A Complete Review on *Psidium guajava* Linn (Medicinal Plant)

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**ABSTRACT**

*Psidium guajava* is an essential food crop and medicinal plant that is commonly used in foods and folk medicines around the world and is available in tropical and subtropical countries. It contains important phytoconstituents such as tannins, triterpenes, flavonoids: quercetin, pentacyclic triterpenoid: guajanoic acid, saponins, carotenoids, lectins, leucocyanidin, ellagic acid, amritoside, beta-sitosterol, uvaol, oleanolic acid and ursolic acid. This analysis is an attempt to compile all the information published on its ethno-botanical, phytochemical and pharmacological activities, considering the immense medicinal significance of the plant. In view of the immense medicinal importance of the plant, this study is an effort to compile all the knowledge reported on its ethno-botanical, phytochemical and pharmacological activities. Many pharmacological studies have demonstrated the ability of this plant to exhibit antioxidant, hepatoprotective, anti-allergy, antimicrobial, antigenotoxic, antiplasmodial, cytotoxic, antispasmodic, anticoagulants, anti-diabetic, anti-inflammatory and antinociceptive activities, supporting its traditional uses. Suggesting a wide range of clinical applications for the treatment of infantile rotaviral enteritis, diarrhoea and diabetes.

**Keywords:** Ethnobotany, myrtaceae, pharmacology, physicochemical, phytochemical, *Psidium guajava*.

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**INTRODUCTION**

*Psidium guajava* L is a fruit-bearing tree commonly known as guava, which belongs to the family Myrtaceae. The French call it *goave* or *goavier*; the Dutch, *guaya*, *goeajaaba*; the Surinamese, *guave or geojaba*; and the Portuguese, *goiaba* or *goaibeira*. Hawaiians call it guava or *kuawa*. In Guam, it is *abas*. In Malaya, it is generally known either as guava or *jambu batu*. Guava grows up to 1500 m in height in almost all of India and is grown commercially in almost all states, with an approximate total area of 50,000 hectares. Uttar Pradesh, Bihar, Maharashtra, Assam, West Bengal and Andhra Pradesh are important guava-growing states in India. The cultivated varieties grow at a height of about 10 m and produce fruit within four years. ¹

Wild trees are well branched, growing up to 20 m long. By its distinctive thin, smooth, copper-colored bark, which reveals a greenish layer underneath, the tree can be easily recognized. Guava trees have spread widely in the tropics because they grow, multiply easily and bear fruits rapidly in a variety of soils. Birds and monkeys love the fruits, dispersing seeds of guava and causing spontaneous dumps of guava saplings to grow in the forest. ¹

The guava tree's leaves and bark have a long history of medicinal use. In India, guava leaf and bark decoction is used to treat diarrhea, dysentery, vomiting and sore throats, and to monitor menstrual cycles. Leaf decoction is used by the Amazon tribes for mouth sores, bleeding gums, as a vaginal discharge shower and to tighten and tone up vaginal walls during labor. Guava is grown all over the tropics. The fruit is eaten commercially, raw or used in the manufacture of jams, jellies, pastes and juice. The Dutch Pharmacopoeia's Guava leaves are official. Guavas are fat and cholesterol-free. They are also an excellent source of alcohol, potassium and vitamin A. ¹

Chemical composition contains Flavonoids, Triterpenoids, Steroids, Carbohydrates, Oils, Lipids, Glycosides, Alkaloids, Tannins and Saponins. Used as Antioxidant, Antibacterial activity, Anti-inflammatory activity, Anticancer activity. Herbal medicine has both medical and economic value. While herbal medicines have advantages, industrialized and developing countries have increased their protection, effectiveness, quality and importance. Herbal medicines enhance patient compliance by preventing the common side effects of allopathic medicines. It is no wonder that one-fourth of the world's population, i.e. 1.42 billion, relies on conventional medicines for the treatment of different diseases. Since time immemorial, medicinal plants have been a significant source of treatment for human diseases.²

About three-quarters of the world's population relies primarily on herbal medicines obtained from fruits and plants. For medicinal purposes, 30 percent of the plant species are used. The worldwide demand for plant-derived drugs can be valued at Rs. 200,000 crores. India's...
Synonyms:
Psidium cujavillus burm.; Psidium pomiferum L.; Psidium pumilum Vahl; Psidium pyriferum Linn. ³

Common Names: Guava (Egypt, USA, Latin America, Asia, Africa), guyaba (Cuba), guayaba (Guatemala, Nicaragua, Paraguay), amrood (India). ⁵

Family- Myrtaceae

**Table 1: Scientific classification**

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Plantae</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clade</td>
<td>Angiosperms</td>
</tr>
<tr>
<td>Clade</td>
<td>Eudicots</td>
</tr>
<tr>
<td>Clade</td>
<td>Rosids</td>
</tr>
<tr>
<td>Order</td>
<td>Myrtales</td>
</tr>
<tr>
<td>Family</td>
<td>Myrtaceae</td>
</tr>
<tr>
<td>Genus</td>
<td>Psidium</td>
</tr>
<tr>
<td>Species</td>
<td>Psidium guajava</td>
</tr>
</tbody>
</table>

**Figure 1: Leaves of Psidium guajava**

**Phytochemistry and functional components:**

The important constituents of guava are vitamins, tannins, phenolic compounds, flavonoids, essential oils, sesquiterpene alcohols and triterpenoid acids. Leaves contain phenolic compounds, isoflavonoids, gallic acid, catechin, epicatechin, rutin, naringenin, kaempferol having hepatoprotective, antioxidant, anti-inflammatory, antispasmodic, anticancer, antimicrobial, anti-hyperglycemic, analgesic actions. The leaf contains two important flavonoids quercetin known for its spasmylytic, antioxidant, antimicrobial, anti-inflammatory actions and guaijaverin known for its antibacterial action. Pulp contains ascorbic acid, carotenoids (lycopenes, carotene) possessing antioxidant, anti-hyperglycemic, anti-neoplastic. The seed contains glycosides, carotenoids, phenolic compounds having antimicrobial actions. ⁷

**Ethanobotanics:**

P. guajava has a long history of common usage, of which modern research has validated a good proportion. Ethnomedical applications include leaf crushing and the application of the extract to the infectious site of wounds, boils, skin and soft tissue. There is an astringent stem, bark and root-bark. Unripe fruit is indigestible and induces feverish vomiting. The leaves are astringent, and the fruit is laxative. Locally, decoction of the leaves is of great benefit for the prolapsus ani of ache upsets and vertigo in infants. P. guajava leaf is a phyto therapy medication used as an anti-inflammatory treatment to treat gastrointestinal and respiratory disorders. It has also been reported for its anti-amoebic and anti-malarial effects. Guava fruit paste and cheese in Florida, the West Indies and parts of South America are popular dishes. P. guajava Linn, a herb. It has an ethano medical history because it has different operations, especially functionally against hyperglycemia. ⁸

**Table 2: Nutrient value of guava fruit**

<table>
<thead>
<tr>
<th>Nutrients</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>2.8-5.5g</td>
</tr>
<tr>
<td>Crude fiber</td>
<td>0.9-1.0g</td>
</tr>
<tr>
<td>Protein</td>
<td>0.1-0.5mg</td>
</tr>
<tr>
<td>Fat</td>
<td>0.43-0.7mg</td>
</tr>
<tr>
<td>Ash</td>
<td>9.5-10mg</td>
</tr>
<tr>
<td>Carbohydrate</td>
<td>9.1-17mg</td>
</tr>
<tr>
<td>Calcium</td>
<td>17.8-30mg</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.30-0.70mg</td>
</tr>
<tr>
<td>Iron</td>
<td>200-400 I.U.</td>
</tr>
<tr>
<td>Carotene (vitamin A)</td>
<td>0.046mg</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0.03-0.04mg</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.6-1.068mg</td>
</tr>
<tr>
<td>Niacin</td>
<td>40 I.U.</td>
</tr>
<tr>
<td>Vitamin</td>
<td>36-50mg</td>
</tr>
</tbody>
</table>
Medical significance of guava:

Guava Psidium L. As a result of its pharmacological activities, it is consumed not only as food but also as traditional medicine in subtropical regions all over the world. Almost all over the world, medicinal plants have a very important role in medical systems. Such findings are expressed in conventional wisdom. It is well known that guava is also used in many parts of the world.

A lot of diseases such as diarrhea-reducing fever, dysentery, gastroenteritis, hypertension, diabetes, caries, pain relief and wounds are healed in the country. Countries with a long tradition of using medicinal plants, such as Mexico, Africa, Asia, and Central America, still use guava at high levels. It is also used as food and in the preparation of food items because of its medicinal uses. Guava contains high amounts of organic and inorganic compounds such as secondary metabolites such as antioxidants, polyphenols, antiviral compounds and anti-inflammatory compounds. It is also used in house building and toy making. There are several compounds in Guava that have anti-cancerous activities. They have a higher number of minerals and vitamins. Phenolic compounds such as flavonoids have an important role in the guava as well. Important antioxidants are lycopene and flavonoids. They help to cure cancerous cells and help to prevent premature aging of the skin. Myocardium inotropism can be caused by Guava. Guava Skin Extract can regulate diabetes levels after 21 days of treatment.

Biological Activity and Clinical Research:

Modern-day researchers have been guided to study guava extracts by the long history of guava use. In various clinical trials, its conventional usage against diarrhea, gastroenteritis and other digestive problems has been validated. In a report that included 17 medicinal Thai plants, Guava leaf demonstrated anti-proliferative activity, which was 4.37 times more than vincristine, on anti-proliferative effects on human mouth epidermal carcinoma and murine leukemia cells using MIT assays. It was shown that bark and leaf extracts had an in vitro toxic action against various bacteria. Gallo catechin isolated from the guava leaf extract demonstrated anti-mutagenic activity against E. Coli. Guava extracts of water and chloroform were successful in activating Salmonella typhimurium mutagenicity. Compared to tea tree oil (TTO), doxycycline and clindamycin antibiotics, the antimicrobial activities of P. guajava and leaf extracts, calculated by the disk diffusion method (inhibition zone), were compared. P. guajava leaf extracts have been shown to be helpful in treating acne, especially those that have anti-inflammatory activities. The active ß flavonoid compound extracted from leaves quercetin-3-O-dalpha-L-arabinopyranoside (guajaverin) - has a high potential for anti-plaque activity by inhibiting Streptococcus mutants formation. In a study performed by the disc diffusion system, Guava leaf extract inhibited the growth of Streptococcus aureus.

Chemical composition:

**Fruit**

Vitamin C, vitamin A, iron, calcium, Manganese, phosphoric, oxalic and malic acids, saponins combined with oleanolic acid. Morin-3-O-α-L-lyxopyranoside and morin-3-O-α-L-arabopyranoside, flavonoids, guaiaverin, Quercetin. Essential oil contains hexanal, -2-hexenal, 2,4-hexadienial, 3-hexenal, 2-hexenal, 3-hexenyl acetate and phenol, while ß-caryophyllene, nerolidol, 3-phenylpropyl acetate, caryophyllene oxide, pentane-2-thiol, 3-penten-2-ol and 2-butenyl acetate, 3-hydroxy-2-butano3-methyl-1-butanol, 2,3- butanediol, 3-methylbutanoic acid, (Z)-3-hexen-1-ol, 6- methyl-5-hepten-2-one, limonene, octanol, ethyl octanoate(pink guava fruit).

**Leaves**

α-pinene, ß-pinene, limonene, menthol, terpenyl acetate, isopropyl alcohol, longicyclene, caryophyllene, ß-bisabolene, caryophyllene oxide, ß-copanene, farnesene, humulene, selinene, cardinene and curcumene, malic acids, nerolidol, ß-sitosterol, ursolic, crategolic, and guayavolic acids, cineol, quercetin, 3-L-4-4-arabino-furanoside (avicularin) and its 3-L-4-pyrano-side (Essential oil), resin, tannin, eugenol, caryophyllene (1a α, 4a α-, 7 α-, 7a β-, 7b α-)-decahydro-1H-cycloprop[e] azulene, Guajavolide (2 α-,3 β-,6 β-,23-tetrahydroxurs-12-en-28,20 β-olide; 1) and guavenoic acid (2 α-,3 β-,6 β-, 23-tetrahydroxurs- 12,20(30)-dien-28-oic acid, triterpenes oleanolic acid, triterpenoids, flavinone-2 Z'-ene, prenol, dihydro benzophenantheridine and cryptone.

**Bark**

Polyphenols, resin and crystals of calcium oxalate.

![Figure 2: Bark](https://www.globalresearchonline.net)

**Root**

Tannin, leucocyanidin, sterols, gallic acid, carbohydrates, salts, tannic acid.

**Seed**

Proteins, starch, oils, phenolic, flavonoid compounds, flavones glycoside, quercetin-3-O-ß-D-(2"-Ogalloyglucoside)-4'-O-vinylpropanionate.
Twigs
Calcium, magnesium, phosphorous, potassium, sodium, fluoride, copper, iron, zinc, manganese, and lead.

Pharmacological actions of Psidium guajava L leaf:

Antibacterial activity
The aqueous and organic extracts of P. guajava leaves revealed antibacterial activity against *Staphylococcus aureus*, *Proteus* spp., and *Shigella* spp. While no activity against *Citrobacter* spp, *Alcaligenes fecalis*, and *Aspergillus* spawns observed. The aqueous extracts of *P. guajava* leaves, roots and stem bark were active against the gram-positive bacteria *Bacillus subtilis* and virtually inactive against the gram-negative bacteria *Escherichia coli* and *Pseudomonas aeruginosa*. The aqueous, alcohol and chloroform extracts of leaves were effective against *Aeromonas hydrophila*, *Shigella* spp and *Vibrio* spp, *Staphylococcus aureus*, *Sarcina lutea* and *Mycobacterium phlei*. The antimicrobial activity of *P. guajava* is attributed to guajaverine, psydicolic acid and the flavonoid compound guajaverin. Antimicrobial activity against Propionibacterium acne was demonstrated by the essential oils γ-terpinene and γ-pinene.

Anti-inflammatory activity
A significant anti-inflammatory activity is provided by the essential oil, the aqueous, the alcoholic, the methanolic and the ethyl acetate extracts. Meanwhile, benzophenone glycosides, sesquiterpenes, and leaf distilled flavonoids are claimed as allergy inhibitors.

Anti-cough action
Guava leaf has long been used to treat diseases such as cough and lung diseases in Bolivia and Egypt. The aqueous extract decreased the frequency of capsaicin aerosol-induced cough within 10 minutes after the extract was administered intra peritoneal. More than 5 g/kg was the LD50 of guava leaf extract. These findings indicated that the extract of guava leaf is recommended as a cough remedy.

Anti-diabetic activity
Recent studies have shown that *P. guajava* is an excellent source of antioxidant phytochemical. High antioxidant activity was shown by the methanolic and extract of leaves. The active principles are quercetin, quercetin-3-O-glucopyranoside, Morin, ascorbic acid, carotenoids, and polyphenolics.

Anti-diabetic activity
The ethanolic stem bark extract in alloxan-induced hyperglycemic rats displayed statistically significant hypoglycemic activity but was devoid of significant hypoglycemic effect in normal and normal glucose loaded rats (OGTT). The water extract demonstrated statistically significant hypoglycemic activity at an oral dose of 250 mg/kg in both acute and sub-acute studies.

Anti-oil activity
The aqueous bark and methanolic extracts of Psidium guajava were found to possess anti-bacterial activity. Four antibacterial compounds have been found isolated from guava leaves. The minimum inhibition concentrations of morin-3-O-alpha-L-lyxopyranoside and morin-3-O-alpha-L-arabopyranoside were 200 microg/ml each for Salmonella enteritidis and 250 microg/ml and 300 microg/ml respectively for *Bacillus cereus*. Hot water extract and Psidium guajava methanol extract showed high activity against Arthriniumsacchari and Chaetomium funicolastrains.

Anti-diarrheal activity
The *P. guajava* L. leaves. This activity is explained by spasmolytic, antibacterial and anti-amoebic effects, and phytochemical such as flavonoids and tannins have been documented to exhibit anti-diarrheal activity by denaturing protein, thereby producing protein-tannate interactions that decrease the permeability of the intestinal mucosa. In addition, the calcium-antagonist properties of quercetin, the biologically active drug, clarify the spasmylytic effect of this popular herbal remedy.

Antiulcer activity
*P. guajava* possesses acid secretion inhibitory effect of antiulcer activity in the aspirin-induced gastric ulcer model mediated by prostaglandins.

Spermato protective activity
Extracts of *Psidium guajava* Linn’s leaves. They have beneficial effects on the development and quality of sperm 0, and may thus boost the sperm parameters of infertile
males with Non obstructive azoospermia and oligospermia.10

CONCLUSION

Ethno medicine applications of Psidium guajava L. in this regard. Over the past decade, leaves have been verified in many studies against several illnesses, demonstrating their potential in the treatment of the most prevalent diseases worldwide. Furthermore, individual compounds such as quercetin, catechin, gallic acid, peltatoside, hyperoside, isoquercitin, and guaijaverin were associated with the effects of the leaves. The skin contains a significant number of fruit phytochemical that are rich in vitamins (A & C), iron, phosphorus, calcium and minerals. The phenolic compounds in guava help to heal cancer cells and prevent premature aging of the skin. Many bacteriostatic and fungi static agents and major oxidants are found in the leaves. It can be very effective for the prevention and treatment of different diseases due to the following biological activities.

REFERENCES