



Detailed Review on Pharmacological Profile of *Artocarpus heterophyllus*

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ABSTRACT

Medicinal plants usage has been continued since olden times for treatment of illness and various diseases internationally. They contain substances which have therapeutics activities and further study of these substances has led to discovery of new drugs. In present days, the medicinal plants play a significant role in the development of plant-based medicines. *Artocarpus heterophyllus* is a plant which belongs to family moraceae and is an indigenous plants found mostly in the forest of western ghats in India. *Artocarpus heterophyllus* are rich in flavonoids, reducing sugars, proteins and minerals. It is used traditionally to cure diarrhoea, wound healing, ulcer, skin diseases and pharmacologically used as anti-bacterial, anti-inflammatory, anti-diabetic, anti-fungal.

Keywords: *Artocarpus heterophyllus*, flavonoids, pharmacological, traditional uses.

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INTRODUCTION

A *rtocarpus heterophyllus* is a plant that belongs to the family Moraceae. Jackfruit is generally grown in Sri Lanka, Bangladesh, Burma, Philippines, Indonesia, Thailand, Malaysia and Brazil being the tropics countries. Jackfruits is a seasonal fruit easily available in summer season. It is a large evergreen tree varies with 10-30m tall, having long tap root and the crown is dense making it the largest tree borne fruit in the world. Jackfruit seeds are boiled and included in the diets which have 77% starch content.¹ The various parts of the plants have different actions such as the fruit pulp and seeds are used as cooling tonic, roots are used in diarrhoea, leaves are used to increase lactation, the ash of the leaves are used for treating wounds caused due to ulcer. The bark stem is used in anaemia, asthma, dermatitis, and expectorant.²

Growth and Distribution

Artocarpus heterophyllus in early years it grows rapidly at about 1.5 m/year in height, later when it reaches maturity its growth become slow to about 0.5 m/year.⁵ The tree is found to be native to the rainforest of Malaysia and Southern part in Western Ghats of India. Jackfruit has been intensively cultivated for generations in many parts of the tropics region, particularly in the Southeast Asia. Today it is a significant fruits of India, Myanmar, China, Sri Lanka, Malaysia, Indonesia, Thailand, and Philippines. Jackfruit

has also been cultivated in many Pacific islands and is of Particular importance in Fiji, where there is large population of Indian descent.⁶

Table 1: Synonyms and common names.

Synonyms ³	Common names ⁴
<i>Artocarpus heterophylla</i> Lam	Sanskrit :Panasa, Atibruhatphala
<i>Artocarpus brasiliensis</i> Gomez	Hindi :Kathal or Panas Bengali :Kanthal
<i>Artocarpus philippinensis</i> Lam	Guajarati :Phanas Kannada :Halasu
<i>Artocarpus maxima</i> Blanco	Konkani :Phanas
<i>Polyphema jaca</i> Lour	Malayalam :Chakka
<i>Soccusarboreus major</i> Rumph	Tamil :Palaa
<i>Artocarpus integra</i> Thunb	Telugu :Panasa
<i>Artocarpus integrifolia</i> auct	Tulu :Pelakai, Gujje
<i>Artocarpus integer</i> auct	

Taxonomical Classification⁷

Table 2: Taxonomical classification of *Artocarpus heterophyllus*.

Kingdom	:Plantae
Phylum	:Tracheobionta
Division	:Magnoliophyta
Class	:Magnoliopsida
Order	:Urticales
Family	:Moraceae
Genus	: <i>Artocarpus</i>
Species	: <i>Artocarpus heterophyllus</i> Lam



BOTANICAL DISCRPTION**Size and form**

Artocarpus heterophyllus is a medium-size, evergreen tree. It typically attains a height of about 10-20 m and a stem diameter of 30-80 cm. The tree has a long taproot with a dense crown. The stem is rough and straight covered with a green or black bark. All parts of the plants comprise a whitish latex which is sticky in nature and it exudes out when there is injury.⁸



Figure 1: Tree of *Artocarpus heterophyllus*

Flowers

This species is bisexual where both male and female structures are present on the same plant. Male flower heads are swollen, elongated, 1–4 cm long and 1 cm wide, which is covered with yellow pollen at maturity that is shed rapidly. Female flower heads are oblong and look like the male heads but without pollen. The stalks of the flower heads are encircled by a small green ring (Figure 2).⁹



Figure 2: Flower of *Artocarpus heterophyllus*

Leaves

The leaves are oblong, oval, or elliptic, 4–25 cm long and 2–12 cm wide, leathery, glossy, and upper surface is deep green in colour. Young leaves are lobed at the premature stage. The apex of the leaves is blunt and tapers to the base (Figure 3).^{8,9}



(b) Inner View

(c) Outer View

Figure 3: Leaf of *Artocarpus Heterophyllus*

Fruit

The fruits exist mainly on the trunk and main branches. Jackfruit has a compound or multiple fruit which has a green to yellow-brown exterior rind, covering a thick, rubbery, whitish to yellowish wall. The central fibrous core held the fruit together. The average weight of the fruit is about 4.5-30 kg. The fruits take about 90-180 days to ripen (Figure 4).^{6,9}



Figure 4: Fruit of *Artocarpus heterophyllus*

Seeds

The seeds are golden yellow or light brown to brown colour. They are round, about 2-3 cm in length, diameter is about 1-1.5 cm, and are enclosed in a thin, whitish membrane. The seeds are prone to fungus infection and they can be stored up to a month in cool, humid conditions (Figure 5).⁶



Figure 5: Seeds of *Artocarpus heterophyllus*

Nutrients Value¹⁵

Table 3: Composition of jackfruit of the edible portion (100g)

Nutrients	Young fruit	Ripe fruit
Water (g)	76.2–85.2	72.0–94.0
Protein (g)	2.0–2.6	1.2–1.9
Fat (g)	0.1–0.6	0.1–0.4
Carbohydrate (g)	9.4–11.5	16.0–25.4
Fiber (g)	2.6–3.6	1.0–1.5
Total sugars (g)	NA*	20.6
Total minerals (g)	0.8	0.8–0.9
Calcium (mg)	30.0–73.2	20.0–37.0
Magnesium (mg)	NA*	27.0
Phosphorus (mg)	20.0–57.2	38.0–41.0
Potassium (mg)	287.0–323.0	191.0–407.0
Sodium (mg)	3.0–35.0	2.0–41.0
Iron (mg)	0.4–1.9	0.5–1.1
Vitamin A (IU)	30.0	175.0–540.0
Thiamine (mg)	0.05–0.15	0.03–0.09
Riboflavin (mg)	0.05–0.2	0.05–0.4
Vitamin C (mg)	12.0–14.0	7.0–10.0
Energy (kJ)	50–210	88–410

Chemical Composition

Artocarpus heterophyllus contains flavanone namely artocapanone and a number of other flavanoids like cycloartocarpin, artocarpinone, artocarpetin, norartocarpetin, artocarpin, cyanomaclurin and dihydromorin.⁹ Two novel 2',4',6'-trioxygenated flavanones, heteroflavanones A and B, extracted from the bark of the root of *Artocarpus heterophyllus*.¹⁰ Free sugars

found are Fructose, glucose and sucrose, the major fatty acids like Capric, myristic, lauric, palmitic, oleic, stearic, linoleic and arachidic acids from the different parts of the plants.¹¹ Prenylflavones are artocarpetin B and heteroartocarpin A, prenylflavonoids mainly kuwanon T, artonin A, artonin B and heterophyllin which are isolated from the barks of the roots.¹² The primary protein from *Artocarpus heterophyllus* seed is Jacalin, consisting of tetrameric two chain lectin having a combination of heavy chain consisting 133 amino acid residues along with light β -chain of 20-21 amino acid residues.¹³ *Artocarpus heterophyllus* seeds also contains minerals such as calcium, phosphorous and iron, manganese and magnesium.¹⁴

PHARMACOLOGICAL ACTIONS

Anti-inflammatory effect

The fruits contain artocarpesin that suppresses the productivity of nitric oxide (NO) and prostaglandin E2 (PGE2) which may provide a potential approach for anti-inflammatory effect.¹⁶

Antioxidant effect

The phenylflavones such as cycloheterophyllin and artonins A and B which are isolated from *Artocarpus heterophyllus* has antioxidant properties against lipid peroxidation.¹⁷

Antifungal effect

The chitin-binding lectin present in the seeds denoted as jackin inhibiting growth of *Fusarium moniliforme* and *Saccharomyces cerevisiae*.¹⁸

Sexual behaviour

The roasted seeds of *Artocarpus heterophyllus* has aphrodisiac activity.¹⁹

Immunomodulatory effect

Jacalin which is the major protein from seeds is found to have application in isolation of human plasma glycoproteins, the investigation of IgA-nephropathy, in analysis of O-linked glycoproteins and detection of tumours.²⁰

Antidiabetic effect

The hot water extracts of *Artocarpus heterophyllus* leaves is found to improved the glucose tolerance in diabetic patients.²¹

Antibacterial effect

The crude extract of barks, stem and roots, stem and root heart-wood, leaves, fruits and seeds with methanol exert broad spectrum antibacterial activity.²²

Anthelmintic effect

The seeds will be found to have nematicidal actions against various types of nematodes.²³

TRADITIONAL USES OF JACKFRUIT

Leaves

Leaves extract used as a control measure in diabetics, cures asthma, prevents ringworm infestation. Heated leaves cure wounds, abscesses and ear problems and relieve of pain. An infusion of mature leaves used to treat gallstones. The ash of jackfruit leaves used to heal ulcer.²⁴

Seeds

Roasted seeds can be used as aphrodisiac. The kernels of ripe jackfruit is rich in vitamin A. Seeds extract is useful for diarrhoea and dysentery and helps digestion.²⁴

Wood

The wood exert sedative property; its pith is said to aid abortion. Wood is used for furniture, as fuel.²⁵

Roots:

The root extract is used for skin diseases, asthma and diarrhoea.²⁵

Latex

The latex can be used as adherent agent. The latex consist of resins which can be used in varnishes.²⁵

Fruits

The young fruit is used to prepared vegetable, pickled. The Pulp of ripen fruit is eaten fresh or can be used for manufacturing local delicacies including chutney, jam, jelly, or used to flavour ice cream and beverages, made into jackfruit honey.²⁵

CONCLUSION

Artocarpus heterophyllus is easily available and considered as underutilised fruit with High nutritive value and considered as poor man's food. The different parts of the tree are found to have medicinal activities. Therapeutically it can be used as antibacterial, anti-inflammatory, wound healing, aphrodisiac and skin diseases. The chemical components that are present in *Artocarpus heterophyllus* are polyphenols, flavanone, flavonoids, fatty acids, reducing sugars, proteins and minerals. Apart from these research, there are still many possible scientific studies that can determined its medicinal and pharmacological activities. Thus, we can conclude that *Artocarpus heterophyllus* is nutritionally and medicinally important fruits in all aspects.

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