

Nutritional and Medicinal Properties of Guava (*Psidium guajava* L.)

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Abstract

Psidium guajava L., commonly known as guava, is a tropical plant of the Myrtaceae family that has been widely used in traditional medicine across many regions owing to its rich phytochemical composition and broad pharmacological activities. Scientific research has confirmed that various parts of the plant especially the leaves and fruit—contain bioactive compounds such as flavonoids (e.g., quercetin), phenolic acids, triterpenoids, tannins, and essential oils, which contribute to its therapeutic potential. These constituents exhibit diverse biological activities including antioxidant, antimicrobial, anti-inflammatory, antidiarrheal, antidiabetic, hepatoprotective, and lipid-

lowering effects, supporting traditional uses in treating digestive disorders, infections, metabolic diseases, and inflammatory conditions. The leaves' extracts show significant antimicrobial and spasmolytic actions, while the fruit is rich in vitamins, minerals, and antioxidants that may help in chronic disease prevention and functional food development. Due to its pharmacological versatility and nutritional value, *P. guajava* continues to be an important subject for research aimed at validating its medicinal applications and developing plant-derived therapeutic agents

Keywords: phytochemicals, antioxidant activity, pharmacological properties.

Introduction

Guava leaves possess a wide range of pharmacological properties that have been validated through numerous scientific studies. These include antioxidant, hepatoprotective, anti-allergic, antigenotoxic, antiplasmodial, cytotoxic, cardioactive, anticough, antimutagenic, antiasthmatic, antidiabetic, anti-inflammatory, and antimicrobial activities, all of which support their traditional medicinal applications. As the main ingredient in simplicia, guava leaves are vital to ensuring the quality of natural products. The plant contains numerous bioactive compounds that contribute to its therapeutic effects. Key constituents include alanine, alpha-humulene, alphahydroxyursolic acid, alpha-linolenic acid, alpha-selinene, amritoside, araban, arabinose, arabopyranosides, arjunolic acid, aromadendrene, ascorbic acid,

ascorbigen, asiatic acid, aspartic acid, avicularin, benzaldehyde, pectin, polyphenols, psidiolic acid, quercetin, quercitrin, serine, sesquiguavene, tannins, terpenes, and ursolic acid. Beyond its medicinal value, guava fruit is widely enjoyed fresh and is also used in cocktails, ice creams, and preserves. Indigenous communities continue to consume guava as a natural delicacy, while its leaves and bark remain important in traditional medicine. Current research explores the plant's morphology, nutritional benefits, and therapeutic potential, alongside its origin and global distribution. Guava is known by different names worldwide: Arabic guwâfah, Bengali Piara, Brazilian araca, Cambodian trapaeksruk, Chinese fan shiliu, English apple guava, French gouyave, German Guavenbaum, Indian amarood/jamba, Portuguese goiaba, and Spanish guayaba.

Morphology

Guava trees are small, ranging from 2 to 7 meters in height, and grow as shrubs or compact trees with numerous branches. Their bark is thin, smooth, and copper-colored, peeling away easily to reveal a greenish layer beneath. At full maturity, the trunk reaches about 25 cm in diameter. The twigs are quadrangular and slightly bent downward. The leaves are evergreen, leathery, and short-petioled, arranged opposite each other. They vary in shape, typically measuring 7–15 cm long and 3–5 cm wide, with forms ranging from oval to elliptical. Distinct parallel veins extend outward from the central midrib, giving the leaves their characteristic appearance. Depending on the variety, guava

fruits weigh between 50 and 200 grams and may appear round, oval, or pear-shaped. The outer skin (exocarp) is thin, pale yellow, and sometimes tinged with pink. Just beneath it lies the fleshy mesocarp, which is thick, granular, and ranges in color from white to yellowish to deep pink, measuring about 3–12 mm in thickness. This layer is juicy, acidic, and flavorful. At the center is the endocarp, which contains numerous hard, yellowish seeds and has a slightly darker tone. The pulp, about 6 mm in diameter, holds between 112 and 535 seeds. The endocarp's structure is composed of stone cells and parenchyma cells, giving the berry its distinctive texture.

Medicinal importance of guava

Psidium guajava L. is valued worldwide in subtropical regions both as a food source and as a traditional medicine, thanks to its diverse pharmacological properties. Medicinal plants, including guava, play a vital role in healthcare systems across many countries, reflecting centuries of traditional knowledge. Guava is widely recognized for treating ailments such as diarrhea, fever, dysentery, gastroenteritis, hypertension, diabetes, dental caries, pain, and wounds. In some cultures, the use of medicinal plants has a long-standing history. Nutritionally, guava is rich in sodium and potassium, which help regulate blood pressure in hypertensive individuals. It also lowers harmful cholesterol while boosting beneficial cholesterol, reducing the risk of heart disease. Beyond its medicinal uses, guava is consumed fresh, processed into culinary products, and even utilized in making toys and housing materials. Chemically, guava contains a high concentration of organic and

inorganic compounds, including secondary metabolites like polyphenols, antioxidants, antivirals, and anti-inflammatory agents. Several of these compounds exhibit anti-cancer properties. The fruit is abundant in vitamins, minerals, flavonoids, and phenolic compounds, with antioxidants such as lycopene and flavonoids helping to combat malignant cells and slow premature skin aging. Guava also influences myocardial inotropism, and studies show that guava peel extract can lower blood sugar after 21 days of treatment. For pregnant women, guava provides folic acid and vitamin B9, essential for fetal nervous system development and protection against neurological disorders. Guava leaves further enhance its medicinal value with anti-inflammatory and antibacterial properties, offering relief from infections, toothaches, swollen gums, and oral ulcers when consumed or applied as juice.

Health benefit of Guava

Parts of plant	Compound	Effect
Bark	Phenolic compound	Stomachache and diarrhea; Strong antibacterial activity (against multi drug resistant vibrio cholera)
Seed	Phenolic compound, Glycosides, Carotenoids.	Antimicrobial
Pulp	Ascorbic acid, Carotenoids, β -cryptoxanthin.	Antineoplastic, antioxidant.
Leaves	Phenolic compound, isoflavonoids, kaempferol, catechin, gallic acid	Antioxidant, hepatoprotection, antimicrobial, antihyperglycemic analgesic

Nutritional profile

They leaves are a powerhouse of nutrients which offers a rich source of proteins, minerals, and vitamins. They contain 9.73% protein on a dry weight basis, along with essential amino acids, making them an excellent plant-based option for sustainable nutrition. In addition, they are packed with vital minerals like calcium, potassium, magnesium, and iron, as well as vitamins C and B. Calcium and phosphorus contribute to stronger bones and help prevent conditions like osteoporosis, while vitamin C boosts immunity and supports healthy blood vessels. Vitamin B plays a key role in improving blood circulation, nerve function, and cognitive health. With their high nutritional value, guava leaves have great potential as a sustainable and versatile dietary supplement for improving overall health and addressing nutrient deficiencies

Phytochemical profile: Research shows that guava leaf oil includes antibacterial compounds such as quercetin and its derivatives, making it useful for fighting infections. Additionally, advanced analysis (GC-MS) has revealed around 60 active components in the oil, with major ones being copaene, caryophyllene, azulene, and oleanolic acid.

Anticancer/ Antitumor activity: Cancer is a disease which causes some cell divides abnormally in an uncontrollable manner and damages body tissues. It can be the result of many external and internal factors involved in the uncontrolled production of reactive oxygen species (ROS). This can lead to formation of tumor, break and restructure of chromosome, cross linkage of DNA, degradation of nucleic acid, base mutations, DNA or RNA strands breakdown and damage of cell membrane.

Conclusion

Psidium guajava L. (guava) is a widely distributed tropical plant with a long history of use in traditional medicine and modern scientific research. Its leaves, fruit, bark, and other parts are rich in bioactive phytochemicals such as flavonoids, phenolic compounds, terpenes, and antioxidants that contribute to a wide spectrum of pharmacological activities. Scientific studies

Antidiabetic activity: Diabetes is one of the chronic diseases in which there is high blood glucose level in body. This condition occurs either if pancreas is not able to produce enough insulin or if body is not able to use the produced insulin.

Antioxidant activity: Oxygen plays a very important role in living organism as it is required by cells for the production of energy. Since, many metabolic processes takes place in human body which leads to the production of free radicals that leads to various disorders. Guava leaves are a rich source of phenolic compounds like gallic acid, ellagic acid, taxifolin, pyrocatechol, ferulic acid and others that plays an antioxidant role. A study was conducted in which crude polysaccharides of guava leaves were used to synthesize silver nanoparticles, which showed high DPPH radical and ABTS radical cation scavenging activity.

Antidiarrheal activity: A study was conducted to see antidiarrheal effects of ethanol extract of guava leaves on Wistar rats and the results showed that concentration of 750 and 500 mg/kg extract dosage showed antidiarrheal potential on castor oil-fed rats.

Antimicrobial activity: Infection takes place when a microorganism enters in any person's body and causes harm. Some examples of infection occurs due to microbes are urinary tract infection, pneumonia, septicaemia etc. Food borne diseases also occur due to pathogens like Salmonella, Bacillus, Escherichia coli, Shigella, Clostridium, Pseudomonas and Staphylococcus that also about the human health.

have confirmed that guava extracts possess strong antioxidant, antimicrobial, anti-inflammatory, antidiarrheal, antidiabetic, and anticancer activities, supporting many of its traditional uses in treating digestive disorders, infections, metabolic diseases, and inflammatory conditions.