

JACKFRUIT: A NUTRIENT-RICH RESOURCE FOR HUMAN HEALTH AND FOOD SECURITY

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ABSTRACT

*Jackfruit (*Artocarpus heterophyllus*) is the largest tree-borne fruit and an important underutilized crop with significant nutritional and medicinal value. It is rich in carbohydrates, proteins, vitamins, minerals, and diverse phytochemicals that exhibit antioxidant, anti-inflammatory, antimicrobial, and anticarcinogenic properties. Various parts of the plant, including fruits, seeds, leaves, and bark, are widely used in traditional medicine. Due to its high energy value, dietary fiber, and bioactive compounds, jackfruit contributes to improved human health and food security. Its adaptability, productivity, and multiple uses make it a promising crop for sustainable agriculture and nutritional enhancement.*

KEYWORDS: *Artocarpus heterophyllus*, food security, health benefits, nutrition, phytochemicals

INTRODUCTION

Jackfruit (*Artocarpus heterophyllus*), belonging to the family Moraceae, is a tropical fruit native to the Western Ghats of India. It is widely cultivated in home gardens across tropical regions and is recognized as the national fruit of Indonesia and Bangladesh. Despite its high nutritional value and adaptability, jackfruit remains an underutilized crop and is often referred to as the “poor man’s fruit.”

The fruit is climacteric and available for a long duration, making it an important source of nutrition throughout the year. Both the pulp and seeds are edible and versatile in use, ranging from fresh consumption to processed products. Apart from its dietary significance, jackfruit also provides timber, animal feed, and medicinal products. Its diverse applications and resilience highlight its importance in ensuring food and nutritional security in developing regions.

NUTRITIONAL COMPOSITION AND PHYTOCHEMICAL PROFILE

Jackfruit is rich in macronutrients such as carbohydrates and dietary fiber, along with essential micronutrients including vitamins and minerals. The presence of bioactive compounds such as flavonoids, carotenoids, and phenolics enhances its functional properties.

The phytochemical composition varies across different plant parts, including fruit, seeds, and leaves, contributing to its wide range of health benefits. These compounds are responsible for antioxidant activity and protection against various chronic diseases.

The major phytoconstituents present in jackfruit are summarized in Table 1.

Table 1: Major Phytoconstituents in Jackfruit and Their Distribution

Phytoconstituents	Plant Part
Carbohydrates (starch, sugars, dietary fiber)	Fruit, Seed
Minerals (Ca, Mg, P, K, Na, Fe)	Fruit, Seed
Fatty acids (palmitic, oleic, stearic)	Fruit
Organic acids (malic, citric acid)	Fruit
Carotenoids	Fruit, Seed
Flavonoids (artocarpine, morin, artonins)	Fruit
Lectins (jacalin)	Seed
Volatile compounds	Fruit, Seed
Vitamins (A, B-complex, E)	Fruit

HEALTH BENEFITS AND FUNCTIONAL PROPERTIES

Jackfruit possesses numerous health-promoting properties due to its rich nutrient and phytochemical content. It is particularly known for its antioxidant, anti-inflammatory, and antimicrobial activities.

- ❖ *Role in Disease Prevention:* The presence of antioxidants such as vitamin C and flavonoids helps neutralize free radicals, reducing the risk of chronic diseases including cancer, cardiovascular disorders, and neurodegenerative conditions. Bioactive compounds such as lignans and saponins contribute to anticancer and anti-ulcer properties.
- ❖ *Digestive Health:* Jackfruit is an excellent source of dietary fiber, which improves digestion, prevents constipation, and supports gut health. Regular consumption helps eliminate harmful substances from the digestive tract and enhances bowel movement.

The major health benefits associated with different parts of jackfruit are presented in Table 2.

Plant Part	Key Compounds	Health Benefits	Reference
Fruit pulp	Functional compounds	Prevents heart disease, anti-inflammatory effects, improves muscle and nerve function	Swami et al., 2012
Fruit pulp	Vitamin B6	Reduces homocysteine levels and risk of heart disease	Soong and Barlow, 2004
Fruit pulp	Vitamin C	Protects skin from ageing, maintains oral health and skin integrity	Babitha et al., 2004
Fruit pulp	Lignans, isoflavones, saponins	Anticancer, antihypertensive, anti-ulcer, anti-aging properties	Baliga et al., 2011
Fruit pulp	Niacin	Supports energy metabolism and hormone synthesis	Mushumbusi, 2015
Fruit pulp	Dietary fiber	Improves bowel movement, prevents constipation, binds toxins	Morton, 1987
Fruit pulp	Iron and copper	Supports thyroid metabolism and blood circulation	Singh et al., 1991
Fruit pulp	Minerals and vitamins	Protect colon mucosa	Morton, 1987
Fruit pulp	Flavonoids (morin, artocarpin, etc.)	Treats fever, wounds, skin diseases, and other disorders	Prakash et al., 2009; Rao and Venkataraman, 1973
Seed & pulp	Ascorbic acid, gallic acid	Antioxidant, cooling and nutritious tonic	Soong and Barlow, 2004
Leaves	Extracts	Anti-diabetic activity	Fernando et al., 1991
Stem, root, bark	Bioactive compounds	Antibacterial and nematocidal activity	Khan et al., 2003
Wood extract	Prenylated flavones	Inhibits melanin biosynthesis (non-cytotoxic)	Arung et al., 2007
Bark (root & stem)	Prenylated flavones	Anti-malarial, anti-diarrhoeal activity	Henirich and Heneka, 2005
Fruit & root	Flavonoids	Anti-atherosclerotic activity	Jagpat and Bapat, 2010

- ❖ *Energy and Metabolic Functions:* Being rich in carbohydrates and vitamins such as thiamine and niacin, jackfruit serves as a natural energy source. It supports metabolic processes, reduces fatigue, and improves muscle and nerve function.

- ❖ *Vision and Skin Health:* Vitamin A present in jackfruit contributes to improved vision and helps prevent conditions such as cataracts and macular degeneration. Additionally, its antioxidant properties promote healthy skin and delay aging.
- ❖ *Role in Diabetes and Weight Management:* Despite its sweet taste, jackfruit has a moderate glycemic impact due to slow sugar release, making it suitable for controlled consumption by diabetic individuals. Its low fat and high fiber content also support weight management.

UTILIZATION AND ECONOMIC IMPORTANCE

Jackfruit is a multipurpose crop with applications in food, medicine, and industry. The ripe fruit is consumed fresh or processed into products such as chips, jams, juices, and sweets. The unripe fruit is used as a vegetable, while seeds are consumed after roasting or boiling. In addition to food uses, jackfruit wood is valued for its durability and is widely used in furniture and construction. Leaves and fruit residues serve as livestock feed, contributing to integrated farming systems. The growing demand for plant-based foods has also increased interest in jackfruit as a meat substitute due to its texture and nutritional value. This opens new opportunities for value addition and commercialization.

ROLE IN FOOD SECURITY AND SUSTAINABILITY

Jackfruit has immense potential in addressing food security challenges, particularly in tropical regions. Its high yield, adaptability to diverse climatic conditions, and minimal input requirements make it suitable for smallholder farming systems. The fruit provides a significant amount of calories and nutrients, making it a valuable resource in combating malnutrition. Its ability to grow in marginal soils and withstand environmental stresses further enhances its role in sustainable agriculture. Promoting jackfruit cultivation and utilization can contribute to dietary diversification, rural income generation, and climate-resilient farming systems.

MEDICINAL AND TRADITIONAL USES

Various parts of the jackfruit plant have been used in traditional medicine for centuries. The fruit, seeds, leaves, and bark possess therapeutic properties that help in treating ailments such as ulcers, skin diseases, infections, and anemia. Extracts from jackfruit have demonstrated antimicrobial, anti-inflammatory, and wound-healing activities. These medicinal properties are largely attributed to the presence of phytochemicals such as flavonoids, phenolics, and carotenoids.

CONCLUSION

Jackfruit is a highly valuable yet underutilized crop with significant potential for improving human health and ensuring food security. Its rich nutritional composition, diverse phytochemicals, and wide range of applications make it an important component of sustainable agricultural systems. Incorporating jackfruit into daily diets can provide essential nutrients and health benefits, while its commercial utilization can enhance rural livelihoods. Therefore, increased awareness, research, and value addition are essential to fully exploit the potential of this remarkable fruit.

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