Bioactive compounds present in different parts of Guava and their significance: A review

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Abstract

Guava (Psidium guajava L.) is a tropical and subtropical fruit crop that is commonly used in food and traditional medicine all over the world. It is a member of the Myrtaceae family. Tannins, flavonoid: quercetin, pentacyclic triterpenoid: guajanoic acid, saponins, carotenoids, lectins, leucocyanidin, uvaol, amritoside, betasitosterol, ellagic acid, oleanolic acid, triterpenes, and ursoic acid are some of the essential phytoconstituents. Guava can be eaten raw or refined into juice, pulp, jam, jelly, nectar, powder, tea, and other items. The guava plant parts are utilized for the improvement of variety industrial and medicinal products. Antiviral, anti-inflammatory, antidiabetic and anti-mutagenic factors are all found in guava. Guava extract has antinociceptive properties and can help with liver inflammation and serum development.

Keywords: Guava, bioactive compounds, antioxidants

Introduction

Guava (Psidium guajava) is an evergreen bush or little tree in the family Myrtaceae developed for its consumable natural products. Guava (Psidium guajava Linn.) is a fruit that is well-known for its culinary and nutritious qualities all over the world (Etim et al, 2020) [1]. The fruit is also as "The fruit of the poor guy" or "Tropical apple". Guava is commonly grown in common tropical and subtropical regions (Adhau and Salvi, 2014) [2]. Guava (Psidium guajava Linn.) is a tropical American fruit that was first introduced to India in the early seventeenth century. Guava is grown in India, Mexico, Brazil, Cuba, Venezuela, Australia, South Africa, Thailand, Malaysia, Indonesia, China, Sri Lanka, the Philippines, Bangladesh, Myanmar, the Dominican Republic, the United States, and Haiti (Mitra et al, 2012) [3]. Guava stands fifth in production among India's most important fruit crops and can be grown throughout the country. Important guava growing states in the country are Uttar Pradesh, Madhya Pradesh, Maharashtra and Bihar, Allahabad district of Uttar Pradesh is very popular for growing the excellent quality of guava fruits in the world(Jolhe et al, 2020) [4]. Guava is grown accros the country which is (0.25 million hectares) with an annual yield of 4.08 million tons respectively. Depending on the species, guava fruits are typically 4 to 12 centimetres (1.6 to 4.7 in) long, round or oval. The fruit is initially green in color, but as it ripens, it turns yellow (Kafle et al, 2018) [5]. The fruit contains approximately 80 percent moisture and 20 percent dry matter including 1 percent ash, 0.7 per cent fat and 1.5 percent protein (Upadhyay et al, 2019) [6]. Guava fruit is commonly eaten fresh as a dessert fruit or processed as puree, juice, concentrate, jam, jelly, cheese, toffee, fruit flakes, squash, syrup, nectar, powder, wine, vinegar, ready-to-eat snacks, beverages, and dehydrated canned products (Sinha and Mishra, 2017) [7]. The root, bark, leaves, and fruit of the plant have been reported to have pharmacological properties (Seshadri et al, 2020) [8] and are used to cure a variety of ailments, malaria, gastroenteritis, spewing, looseness of the bowels, diarrhea, wounds, ulcers, toothache, sore throat, swollen gums, and a host of other symptoms have also been handled with various sections of the plants throughout herbal medicine (Biswas et al, 2013) [9]. This plant has also been used to treat life-threatening illnesses including diabetes, hypertension, and obesity. Guava fruit comes in two varieties of white and pink interior Interspersed with little hard seeds. White guava has a sweeter flavor and is more widely cultivated, while pink guava is considered a delicacy. The fruits are circular to ovoid, fleshy, yellow, and around 5cm in diameter, with a pink or white edible mesocarp containing small round seeds.
Guava seeds make up between 6-12 percent of the total weight of the fruit. The seeds are round in shape and pale yellowish brown in color, with 16 percent oil, 7.6 percent protein, and 61.4 percent crude fiber content. Guava seeds, have the ability to become a source of oil that can be used in food products and as a dietary supplement (Rainha et al., 2015) [10]. The leaves are opposite, oblong, three to seven inches long, and have prominent veins on the underside. Guava leaf is widely used to treat diarrhea, gastroenteritis, and other digestive issues, while the fruit of the guava has been used to raise platelets in dengue fever patients (Lailly et al., 2015) [11]. The guava bark is thin and has green patches on it. It is incredibly easy to dispense with it in long strips. It contains a significant volume of antimicrobial and antibacterial substances (Rahim et al., 2010) [12].

Guava is a very rich source of ascorbic acid (vitamin C) and contains other nutraceutical components, including vitamin A (beta-carotene), vitamin B1 (thiamine), (B2) riboflavin, niacin and pantothenic acid (Vijaya Anand et al., 2020) [13]. Moreover, it additionally contains a considerable measure of phosphorous, calcium, iron, potassium, and sodium. The major ingredients of guava are citric acid and acetic acid (Falachum et al., 2020) [14]. Guava’s dietary importance is enhanced by the presence of antioxidant pigments such as carotenoids and polyphenols. These various bioactive nutrients play a significant role in traditional therapies for various lifestyle problems, such as diabetes (type 2) and obesity (Upadhyay et al., 2019) [15]. α-pinene, β-pinene, limonene, menthol, β-sitosterol, cineol, quercetin are bioactive compounds with different pharmacological activity (Ngbolua, 2018) [16].

**Cultivation of guava**

Guava is raised in both tropical and subtropical regions up to 1500 m. above mean sea level. It tolerates high temperatures and drought conditions in northern India during the summers (Dinesh and Reddy, 2012) [17]. Guava is primarily grown in the tropics and can withstand temperatures of 15–45 °C (59–113°F) (Singh, 2011) [18]. Guava grows optimally between 23 and 28°C (73–82°F) but established trees can tolerate short periods at 3 to 2°C (27–28°F) although temperatures below 15°C (60°F) may cause the tree to stop producing fruit. It is, however, vulnerable to heavy frost, which can destroy young plants. During the rainy season (July - September), an annual rainfall of about 100 cm is adequate. The quality of the fruits is harmed by rain during the harvesting season. Guava can grow in a variety of soils, including sandy and rocky soils, as well as loams, preferring a pH of 4.5–7 but tolerating alkaline soils up to pH 8.5. (Birdi et al., 2020) [19]. Guava is more drought tolerant than most tropical fruits, and it can survive long periods of drought by ceasing vegetative development before the weather improves. Guavas of high quality are grown in river basins. Water logging is a problem for the crop (Sehrawat et al., 2014) [20]. During the rainy season, planting takes place. The months of June and July are suitable for planting the layers and seedlings. India is the top producer of guava in the world and approximately 200640 hectare agricultural land has been used for Guava cultivation. Different cultivars of guava has been grown across the country and reported productivity of 15.3 MT/Ha respectively. UP is leading in guava production having 928.44 tonnes of produce in 2017- 2018. Top ten guava producing states and varieties grown therein have been shown in Table no 1.

**Taxonomy of guava**

The guava plant (Psidium guajava L.) belongs to the Myrtaceae family. Psidium guajava is the most important fruit of the genus Psidium, which contains around 150 species. Guava is thought to have originated from an area extending from southern Mexico to or through Central America. Singh, (2011) [21]. Guava is widely known and cultivated throughout the world (Paull and Duarte, 2012) [22].

| Kingdom: | Plantae |
| Order: | Myrtales |
| Family: | Myrtaceae |
| Subfamily: | Myrtoidae |
| Genus: | Psidium |
| Species: | Guajava |
| Binomial name: | Psidium guajava Linn. |

**Nutritional value of guava**

This popular fruit is a source of nutrients. The fruit is a good source of carbohydrates, proteins, fats, minerals, and other nutrients, and thus may help reduce the risk of malnutrition (Youssef and Ibrahim, 2016) [23]. According to the USDA’s Food Data Central, guava is a strong source of protein (2.3%), carbohydrates (12.16%), and dietary fiber (4.8%), among other popular fruits. Guava has been stated to be a good source of calcium, with 17.63 mg per 100 g. In addition, Guava is an excellent source of ascorbic acid, i.e. 241.86 mg/100 g, which, together with various fruits, makes it a promising source of discovery and added value in food products (Bogha et al., 2020) [24]. Lutein, zeaxanthine, and lycopene are abundant in guava. It is rich in flavonoids, fructose sugar, and carotenoids (Das, 2011) [25]. Minerals such as calcium, phosphorus, iron, and vitamins like niacin, pantothenic acid, thiamin, riboflavin, vitamin A, and vitamin E are abundant in fruit (Reddy, 2017) [26]. Guava contains both polyphenolic compounds and carotenoids, which provide the fruit with antioxidant pigments, making it one of the most antioxidant-rich fruits (Omayio et al., 2019) [27]. Essential oils, phenols, triterpenes, saponins, flavonoids, lectins, fiber, and pectin, as well as fatty acids, are all present in guavas. Caffeic, coumaric, ferulic, cinnamic, ellagic, and rosmarinic acids are among the polyphenol and glycoside esters found in guava fruit. (Medina and Herrero, 2016) [28]. Flavonoids such as myricetin, naringenin, epicatechin, quercetin, rutin and apigenin have been found. (Vijaya Anand et al., 2020) [29]. The major components in fruit are α-Pinene, β-caryophyllene, (Z)-3-hexenal, and α-humulene. Carnbonyls and esters such as 3-hydroxy-2-butanone, benzaldehyde, ethyl hexanoate, (Z)-3-hexenyl acetate, hexyl butanoate, and ethyl octanoate are only contained throughout the fruit (Lee et al., 2011) [30]. Guava leaves contain variety of chemical components for example, α-pinene, β-pinene, limonene, menthol, caryophyllene, β-isobolene, farnesene, humulene, selinene, cardinene and curcumene, malic acids, β-copanene, β-sitosterol, cineol, quercetin, tannin, guajavolide and guavenoic acid, resin, triterpenes, such as oleanolic acid, triterpenoids, prenol, dihydrobenzopanethridine, and cryptonine. flavonone-2, 2'-ene (Thome et al., 2019) [31]. In Guava seed Presence of bioactive compounds such as polyphenols, tocopherols and phytoestrogens in these fruit seed oils makes them highly desirable due to their beneficial effects on human body. Guava seeds had a protein content of 9.73 percent dry matter, with 15 amino acids, 67 percent of which were arginine, glutamic acid, aspartic acid, glycine, and leucine. The main

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**Binomial name:** Psidium guajava Linn.
fatty acids were linoleic (60.0 percent), palmitic (14.8 percent), oleic (12.5 percent), stearic (9.08 percent), and arachidic (1.31 percent). Being a rich source of linoleic acid, it can be used to supplement food products deficient in omega-6 essential fatty acid. Guava seed oil is a good source of palmitic acid and stearic acid and apart from that significant amount of mono unsaturated fatty acid (MUFA) and poly unsaturated fatty acid (PUFA) (Kapoor et al, 2020) [32]. Proteins, oils, phenolic, flavonol glycoside, starch, flavonoid compounds, quercetin-3-O—D-(2"-O-galloylglucose)-4'-O-vinylpropanoate are all contained in guava seed (Molla and Azene, 2011) [33]. *Psidium guajava* twigs contain calcium, magnesium, phosphorus, potassium and sodium. Concentrations of fluoride, copper, iron, zinc, manganese, lead and also contains flavonoid, sesquiterpene alcohols and triterpene acids (Ngbolua, 2018) [34]. The bark contains 12–30 per cent tannin and one of the sources states that it contains 27.4 per cent tannin or polyphenols, resin and calcium oxalate crystals. Tannin can be found in roots as well. Roots also include leukocyanidins, gallic acid, and sterols (Naseer et al, 2018) [35].

**Utilization of different part of guava**

Guava is used to make a variety of processed items, including drinks, syrup, ice cream, jams, jellies, toffee, juice, and dehydrated and canned products. Additionally different parts of guava being utilized for different pharmacological applications.

**Food utilization**

The guava has incredible potential for broad business use because of its simplicity of development, high nutrient content, and processing in a variety of consumer products (Kocher, 2011) [36]. There are a variety of products that can be made from guava processing including guava jam, juice, pulp, jellies, chocolate, wine and guava powder (generally utilized in the preparing of yogurt) and spray soluble guava extracts containing high antioxidants concentrations (Kadam et al, 2012) [37].

**Guava Jams and Jellies:** Jam is a semi-solid mixture obtained by cooking a fruit soft tissue with sugar. Jam is an in-between moisture food prepared by boiling fruit pulp with sugar (sucrose), pectin, acid and other ingredients (additive, coloring and flavoring materials) to a rationally thick solid product that is prepared by boiling clear strained fruit extracts free of pulp after adding the required amount of sugar, citric acid and pectin. It should have a total soluble solids content of at least 65 percent and a fruit portion of at least 45 percent (Jolhe et al, 2020) [38]. The fruit is sliced into little pieces and cooked for around 45 minutes at low temperatures with utilizing similar measure of water and the juice extricated by filtration utilizing sifters or muslin cloth (Kuchi et al, 2014) [39]. Sugars are added to the extracted juice until it is boiled to 105 °C or a layer is formed by cooling a little segment in a spoon. The measure of sugar utilized differs relying upon the pectin content of the extracted juices, going from 0.5 kg sugar/kg juice to 0.75 kg sugar/kg juice for pectin rich juice and low-pectin juice respectively. After that, hot filling into clean and sterilized containers (SWER et al, 2019) [41].

**Guava leathers:** Guava leather is prepared by dehydrating the purée of fruit into a leather sheet. Leathers can be eaten as a confection or cooked to make a sauce. In the tropics, there is a scarcity of knowledge on the chemical and organoleptic properties of guava leathers. Guava leather has a higher protein and fat content. This was also noted in ash content with pawpaw leather (2.67 per cent) and guava leather (2.87 percent) (Kanwal et al, 2016) [42].

**Guava Shrikhand:** The current consumer preference for reduced or low-fat products that help to reduce the risk of chronic degenerative diseases has prompted the production of probiotic low-fat foods such as shrikhand, a semisolid light, sweetish sour fermented dairy product. In Gujarat, Maharashtra, and Karnataka, it is a famous delicacy. The procedure for making shrikhand began with heating skim milk, cooling it at 30 °C in a batch pasteurizer, adding lactic acid bacteria (LAB) starter culture, and thoroughly mixing it with a mixer. The temperature of the pre-sterilized storage vat was kept at 37 °C during the incubation period, which lasted between 8 to 12 hours. After the curd was properly set, the contents were transferred to another vessel through a clean, moist muslin cloth. Sugar and guava powder have been added to this chakka and have been thoroughly mixed either manually or mechanically to a homogeneous consistency. It is usually packaged in polystyrene cups and stored under refrigerated conditions (Kumar, 2011) [43].

**Guava Juice and Nectars:** The Fresh fruits or the pulp of the guava are used to produce guava juice. Juice is separated by squeezing the guava fruit with hydraulic filter press or from the pulp after dilution with water and resulting filtration. The juice is generally not clear and requires the use of pectic enzymes to make it smoother and easier to clean. Studies by Imungi showed that the ideal conditions for removing guava juice utilizing proteolytic enzymes from Kenyan guava were 400 ppm compound at a temperature of 45-50 degree C for an hour and a half (90 minutes).

**Guava wine:** The wine made from guava (*Psidium guajava* L.) is the result of anaerobic yeast fermentation, in which the sugars are converted to alcohol and carbon dioxide (Sevda and Rodrigue, 2011) [40].

**Guava leaf tea:** The leaf of *Psidium guajava* was extracted with hot water and yielded 14 percent guava leaf extract. In a summary, 100 g of dried leaves were mixed with 2 L of distilled water (DW) and decocted at 80 °C for 30 minutes. The extracted solution was freeze dried after filtering through four layers of gauze to remove leaves (Kaneko et al, 2013) [46].

**Guava leaf powder:** The guava leaves were collected and manually shredded into small pieces. Subsequently, the biomaterial was washed a few times using ordinary tap water
followed by a single wash with pure distilled water to make it free from dust and undesired soluble contaminants. The wet material was allowed to sit in a clean and dry place to allow free water to evaporate from the surface and thereafter was placed in an electric oven at 50 °C for 24 h. The dried guava biomass was kept in desiccator while cooling, crushed into powdered form and stored in moisture-free conditions until further use in experimentations (Ponnuchamy et al, 2019) [47].

**Guava seed powder:** Firstly collection of seeds and seeds were dried in an air circulation oven (Tecnal, model TE-394/L) at 60°C for approximately 16 hours. After dehydration, the seeds were crushed using a domestic blender (Walita) and the powder obtained. The powder was packaged in lidded polyethylene containers (Uchóa-thomaz et al, 2014) [48].

**Guava seed powder fortified biscuits (GSPFB)**

With the help of response surface methodology (RSM), the level of guava seed powder, wheat flour and sugar was optimized. 17.65 g of guava seed powder, 62 g of wheat flour and 20 g of sugar were mixed. Butter (25 g), baking powder (1 g) and vanilla flavour (2 ml) were also used. The oven was pre-heated to 180 °C. The dough was then rolled on a platform and cut into round shape. Cut biscuit dough were then lined upon food grade steel mesh on an oven tray and baked in the oven at 180 °C for 25 min and cooled for 30 min at ambient temperature. Control samples were prepared without any addition of Guava seed powder. Biscuits of each formulation were made in triplicate. The process adopted for biscuit manufacture was as per the method elaborated by the AACC (2000). The biscuits were cooled for 30 min and then packed in Low density polyethylene pouches and sealed until further analysis (MAURYA and PANDEY) [49].

**Guava pomace:** Guava pomace is a representation of preparing waste delivered after the production process, and it can represent up to 15% of the first natural fruit (Denny et al, 2013) 50. To get juice, Guava fruits were utilized. A cabinet tray dryer was utilized for drying guava pomace, which could correctly control the ideal drying temperature somewhere in the range of 20 and 150 °C. The guava pomace, high in moisture content, ana dry at a temperature of 65°C as proposed by previous studies for drying carrot pomace. (Tangirala et al, 2012) [51].

**Pharmacological utilization**
The use of guava in restorative practices was considered to be a few different Specialists in various diseases and has demonstrated the potential for the treatment of most diseases worldwide. Guava has been shown to be effective in the treatment of these diseases in ethno pharmacological assessments, research centres, and clinical preliminary studies. In addition, harmful quality evaluations of the roots, bark, leaves, natural items, blossoms and seeds of the plant have been viewed as safe for therapeutic purposes, both for oral and effective use, at whatever point controlled in blends and improvement structures (Gupta et al, 2020) [52].

**Antioxidant activity**
Recent findings have shown that *Psidium guajava* is an important source of phytochemical antioxidants. Guava is a very good antioxidant and a rich source of vitamin C. Guava has antioxidant properties that are attributed to the polyphenols found in its leaves Guava leaf extracts and essential oil from the stem and bark will scavenge free hydrogen peroxide, superoxide anion radicals, and inhibit the development of hydroxyl radicals (Fasola et al, 2011) [53]. (Vyas et al, 2010) [54]. The antioxidant properties of guava can be due to quercetin, carotenoids, vitamin C, and polyphenols (Dakappa et al, 2013) [55]. Quercetin, quercetin-3-O-glucopyranoside and morin may be extracted from the leaves. Antioxidant activity can be seen in these compounds. Quercetin has anti-oxidant properties. It is thought to be the most active and powerful antioxidant found in guava leaves (Soman et al, 2010) [56]; (Nantitanon et al, 2012) [57].

**Anti-diabetic**
Blood glucose levels have been found to *Psidium guajava*. Guava fruit extract has been shown to help diabetes patients lose weight and control their blood sugar levels. Guava fruit extract was given at portions of 125 and 250 mg/kg to STZ- incited diabetics. Guava Fruit Extract reduces the depletion of insulin-positive beta cells and insulin release by protecting pancreatic tissues, including islet beta cells, from oxidation. (Huang et al, 2011) [58]. Quercetin, kaempferol, myricetin had inhibitory effects on sucrose, maltase, and α-amylase (Wang et al, 2010) [59].

**Anti-inflammatory activity**
Germ contamination and thymus production have been shown to be blocked by guava extract in ethyl acetate. It has the potential to serve as an antiviral agent. It has the ability to improve mRNA expression. Guava may alter the work of the heme oxygenase-1 protein. Because of this, it can be used as an anti-inflammatory agent for the skin. The lipopolysaccharide that develops nitric oxide is inhibited by guava extract in ethanol. The outflow of E2 is inhibited. In this way, it serves as an anti-inflammatory agent (Jang et al, 2014) [60].

**Anticancer effect**
A few examinations have shown that therapeutic plants of *Psidium guajava* effectcally affect human epidermal carcinoma and murine leukemia cells. The decrease measure, the LDH discharge examine, and the colony forming assay all revealed that the GBA was extremely cytotoxic. The decrease measure, the LDH discharge examine, and the colony forming assay all revealed that the GBA was extremely cytotoxic. The concentrate showed inhibited of HT-29 cell development at 250 μg/ml. branch extract displayed apoptotic impacts in HT-29 cells, including chromatin condensation and shrinking. It causes cytotoxicity and raises the sub-G1 phase of HT-29 cells. (Lee and Park, 2010) [61].

**Antiviral Activity**
Antiviral movement of guava extracts was resolved against development of A/Narita/1/2009 (amantadine-safe pandemic strain 2009) with an IC50 of 0.05 percent and development of A/Yamaguchi/20/06 (touchy strain) and A/Kitakyushu/10/06 (oseltamivir-safe strain). The development of these strains has been firmly hindered by guava extracts. Guava tea has been shown to be effective against flu infection and has additionally been appeared to build up viral tolerance in the body (Sriwilaijaroen et al, 2012) [62].

**Antidiarrhoeal effect**
Quercetin and quercetin-3-arabinoside, obtained from the buds and leaves of *Psidium guajava* L. at concen. of 1.6 μg/ml, showed a morphine-like hindrance of the arrival of
acetylcholine in the coaxially prompted ileum followed by an underlying ascension in muscle tone followed by a consistent decline. Methanol extract from leaves (8 μg/ml) of Psidium guajava showed activity against simian (SA-11) rotavirus by 93.8 percent hindrance. Furthermore, guava galactose-lectin has been appeared to tie to Escherichia coli (a natural cause of diarrhea), hinder its bond to the intestinal wall, and accordingly avoid diarrheal inflammation. (Gupta et al. 2011) [63].

**Immunomodulatory activity**

Psidium guajava leaf extract showed immunomodulatory activity. Decoction of guava leaves has been shown to activate macrophages to destroy E. coli strain (heat stable toxin producer) using murine monocyte cell line, J774 (Birdi et al, 2014) [64]. Ethyl acetate fraction of guava leaves has been shown to suppress COX2 expression, cytokine secretion, degranulation, and FceRI-mediated signaling in antigen-stimulated mast cells. A flavonoid fraction of guava leaf extract has been shown to control the activation of the nuclear factor KB in the *in vitro* model system using Labeo rohita head renal macrophages (Daswani et al, 2017) [65].

**Antiparasitic Activity**

Antiparasitic drug are utilized to treat irresistible infections brought about by ectoparasites, protozoa, parasitic fungi, and helminths, among other things. Guava leaf essential oil worked well in an *in vitro* antiparasitic experiment as a host for Toxoplasma gondii. Guava leaf essential oil's conceivable restorative activity may have prompted the *in vitro* reduction of free extremists associated with toxoplasmosis pathology (Lee et al, 2013) [66].

**Wound healer**

The gingival, periodontal ligament fibers are composed of collagen. Fibroblasts are the most common cell type found in periodontium connective tissue. Vitamin C is required to facilitate the rise in these hematological indices was not detected. 200mg/kg could be sufficient to stimulate the necessary frequency caused by capsaicin aerosol within 15 minutes of administration when compared to a control (Kafle et al, 2018) [70].

**Hematological activity**

The methanolic extract of Psidium guajava bark can be used as a blood booster in anemic patients or as a prophylactic purpose. As a result, it is suggested that a concentration of 200mg/kg could be sufficient to stimulate the necessary haemopoiesis. While the exact process by which the extract facilitated the rise in these hematological indices was not determined in this research, it is concluded that this behavior was a direct result of the extract on the haematopoietic systems (Fasola et al, 2012) [71].

**Table 1:** Indian States according to decreasing order of guava production and varieties cultivated therein (APEDA2017)

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>States</th>
<th>Varieties grown</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Madhya Pradesh</td>
<td>L-49, Allahabad safeda, Gwalior-27, Hafshi, Seedless Chittidar</td>
</tr>
<tr>
<td>3</td>
<td>Bihar</td>
<td>Allahabad Safeda, Apple Colour, Chittidar, Hafshi, Harijha, Sardar, Selection-8</td>
</tr>
<tr>
<td>4</td>
<td>Andhra Pradesh</td>
<td>Allahabad safeda, Lucknow 49, Anakapalli, Banarasi, Chittidar, Hafshi, Sardar, Smooth Green, Safed Jam, Arka Mridula</td>
</tr>
<tr>
<td>5</td>
<td>West Bengal</td>
<td>L-49, Allahabad Safeda, Dudhe Khaja, Gole Khaja, Kabli, Baruipur, Chittidar, Harijha, Sardar</td>
</tr>
<tr>
<td>6</td>
<td>Chhattisgarh</td>
<td>Lucknow 49&quot;, 'Allahabadi Safeda' and 'lali'</td>
</tr>
<tr>
<td>8</td>
<td>Gujarat</td>
<td>Nagpur seedless, Dharwar, Dholka, Kothrud, L-24, L-49, Nasik, Sindh</td>
</tr>
<tr>
<td>9</td>
<td>Tamil Nadu</td>
<td>Anakapalli, Banarasi, Bangalore, Chittidar, Hafshi, Nagpur Seedless, Smooth Green</td>
</tr>
<tr>
<td>10</td>
<td>Karnataka</td>
<td>Allahabad Safeda, L-49, Arka Mridula, Araka Amulya, Bangalore, Dharwar</td>
</tr>
</tbody>
</table>

**Table 2:** food utilization of different parts of guava

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Parts of guava</th>
<th>Utilization</th>
<th>references</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fruit</td>
<td>Jam</td>
<td>Rahman et al, 2018 [38]</td>
</tr>
</tbody>
</table>
### Table 3: pharmacological utilization of different parts of guava

<table>
<thead>
<tr>
<th>Sr. no</th>
<th>Parts of guava</th>
<th>utilization</th>
<th>references</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaf</td>
<td>Antioxidant activity</td>
<td>Fasola et al., 2011; Vyas et al., 2010; Soman et al., 2010; Nantitano et al., 2012</td>
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<tr>
<td>2</td>
<td>Fruit</td>
<td>Anti-diabetic</td>
<td>Huang et al., 2011</td>
</tr>
<tr>
<td>3</td>
<td>Guava skin</td>
<td>Anti-inflammatory activity</td>
<td>Jang et al., 2014</td>
</tr>
<tr>
<td>4</td>
<td>buds</td>
<td>Antidiarrhoeal Effect</td>
<td>Gupta et al., 2011</td>
</tr>
<tr>
<td>5</td>
<td>Leaf</td>
<td>Immunomodulatory activity</td>
<td>Birdi et al., 2014; Daswani et al., 2017</td>
</tr>
<tr>
<td>6</td>
<td>Leaf</td>
<td>Antiparasitic Activity</td>
<td>Lee et al., 2013</td>
</tr>
<tr>
<td>7</td>
<td>Root bark</td>
<td>Wound healer</td>
<td>Mittal et al., 2010</td>
</tr>
<tr>
<td>8</td>
<td>Leaf and bark</td>
<td>Antibacterial</td>
<td>Shu et al., 2011</td>
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<td>9</td>
<td>Leaf and fruits</td>
<td>Cold and Cough</td>
<td>Kafle et al., 2018</td>
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<tr>
<td>10</td>
<td>Bark</td>
<td>Hematological activity</td>
<td>Fasola et al., 2012</td>
</tr>
</tbody>
</table>

### Guava

- **Fruits**
  - Vitamin C
  - Vitamin A
  - Iron
  - Zinc
  - Magnesium
  - Phosphorous
  - Calcium
  - Manganese
  - Polyphenols
  - Quercetin
  - Quercitrin
  - Ursolic acid
  - Tannins

- **Leaves**
  - α-pinenol
  - β-pinenol
  - Linolenic acid
  - Jasmonic acid
  - Tujic acid
  - Ascorbic acid
  - β-carotene
  - Carotenes
  - Carotenoids
  - β-carotene
  - Vitamin A

- **Seeds**
  - Squalene
  - Sterols
  - Phytosterols
  - β-sitosterol
  - Campesterol
  - Stigmasterol
  - Sitosterol

- **Tannins**
  - Calcium
  - Magnesium
  - Phosphorous
  - Potassium
  - Sodium
  - Copper
  - Zinc
  - Manganese
  - Lead

### Conclusion

Guava (Psidium guajava Linn.) is well known for its food and nutritional qualities all over the world. Guavas were also included in the list of super fruits because they were high in folic acid, dietary fiber, potassium, and dietary minerals. In guava plant various bioactive compound are available like araban, arabinose, ascorbigen,destructive, guajavonic destructive, linoleic destructive, myristic destructive, guajiverine, tannins, polyphenols, quercetin, quercitrin, ursolic destructive and terpenes. The medicinal properties of guava fruit are attributed to its high levels of vitamins, minerals, and bioactive compounds, which contribute to its health benefits. Guava leaves, seeds, and other parts also possess different pharmacological activities, making it a versatile and valuable resource.
guava fruit, leaves, and other plant parts are also well-known in traditional medicine. Since any aspect of the guava tree has economic importance, it is grown on a commercial scale. The guava plant has gone through a critical stage as far as biological action and remedial use, and the fruit is viewed as the tropics’ poor man’s apple. Plant parts from the guava plant are used in a variety of consumer and medicinal products. The plant has been commonly considered for its pharmacological actions, and numerous studies as well as published literature specify its powerful anti-diarrheal, antimutagenic, hepatoprotective, anti hypertensive, antioxidant, hypoglycemic, and antimicrobial properties.

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