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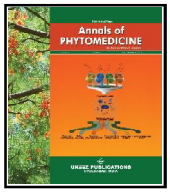

Review Article : Open Access

A review on nutritional and medicinal properties of guava (*Psidium guajava* L.)

Edepalli. Naga Venkata Sai Lakshmi, Sandeep Kumar◆, Dalal Ashutosh Sudhir, Patel Shubh Jitendrabhai, Sanampreet Singh and Sanjay Jangir

Department of Horticulture, School of Agriculture, Lovely Professional University, Phagwara-144411, Jalandhar, Punjab, India

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Abstract

Guava (*Psidium guajava* L.) is an evergreen tree and it belongs to Myrtaceae family, native to Mexico and Central America. It is a climacteric fruit that mainly grows in tropical and subtropical parts of various countries. Guava is a rich source of minerals and vitamins such as vitamin C, vitamin B, potassium, lycopene, manganese, iron, fibre, and calcium. Guava fruit, leaf, and other plant parts have good nutritional and medicinal value for their therapeutic benefits. Guava fruits and leaves extracts are used to reduce health ailments. It has many curative properties like anticancer, antimalarial, antiobesity, antifungal, antibacterial, antidiabetics, and antihypertensive properties. The phytochemicals present in the leaves are used to reduce cough and cold problems. The presence of specific nutraceuticals such as caffeic acid, gallic acid, flavonoids, apigenin, hyperin, *etc*., which are supposed to provide health benefits.

1. Introduction

Guava (*Psidium guajava* L.) is a significant commercial fruit crop grown in the Indian subcontinent's tropical and subtropical regions. It is a member of the Myrtaceae family, which also contains several large and minor plants with economic value in agriculture (Boora, 2012). It is climacteric with a high respiration rate and cellular respiration which results in a high degree of perishability and its life span is 2-3 days at room temperature (Phebe *et al*., 2010)). It has a sweet test and excellent flavour and rich source of polyphenols, carotenoids, dietary fibres, and ascorbic acids (Ahmed *et al*., 2022).

A guava tree produced several rounds, ovoid, or pear-shaped fruits that are around 5-10 cm long and weigh around 50 to 200 g (Chen *et al*., 2007). Due to the special colour of guava fruits (especially pink/white) are widely used for table purposes and in various food products like ice creams, pastries, jams, jellies, and wines. Guava leaves and fruits provide several health benefits such as cancer prevention, blood pressure regulation, diarrhea treatment, gastrointestinal issues, boots immunity, promoting heart health, and improving sleep quality (Palozza *et al*.,1992). Guava is a "super fruit" because it has four times more vitamin C than orange and four times more fibres than pineapple (Vora *et al*., 2018).

The guava fruit is a rich source of nutrients and minerals such as vitamin A, vitamin B, and vitamin C, carbohydrates, crude fibre, flavonoid, thiamin, niacin, pyridoxine, cyanogobalamin, phenolic, betacyanins, polyphenol, and carotene (Naseer *et al*., 2018). Guava leaves containa high concentration of flavonoids and polyphenols associated with potent antioxidant activity (Pandhi *et al*., 2022). Quercetin's antiplasmodial effect is believed to be due to its relaxing effect on the muscles lining the digestive tract. Diabetes can be treated using guava leaf polysaccharides, which can also be used as an antidote by humans (Gurib, 2006).

Table 1: Nutritional composition of guava fruit

S. No.	Nutrients/minerals	Value/100 g
1.	Water	80.80 g
2.	Energy	68 kcal
3.	Protein	2.55 g
4.	Total lipid (fat)	0.95 g
5.	Carbohydrate	14.32 g
6.	Fiber, total dietary	5.4 g
8.	Calcium	18 mg
9.	Iron	0.26 mg
10.	Magnesium	22 mg
11.	Phosphorus	40 mg
12.	Potassium	417 mg
15.	Vitamin C	228.3 mg
18.	Niacin	1.084 mg

Source: Parvez *et al*. (2018)

In 1989, DeFelice invented the phrase "nutraceutical," which combines the words "nutrition" and "pharmaceutical." Nutraceuticals have been characterised as food or a component of it that offers medicinal or health advantages, including the treatment and/or prevention of disease (Mehrotra *et al*., 2021). India takes pleasure in using some of the most traditional medical practices that are still the mainstay of providing medical care to a large chunk of its population (Rekha *et*

Corresponding author: Dr. Sandeep Kumar
Assistant Professor, Department of Horticulture, School of Agriculture, Lovely Professional University, Phagwara-144411, Jalandhar, Punjab, India
E-mail: sandeep.28184@lpu.co.in
Tel.: +91-9782841870

al., 2019). For primary healthcare, 80% of the population in various Asian and African nations rely on traditional herbal remedies, although in many affluent nations, between 70% and 80% of people utilise alternative or complementary medicines that are mostly made of herbal medicines (Bushra *et al*., 2020).The ethnomedicines derived from medicinal plants are thought to be significantly safer, and they have demonstrated their efficacy in the treatment of various illnesses (Kumar *et al*., 2021).

Table 2: Different compounds and their uses in guava plant parts

S.No.	Plant part	Compound	Ethnomedicinal use	References
1.	Seed	Glycosides, carotenoids and phenoliccompounds	Antimicrobial activity	Pelegrini *et al*., 2008
2.	Bark	Phenolic	Strong antibacterial activity, stomach ache and antidiarrheal activity	Peng *et al*., 2011
3.	Leaves	Phenolic, flavonoids, gallic acid, catechin, epicatechin, rutin, naringenin, kaempferol	Antioxidant, anti-inflammatory, antispasmodic, anticancer, anti-microbial, anticonservative, and neuropathic activity	Ryu *et al*., 2012
4.	Skin	Phenolic	Improvement of food absorption	Nascimento *et al*., 2010
5.	Pulp	Ascorbic acid, carotenoids(lycopene, β-carotene, β-cryptoxanthin)	Antioxidant, antihyperglycaemic,	Huang *et al*., 2011

Figure 1: Guava plant.

Figure 2: Guava flower.

Figure 3: Guava fruit.

Figure 4: Cuttedguava fruit.

2. Wound healing properties

Ancient inhabitants of India and China ground guava leaves into a paste with a little water or oil, which they applied to the surface of wounds. When a methanolic extract of guava leaves was administered locally twice a day, tannins and flavonoids in the extract healed the wound (Kafle *et al*., 2018). The leaves are cleaned, crushed, and extracted with oil. To aid in absorption, a vehicle is added to the extract, primarily melted candle wax. The finished combination is then rubbed onto the incision twice daily for four days (Okoli *et al*., 2021). By promoting blood clotting, battling infections, and accelerating the wound-healing process, such guava-like medicinal herbs have an essential role in the healing of wounds. Numerous studies have demonstrated that ointment prepared from guava leaves can heal wounds far more quickly than what the market offers (Thakur *et al*., 2020).

3. Ulcer and antacid protectant activity

The alkaline composition of guava leaves provides an excellent response against stomach hyperacidity. In many villages, guava leaves are used for tea to combat acidity (Kafle *et al*., 2018). This mixture is made by boiling 12 to 15 young guava leaves in 2 to 4 cups of water. The methanolic extract demonstrated the greatest antacid and ulcer healing properties *in vitro* out of all the extract solvents (Raja *et al*., 2006). Guava fruit and leaves include flavonoids and saponins that have been proven to be an effective treatment for reducing stomach acidity and the subsequent development of ulcers. Wister rats' stomachs developed ulcers after consuming ethanol, and a methanolic extract of *P. guajava* leaves at doses of between 500 and 1000 mg/kg weight gain significantly reduced the ulcer (Uduak *et al.*, 2012).

4. Guava gives relief for colds and cough

Colds and coughs can be treated with guava leaves. Guava is a high source of iron and ascorbic acid, which helps to minimize mucus production and lung congestion while also keeping the respiratory system clear of pathogens that are harmful to humans. These compounds in guava act wonderfully in curing influenza. Tender leaves are helpful to reduce colds and coughs (Jairarj *et al.*, 1999). Because of its astringent characteristics, it keeps the respiratory system, throat, and lungs free of microorganisms and reduces existing microbial activity. It works by causing the dissolution of mucus polymers, easing a cough, and reducing additional mucus production. In India, one of the home remedies is using roasted ripe guava to reduce cold and cough (Kafle *et al*., 2018). Another study found that 15 min after administration of a hydroextract of *P. guajava* leaves, the coughing frequency generated by capsaicin aerosol had been significantly reduced compared to the control (Kafle et *al*., 2018).

5. Guava leaves as an ingredient for functional food

Many studies have suggested the positive effects of using GL extract as a functional food ingredient because it contains a variety of substances like rutin, naringenin, gallic acid, catechin, epicatechin, kaempferol, isoflavonoids, vitamins, citric acid, and flavonoids like quercetin and guaijaverin, which are well known for their antimicrobial, antioxidant, and anti-inflammatory properties (Shaik *et al*., 2019). Based on the presence of its phenolic compounds, GL extract was proven in a study to have hypoglycemic effects that improved vascular dysfunction in rats with diet-induced obesity (Diaz-de-cerio *et al*., 2017). Another investigation into the effects of adding yellow strawberry GLs, which are rich in phenolic and flavonoid compounds, to laying hens' diets revealed antimicrobial and antioxidant effects. These effects may improve the quality of eggs by blocking the mechanisms of the enzyme cyclooxygenase, which is essential as an inflammatory mediator (Dos Santos *et al*., 2020). These instances show that GL, which does not affect the rheological and sensory qualities of food, is a great source of active chemicals for functional ingredient additives (Kumar *et al*., 2021).

Table 3: Pharmacologicalactivities in guava

S.No.	Pharmalogical effect	Pharmalogical activity	References
1.	Antioxidant activity	With the extraction of guava and 65% ethanol with the conc.0.47 g/l, it shows the effects of scavenging hydroxy radicals and it inhibits lipid peroxidation.	Wang *et al*., 2007
2.	Antidiabetic activity	With the extraction of guava and methanol with the conc. of 0.2-1.0 ml, the dosage is depending upon the percentage of inhibition activity against the α-amylase enzyme.	Manikandan *et al*., 2013
3.	Antibacterial activity	The 75% methanol/acetone and guava extract with the conc. of 5.0 and 2.0 mg/ml, it shows the effects of antibacterial activity against on *E. coli, S. typhimurium,* and *S.multocida*.	Puntawong *et al*., 2012
4.	Antifungal activity	With the use of hexane 50 mg/ml, it shows the effects of antifungal activity against *Trichophyton rubrum, T. tonsurans, Candida parapsilosis* and *C. albicans*.	Abdelrahim *et al*., 2002
5.	Antimalarial activity	The solution of aqueous 10-20 mg/ml, fever "teas" are constructed with the leaves as an active component. They are also present in the pot plant that is used to make the steam medicine for malaria. Antimicro-bials, flavonoids, and terpenoids are included in the stem bark extract, which has been demonstrated to be effective for the treatment of malaria.	Nundkumar *et al*., 2002
6.	Antihypertensive activity	Using water, extraction of guava and ethanol with the conc. of 0.6-2.0 g/kg (according to body wgt), it shows against the antihypertensive activity by controlling the levels of blood pressure from the beginning to the end of the experiment.	Gutierrez *et al*., 2008
7.	Anticancer activity	With the extraction of guava and essential oil (<1.6 mg/day), it has been demonstrated that the *p. guajava* leaf has antiprostate cancer activity. In a xenograft mouse tumour model, it reduced the prostate specific antigen serum concentrations as well as the distant metastasis.	Chen *et al*., 2010
8.	Antiobesity property	Guava leaves are utilized 200 mg/kg of body weight in diabetic rats. As a result of poor carbohydrate metabolism, GLs reduced blood glucose levels and encouraged oral glucose tolerance, both of which are necessary to avoid weight loss. The insulin levels stabilised as a result of increased hexokinase and G6PDH activity and decreased gluconeogenic enzyme and glucose-6-phosphatase activity.	Vinayagam *et al*., 2018

6. Conclusion

Guava is a nutritional power house and it is a rich source of antioxidants, vitamins C and A, lycopene, calcium, manganese, and potassium. In addition, guava is a great addition to your regular diet because it is low in calories and high in fibre content that's why it improves the digestion system. Guava has a high concentration of nutrients that are not only vital for life but also aid in reducing the effects of free radicals on the body. Additionally, it contains a range of phytochemicals that are good for controlling conditions like diabetes, obesity, and high blood pressure.

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Conflict of interest

The authors declare no conflicts of interest relevant to this article.

References

Abdelrahim, S.I.; Almagboul, A.Z.; Omer, M.E.A and Elegami, A. (2002). Antimicrobial activity of *Psidium guajava* L. Fitoterapia, **73**(7-8):713-715.

Ahmed, N.; Kumar, K.; Kaur, J.; Jan, S.; Chauhan, D.; Thakur, P.; Singh, T.P. and Kumar, S. (2022). Apple wastes and by-products: Chemistry, processing, and utilization: In Handbook of Fruit Wastes and By-Products, 73-86.

Boora, R.S. (2012). Improvement in guava (*Psidium guajava* L.): A review. Agricultural Reviews, **33**(4).

Bushra, P.; Abida, P.; Rabea, P.; Sayeed, A.; Minhaj, A. and Muhammad, I. (2020). Challenges and opportunities for traditional herbal medicine today with special reference to its status in India. Ann. Phytomed., **9**(2):97-112.

Chen, H.Y. and Yen, G.C. (2007). Antioxidant activity and free radical-scavenging capacity of extracts from guava (*Psidium guajava* L.) leaves. Food Chemistry, **101**(2):686-694.

Chen, K.C.; Peng, C.C.; Chiu, W.T.; Cheng, Y.T.; Huang, G.T.; Hsieh, C.L. and Peng, R. Y. (2010). Action mechanism and signal pathways of *Psidium guajava* L. aqueous extract in killing prostate cancer LNCaP cells. Nutrition and Cancer, **62**(2):260-270.

Díaz-de-Cerio, E.; Gómez-Caravaca, A.M.; Verardo, V.; Fernández-Gutiérrez, A. and Segura-Carretero, A. (2016). Determination of guava (*Psidium guajava* L.) leaf phenolic compounds using HPLC-DAD-QTOF-MS. Journal of Functional Foods, **22**:376-388.

Dos Santos, A.F.; Da Silva, A.S.; Galli, G. M.; Paglia, E.B.; Dacoreggio, M.V.; Kempka, A. P. and Paiano, D. (2020). Addition of yellow strawberry guava leaf extract in the diet of laying hens had antimicrobial and antioxidant effect capable of improving egg quality. Biocatalysis and Agricultural Biotechnology, **29**:101788.

Gutiérrez, R.M.P.; Mitchell, S. and Solis, R.V. (2008). *Psidium guajava*: Areview of its traditional uses, phytochemistry, and pharmacology. Journal of Ethnopharmacology., **117**(1):27.

Huang, C.S.; Yin, M.C. and Chiu, L.C. (2011). Antihyperglycemic and antioxidative potential of *Psidium guajava* fruit in streptozotocin-induced diabetic rats. Food and Chemical Toxicology., **49**(9):2189-2195.

Jaiarj, P.; Khoohaswan, P.; Wongkrajang, Y.; Peungvicha, P.; Suriyawong, P.; Saraya, M. S. and Ruangsomboon, O. (1999). Anticough and antimicrobial activities of *Psidium guajava* Linn. leaf extract. Journal of Ethnopharmacology, **67**(2):203-212.

Kafle, A.; Mohapatra, S.S.; Reddy, I. and Chapagain, M. (2018). A review on medicinal properties on *Psidium guajava*. J. Med. Plants Stud., **6**:44-47.

Kumar, M.; Tomar, M.; Amarowicz, R.; Saurabh, V.; Nair, M. S.; Maheshwari, C. and Satankar, V. (2021). Guava *(Psidium guajava* L.) leaves: Nutritional composition, phytochemical profile, and health-promoting bioactivities. Foods, **10**(4):752.

Manikandan, R.; Anand, A.V. and Muthumani, G.D. (2013). Phytochemical and *in vitro* antidiabetic activity of methanolic extract of *Psidium guajava* leaves. Int. J. Curr. Microbiol. App. Sci., **2**(2):15-19.

Mehrotra, N. and Kaustubh, J. (2021). Nutraceuticals: Potential prospect for COVID-19 management. Ann. Phytomed., **10**(1):85-102.

Nascimento, R.J.; de Araújo, C.R. and Melo, E.D.A. (2010). Antioxidant from agri-industrial wastes of the guava fruits (*Psidium guajava* L.). Alimentos e Nutriçao, **21**(2):209-216.

Naseer, S.; Hussain, S.; Naeem, N. and Pervaiz, M. (2018). The phytochemistry and medicinal value of *Psidium guajava* (guava). Clinical Phytoscience, **4**(1):1-8.

Nundkumar, N. and Ojewole, J.A.O. (2002). Studies on the antiplasmodial properties of some South African medicinal plants used as antimalarial remedies in Zulu folk medicine. Methods and Findings in Experimental and Clinical Pharmacology, **24**(7):397-402.

Okoli, C.O.; Ezike, A.C.; Akah, P.A.; Udegbunam, S.O.; Okoye, T.C.; Mbanu, T.P. and Ugwu, E. (2009). Studies on wound healing and antiulcer activities of extract of aerial parts of *Phyllanthus niruri* L. (Euphor biaceae). American Journal of Pharmacology and Toxicology, **4**(4):118-126.

Palozza P, Krinsky N.I. (1992). Antioxidant effects of carotenoids *in vivo* and *in vitro*: An overview. Methods in Enzymology, **1**(13):403-20.

Pandhi, S.; Arvind, K. and Dinesh, C.R. (2022). Efficacy evaluation of extraction technologies for guava (*Psidium guajava* L.) leaves extract. Ann. Phytomed., **11**(1):413-418.

Parvez, G.M.; Shakib, U.; Khokon, M. and Sanzia, M. (2018). A short review on a nutritional fruit: Guava. Open Access: Toxicology and Research, **1**:1-8.

Pelegrini, P.B.; Murad, A.M.; Silva, L.P.; Dos Santos, R.C.; Costa, F.T.; Tagliari, P.D. and Franco, O.L. (2008). Identification of a novel storage glycine-rich peptide from guava (*Psidium guajava*) seeds with activity against gram-negative bacteria. Peptides, **29**(8):1271-1279.

Peng, C.C.; Peng, C.H.; Chen, K.C.; Hsieh, C.L. and Peng, R.Y. (2011). The aqueous soluble polyphenolic fraction of *Psidium guajava* leaves exhibits potent anti-angiogenesis and anti-migration actions on DU145 cells. Evidence-Based Complementary and Alternative Medicine, pp:11.

Phebe, D. and Ong, P.T. (2010). Extending 'Kampuchea'guava shelf-life at 27°C using 1-methylcyclopropene. International Food Research Journal. **17**(3):63-69.

Puntawong, S.; Okonogi, S. and Pringproa, K. (2012). *In vitro* antibacterial activity of *Psidium guajava* Linn. leaf extracts against pathogenic bacteria in pigs. Chiang Mai. Univ. J. Nat. Sci., **11**(2):127-34.

Raja, N,L. and Sundar, K. (2006). *Psidium guajava* Linn confers gastro protective effects on rats. European Review for Medical and Pharmacological Sciences, **16**(2):151-156.

Rekha, R.W.; Geeta, J. and Kumar, A.N. (2019). DNA fingerprinting in industrially important medicinal trees. Ann. Phytomed., **8**(1):19-35.

Ryu, N.H.; Park, K.R.; Kim, S.M.; Yun, H.M.; Nam, D.; Lee, S.G. and Ahn, K.S. (2012). A hexane fraction of guava leaves (*Psidium guajava* L.) induces anticancer activity by suppressing AKT/mammalian target of rapamycin/ribosomal p70 S6 kinase in human prostate cancer cells. Journal of Medicinal Food, **15**(3):231-241.

Shaik, S.; Chintagunta, A. D.; Dirisala, V. R. and Sampath, K. N. S. (2019). Extraction of bioactive compounds from *Psidium guajava* and their application in dentistry. AMB Express, **9**(1):1-9.

Thakur, K.; Mol, P. M.; Gawhankar, M.; Gupta, H.; Patil, P. and Thakur, M. (2022). Physicochemical characterization and antimicrobial properties if Mahamanjishthadikadha: An Ayurvedic formation. Ann. Phytomed., **9**(1):78-90.

Uduak, E.U.; Timbuak, J.A.; Musa, S.A.; Ikyembe, D.T.; Abdurrashid, S. and Hamman, W.O. (2012). Ulcer protective effect of methanol extract of Psidium guajava leaves on ethanol induced gastric ulcer in adult wistar rats. Asian Journal of Medical Sciences, **16**(2):151-156.

Vinayagam, R.; Jayachandran, M.; Chung, S.S.M. and Xu, B. (2018). Guava leaf inhibits hepatic gluconeogenesis and increases glycogen synthesis via AMPK/ACC signaling pathways in streptozotocin-induced diabetic rats. Biomedicine and Pharmacotherapy, **103**:1012-1017.

Vora, J.; Mankame, G. and Madav. (2018). Biochemical And Nutritional Assessment of Guava (*Psidium Guajava*). Journal of Biotechnology and Biochemistry, **4**(5):1-7.

Wang, B.; Jiao, S.; Liu, H. and Hong, J. (2007). Study on antioxidative activities of *Psidium guajava* Linn leaves extracts. Journal of Hygiene Research, **36**(3):298-300.

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