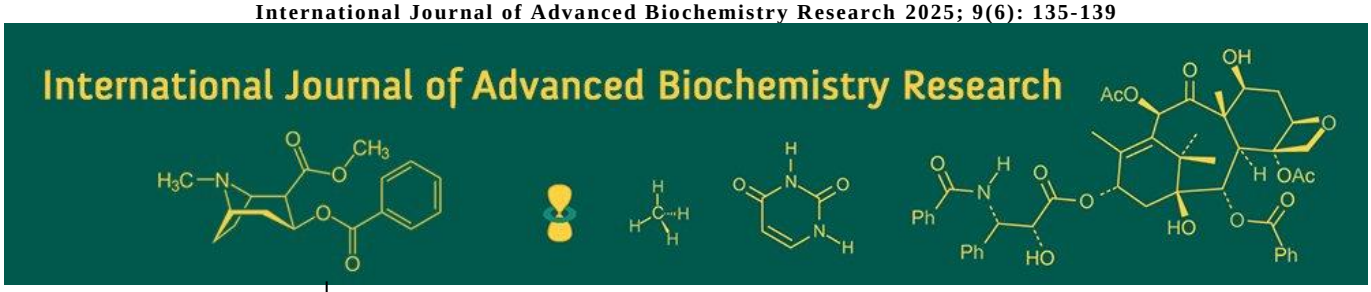

ISSN Print: 2617-4693
ISSN Online: 2617-4707
NAAS Rating: 5.29
IJABR 2025; 9(6): 135-139
www.biochemjournal.com
Received: 27-04-2025
Accepted: 30-05-2025

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Papaya a wonder fruit: A review

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DOI: https://www.doi.org/10.33545/26174693.2025.v9.i6b.4560

Abstract
Papaya (*Carica papaya* L.) is a tropical fruit also called as a “wonder fruit” renowned for its nutritional richness and diverse pharmacological properties. This review aims to consolidate current knowledge regarding the fruit's nutritional composition, health benefits, and various applications in food, medicine, and industry. The significance of papaya's bioactive compounds, including enzymes, vitamins, and antioxidants, in promoting human health and preventing disease is discussed. Moreover, papaya is a good source of vitamin A, vital for vision, immune health and cell growth, often present in the form of beta-carotene, a precursor that the body converts as needed. Furthermore, the review examines emerging research highlighting papaya’s potential in disease prevention, particularly against certain cancers and cardiovascular ailments, attributed to its antioxidant and immunomodulatory activities. The comprehensive overview underscores the multifaceted benefits of papaya, solidifying its reputation as a truly wonder fruit with significant implications for health and nutrition.

Keywords: Papaya, nutritional composition, health benefit, and antioxidant

Introduction
Papaya, often referred to as the "wonder fruit," is a widely cultivated tropical fruit belonging to the Caricaceae family. Originating from warm climates of the Americas, likely in Southern Mexico and Central America, this fruit- bearing tree or large shrub has journeyed across continents, now thriving in tropical and sub-tropical regions worldwide, including India. Its distinctive appearance, with a single trunk is covered by large, deeply lobed leaves and the charactistics clusters of ripening fruit hanging directly from the trunk, makes it more recognizable. The fruit is cherished not only for its sweet taste and vibrant colour but also for its impressive array of nutrients and bioactive compounds. Traditionally, various parts of the papaya plant, including the fruit, leaves, and seeds, have been used in folk medicine to treat a wide range of ailments. Today papaya more than just a delicious treaties recognized as a powerhouse of nutrients and bioactive compounds. Its versatility extends from being enjoyed fresh to being incorporated into a wide array of culinary creations, both sweet and savory. Furthermore, scientific research continues to validate the traditional use of papaya, overcoming its potential in promoting health and well-being. From this humbleorigins to its global cultivation and significant position in the world of fruits. This review explores the nutritional profile, health benefits, and diverse applications of papaya, highlighting its potential to contribute to human well-being.

Taxonomical classification

Category	Classification
Kingdom	Plantae
Subkingdom	Viridiplantae
Infrakingdom	Streptophyta
Super-division	Embryophyta
Division	Tracheophyta
Subdivision	Spermatophytina
Class	Magnoliopsida
Superorder	Brassicales
Order	Brassicales
Family	Caricaceae
Genus	*Carica*
Species	*Carica papaya*

Taxonomy, Morphological character of *Carica papaya* Botanical Description

Papaya plant

It is large having height 20-30 feet. Leaves are very large in size up to 2-3 feet and the stem are hollow, tan brown and light green in colour has diameter of 8-10 inches. *Carica papaya* is a polygamous species that's means it's hard to identify. papaya has present of trunk which is found in the top of tree which is look like umbrella canopy of palmately lobed leaves. The most important fruit is the pawpaw (*Carica papaya* Linn.) family of Caricaceae with 22 and more species.

Papaya flowers

Papaya flowers are dioeciously or hermaphroditic in nature and they obtain only male, (hermaphroditic) bisexual flowers. Whereas female flower are pear outline or shape. The most papaya plants are self pollinated thus the male flower of papaya is smaller as compare with female flower. While bisexual flowers are sub cylindrical. Flower are introverted or before previous of three character. The position of ovary is superior. Female and bisexual flower are semisolid, ivory white in colour and borne on short pendiculesin leaf axils, along the main stem. A male *Carica papaya* is known by the smallest flower borne on long glowing.

Fig 1: The flowers and fruits of male, female, and hermaphrodite papaya. (A) Female flowers; (B) hermaphrodite flowers; (C) male flowers; (D) female fruit; (E) hermaphrodite fruit; (F) male tree.

Papaya fruit

The fruit of papaya is oval in shape which is filled with central seed cavity it borne in auxiliary on the stem, weight of fruit about 1 to 3 kg. And raw papaya is of green in colour and it turning yellow or red orange during maturity. Fresh of fruit ranges from yellow orange to salmon at maturity. Because of it is melon having a middle seed cavity.

Medicinal uses of *Carica papaya* plant mentioned in traditional ayurvedic literature

Parts	Medicinal uses
Ripe fruits	Carminative, diuretic, chronic diarrhea, dysentery, wounds of urinary tracts, stomachic, ringworm, sedative and tonic, bleeding piles
Unripe fruit	Diuretic, anti-bacterial activity, laxative, used in snakebite to remove poison, abortifacent
Seeds	Carminative, anti-fertility agents in males, counter irritant, as a paste in the treatment of ringworm and psoriasis
Roots	Anti-fungal activity, diuretic, checking irregular bleeding from uterus, piles
Leaves	Asthma, beriberi, fever, abortion, dressing wounds (fresh leaves), antibacterial activity, jaundice, gonorrhea, urinary complaints
Flower	Febrifuge, jaundice, pectoral properties
Stem bark	STD, anti-fungal activity, jaundice, anti-haemolytic activity, sore teeth

Source: Kartikar and Basu (1998) [2]

Importance of various parts of papaya

Seeds: Papaya seeds are used for the treatment of sickle cell disease and their related disorders. Papaya seeds are the good source of nutrients like healthy fats, protein, and

dietary fiber, which can complement to the overall nutritional intake when used in moderation value.

Leaves: Leaves of papaya have an anti-inflammatory and antioxidants properties including flavonoids, polyphenols and vitamin C content. The presence of these compounds helps to decrease the chance of chronic diseases. Some people have noticed and also early science hints, that juice or extracts made from papaya leaves might helps in our body for making more platelets. This could also be helpful for people who have illnesses like dengue fever, where their platelet levels can drop.

Roots: Papaya roots are used as traditional medicine to cure the problems related to tummy troubles (digestion) because of having enzyme papain.

Flowers: Papaya flowers are a unique part of the papaya plant and can be used as both culinary purpose and medicinal purpose.

Skin: There is a presence of enzymes in papaya skin which is responsible for the skin-brightening effects. Regular use can help reduce the appearance of dark spots, hyperpigmentation and uneven skin tone. The antioxidants in papaya skin can help fight free radicals and reduce the signs of premature aging like fine lines and wrinkles.

Nutritional Composition

Papaya is a nutrient-dense fruit, providing substantial amounts of essential vitamins, minerals, and dietary fiber. The following table summarizes the key nutritional components of ripe papaya fruit:

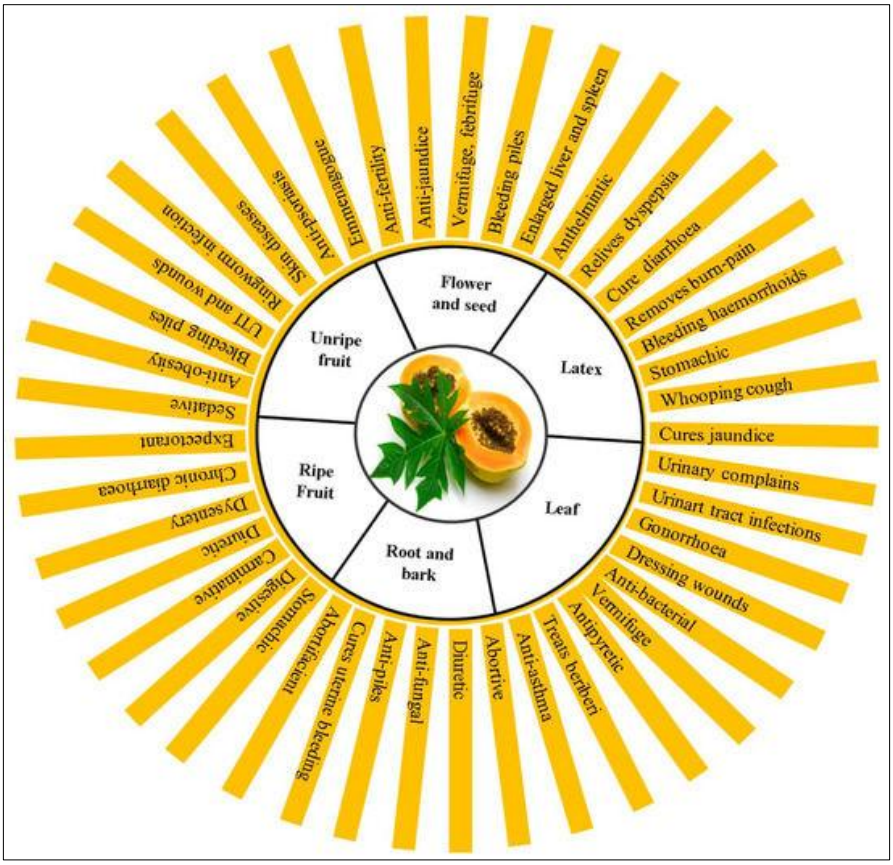
Chemical composition	Ripe	Unripe
Moisture	91.47%	92.04%
Protein	0.4	0.50
Fat	0.2	0.23
Carbohydrate	4.1	4.40
Calorific value	S100KJ	100
Vitamin A	2472 IU	548IU
Vitamin B2	0.11	0.12
Vitamin B5	0.44	0.24
Vitamin B9	60.90µg	29.79µg
Biotin	3.05	1.24
Vitamin C	43.1	20.73mg
Iron	0.23mg	0.20
Calcium	15.02mg	-

Source: Longvah *et al.*, 2017

Health Benefits

The unique nutritional profile of papaya confers a wide range of health benefits, supported by scientific research:

- **Digestive Health:** Papain and chymopapain enzymes facilitate protein digestion, alleviating digestive disorders such as bloating and constipation.
- **Antioxidant Activity:** Papaya's rich content of carotenoids, flavonoids, and vitamin C contributes to its potent antioxidant activity. These compounds neutralize free radicals, reducing oxidative stress and protecting against chronic diseases. Studies have shown that papaya consumption may help to improve the antioxidant defense system in the body.
- **Anti-inflammatory Effects:** Papaya contains compounds with anti-inflammatory properties, which may help to reduce inflammation associated with conditions like arthritis.
- **Cardiovascular Health:** The high fiber and potassium content in papaya contributes to heart health. Fiber helps lower cholesterol levels, while potassium helps maintain healthy blood pressure. Lycopene, a carotenoid found in papaya, has also been linked to a reduced risk of heart disease.
- **Immune Support:** Papaya is an excellent source of vitamin C, a crucial nutrient for immune function. Adequate vitamin C intake helps the body fight off infections and maintain overall health.
- **Eye Health:** The carotenoids lutein and zeaxanthin, present in papaya, are essential for eye health. They help filter out harmful blue light and protect against age-related macular degeneration.
- **Skin Health:** The antioxidants and vitamin A in papaya contribute to healthy skin by protecting against damage from free radicals and promoting cell regeneration. Papaya is also used in cosmetic applications for its skin-rejuvenating properties.
- **Anti-cancer Properties:** Some studies suggest that the bioactive compounds in papaya, such as lycopene, may have anticancer effects. However, more research is needed to fully understand the potential of papaya in cancer prevention and treatment.
- **Enzymes:** Papain and chymopapain, proteolytic enzymes that aid in digestion.
- **Antioxidants:** Carotenoids (lycopene, beta-carotene), flavonoids, and phenolic acids, which protect against oxidative stress.



Other Applications

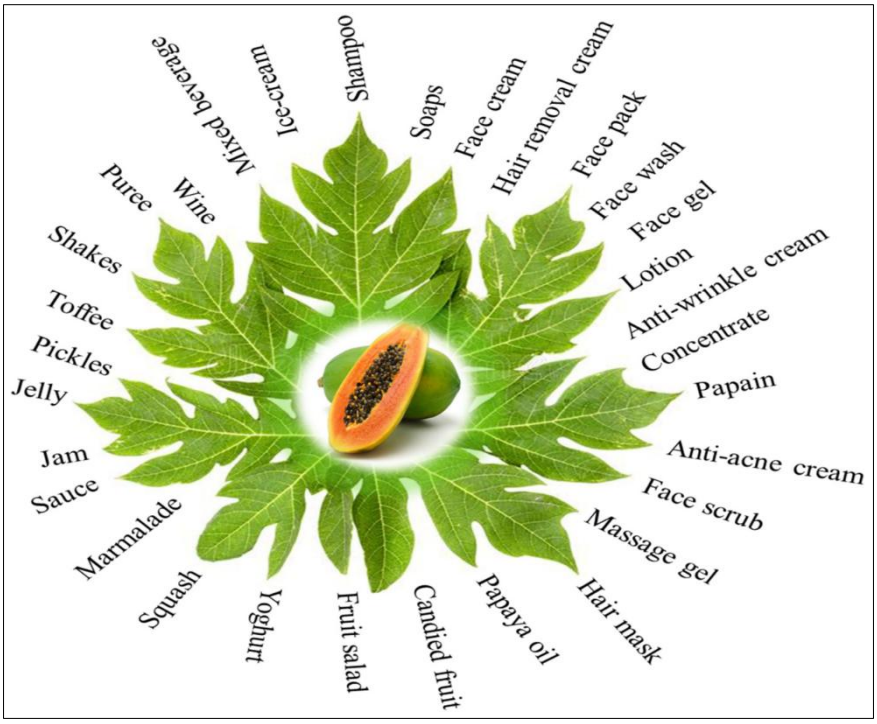
Beyond its nutritional and medicinal value, papaya has diverse applications in various industries:

- **Food Industry:** Papaya fruit is consumed fresh and used in a variety of food products, including juices, jams, jellies, and desserts. Unripe papaya is used as a vegetable in some cuisines and is a source of papain.
- **Cosmetics:** Papaya extracts are used in skincare products due to their enzymatic and antioxidant properties, which help to exfoliate, brighten, and rejuvenate the skin.
- **Meat Tenderization:** Papain is a natural meat tenderizer and is used commercially to improve meat texture.
- **Traditional Medicine:** Different parts of the papaya plant have been used in traditional medicine systems like Ayurveda for their therapeutic properties.

Company name	Brand name	Dosage form	References
Rochway	Papaya leaf extract capsules	All of the dry leaves that make up the capsule are finely powdered and come from natural papaya components.	Balbontin C, Gaete-Eastman C, Vergara M, Herrera R, Moya-León MA (2007). Treatment with 1-MCP and the role of ethylene in aroma development of mountain papaya fruit. Postharvest Biological Technology 43:67-77.
Rochway	Papaya leaf extract – 500 ml	Papaya leaf extract that is dry and 100% bio-fermented from *C. papaya*	Bere AW, Mulati O, Kimotho J, Ng'ong'a F (2021). Carica papaya leaf extract silver synthesized nanoparticles inhibit dengue Type 2 viral replication in vitro. Pharmaceuticals (Basel) 14:718.
Herbal Papaya	Papaya Leaf (Paw Paw Twig) Extract (alcoholfree)	Sixty vegetable capsules made from dried Papaya leaf	Cauwenberghs S, Van-Pampus E, Curvers J, Akkerman JWN, Heemskerk JWM (2007). Hemostatic and signalingfunctions of transfused platelets. Transfusion Medicine Review 21:287-294.
Celebration Herbals	This product is an herbal tea, which is manufactured only from papaya leaves. There is no caffeine in it. The container measures 1.33 ounces (38 g) and includes 24 tea bags	(Papaya leaves that have been fermented) Tea bags	Dubey A, Ghosh N, Singh R. A (2023). Role of aqueous and ethanolic seed extract of Asparagus racemosus on acrinduced neurotoxicity in adult zebrafish: emergence of neuroprotective results. Egyptian Journal of Aquatic Biology and Fisheries27:285-296. Dubey A, Ghosh N, Singh R (2023). An in-depth and in vitro evaluation of the antioxidant and neuroprotective activity of aqueous and ethanolic extract of *Asparagus racemosus* Linn seed. Research Journal of Chemistry and Environment 27:46-66.
Micro Lab Limited	Caripill	Extract of dried *C. papaya* leaves contained in a tablet	Dubey A, Singh Y (2021). Medicinal properties of cinchona alkaloids - A brief review. Asian Journal of Research in Pharmaceutical Sciences **11**:224-228.

Value added products of papaya

Papaya can also be used to create value-added products. Products such as pickle, candy, papaya –mix juices and face wash are already being sold in the market.



Conclusion

Papaya is a highly nutritious fruit with a wide range of health benefits and diverse applications. Its rich content of vitamins, minerals, enzymes, and antioxidants makes it a valuable food for promoting overall health and preventing chronic diseases. The nutritional profile of papaya is ongoing research on papaya's bioactive compounds continues to unveil its potential in medicine, nutrition, and various industries. The fruit enzymes significantly improve digestion. Its powerful antioxidants- carotenoids, flavonoids and vitamin C- combat oxidative stress, potentially reducing chronic diseases risk. Papaya also boasts anti-flammatory properties, offering therapeutic potential for various conditions. Beyond the fruit itself, other parts of the papaya plant are valuable. Leaves are used in traditional medicine for dengue fever, while seeds show anthelmintic and antimicrobial effects. Papaya's potential extends to skincare, wound healing and even industrial enzyme production, solidifying its "wonder fruit" status. Papaya truly stands out as a wonder fruit, offering a promising avenue for improving human well-being. Further research is vital to fully understand its bioactive compounds and explore new therapeutic uses. Standardized extraction methods and clinical trials are needed to validate traditional claims and develop papaya – based nutraceutical. Nonetheless, existing evidence strongly supports including papaya in a healthy diet and continuing its exploration as a natural powerhouse for health and wellness.

References

1. Dubey A, Samanthula KS, Dash SS, Sethy AA, Kumari M. Role of *Carica papaya* in Thrombocytopenia. J Nat Remedies. 2025;2320-3358.
2. Kartikar KR, Basu BD. Indian medicinal plants. Reprint, 2nd ed. Springer Science+Business Media. New York, USA. 1998, 1097-1099.
3. Veersain AK, Kumar M, Thilagam P, Yadav R, Rajpoot S, Yadav S, *et al*. A comprehensive review of papaya's multidimensional impact on health and wellness. Int J Stat Appl Math. 2023;8:1065-1071.
4. Vidya sala A. *Carica papaya*. In: Ramankutty C, editor. Indian medicinal plants: a compendium of 500 species. Orient Longman Pvt Ltd.. Hyderabad. 2005, 383-384.