

Research Article

## Preliminary Phytochemical Analysis of Leaf Powder Extracts of *Psidium guajava* L.

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### ABSTRACT

The plant *Psidium guajava* is native of South Eastern Asia; grow in Tamil Nadu, Karnataka, Maharashtra, Punjab and Uttar Pradesh. Leaves are dark green, elliptic, ovate or oblong rounded or with an obtuse apex. Guava is commonly known for its food and nutritional values and the fruit considered as poor man apple of tropics. The present study was carried out to evaluate the phytochemicals present in the leaf powder of guava. The phytochemical study showed the presence of phenol, carbohydrates and cellulose in all the four solvent extracts. Terpenoids were also present in certain solvent extracts. Flavonoids were present in chloroform and benzene extracts.

**Keywords:** *Psidium guajava*, leaf powder, phytochemical tests.

### INTRODUCTION

Plants generally have varied chemical compositions depending upon species. A good number of plants are known to be of economic and medicinal value. Those that are of medicinal value are often used as herbal remedy for the restoration and maintenance of good health. Some herbs have been considered as drugs and therefore generally safe and effective<sup>13, 14</sup>. The species *Psidium guajava* is an example of plants commonly used in popular medicine. The leaf extract of guava showed anticough activity by reducing the frequency of cough induced by capsaicin aerosol<sup>4</sup>. Phytochemicals are basically divided into two groups that are primary and secondary metabolites<sup>5, 9</sup>. Phytochemicals are defined as bioactive non-nutrient plant compounds found in fruits that have been attributed to reduce the risk of major chronic diseases<sup>1, 6</sup>.

The major constituents of phytochemical consist of carbohydrates, aminoacids, proteins, and chlorophylls, while, secondary metabolites consist of alkaloids, saponins, steroids, flavonoids, tannins, etc.<sup>5</sup>. The phytochemical constituents play a significant role in the identification of crude drugs and also to evaluate drugs derived from the plant sources<sup>7</sup>. The effectiveness of using plant parts like seeds of pomegranate, dry ginger, black pepper and bay leaves for preparation of effective home remedies against various digestive problems including, loss of appetite, gas trouble, indigestion, diarrhea and dysentery have been reported<sup>15</sup>. The decoctions made from the leaves of the guava plant have been reported to be used by many tribes for diarrhea, dysentery, sore throats, vomiting, stomach upsets, vertigo and also to regulate menstrual periods throughout the tropical Amazon and India<sup>8</sup>. The therapeutic activity of extracts from guava

leaves/bark against cancer, bacterial infections, inflammation and pain have been studied<sup>2</sup>.

### MATERIALS AND METHODS

In the present study, dry leaf powder of *Psidium guajava* was used. A study was carried out on various phytochemical aspects using different solvent extracts.

Collection of plant samples: The fresh leaves of *Psidium guajava* were obtained from Kengarai village in Nilgiri District of Tamil Nadu, India (Plate 1). *Psidium guajava* L. belongs to the family Myrtaceae and it possess a twisted trunk. It has green leaves and white flowers. It also contains essential oils, tannins, flavonoids, sesquiterpenic alcohol and triterpenoid acids. Tea made from its leaves or buds is used for treatment of diarrhea and it is also used as an antiseptic.

Guava is rich in tannins, phenols, triterpenes, flavonoids,



Plate 1: Morphology of the Plant- *Psidium guajava*

essential oils, saponins, carotenoids, lectins, vitamins, fibre and fatty acids. Guava fruit contain high vitamin 'C' than citrus fruits and also appreciable amounts of vitamin A as well. The leaves of guava are rich in flavonoids, in particular, quercetin. The flavonoids are known to possess anti-bacterial activity. Quercetin is thought to contribute to the anti-diarrheal effect of guava: it is able to relax intestinal smooth muscle and inhibit bowel contractions. Guava is commonly known for its food and nutritional values and the fruit considered as poor man apple of tropics.

- ough, stomach ache and dysentery.
- The flowers are said to cool the body and are used in bronchitis. They are also applied to eye sores.
- Bark decoction is taken for stomach ache, also used in fever, headache, gonorrhoea, menstrual disturbances, and sores.

#### Preparation of Leaf Powder

The leaves of *Psidium guajava* were collected, cleaned and air dried under shade for about three weeks. After drying, the leaves were then blended using a household electric blender. This fine powder was analyzed for the phytochemicals present in it.

Preliminary Phytochemical Analysis: The leaf powder of the study plant was dissolved in various solvents and the preliminary phytochemical tests were carried out<sup>3</sup>.

#### Test for Alkaloids

Mayer's Reagent: To 1ml of the extract, 2ml of Mayer's reagent was added. Appearance of dull white precipitate indicated the presence of alkaloids.

Test for Flavonoids: To 1ml of extract, 1ml of neutral ferric chloride was added. The formation of brown colour confirmed the presence of flavonoids.

#### Test for Steroids

Lieberman-Burchard's Test: The extracts were dissolved in 2ml of chloroform to which 10 drops of acetic acid and five drops of concentrated sulphuric acid were added and mixed. The change of red colour through blue to green indicated the presence of steroids.

#### Test for Terpenoids

Salkowski Test: Five ml of each extract was mixed in 2ml of chloroform and concentrated sulphuric acid (3ml) was carefully added to form a layer. A reddish brown precipitate of the interface indicated the presence of terpenoids.

Test for Quinone: To 1ml of extract, a few drops of concentrated hydrochloric acid were added. A yellowish brown colour was observed that showed the presence of quinone.

Test for Phenols: To 1ml of extract, lead acetate solution was added and the precipitate formation indicated the presence of phenolic compounds.

Test for Starch: To 1ml of extract, a few drops of iodine solution were added. Any characteristic colour change showed the presence of starch.

#### Test for Anthocyanin

NaOH Test: A small amount of extract was treated with 2ml of NaOH and observed for the formation of blue green colour.

#### Test for Proteins

#### Medicinal Values:

- The young leaves are used as tonic in digestive disorders.
- A decoction of young leaves and shoots is prescribed as febrifuge and for antispasmodic baths.
- Powdered leaves are locally applied in rheumatism.
- A decoction of the leaves is used as gargle to relieve toothache and gum boils.
- The leaf juice is also used for treating diarrhea, c

Ninhydrin Test (Acetone): Ninhydrin was dissolved in acetone. The leaf extract was treated with ninhydrin and observed for the formation of purple colour.

#### Test for Carbohydrates

Molisch's Test: Two drops of Molisch reagent was added to an aqueous or hydrochloric acid solution of the extract and two ml of concentrated sulphuric acid was added by the side of the test tube. The formation of reddish violet ring at the junction of the liquids indicated the presence of carbohydrates.

Test for Cellulose: To 1ml of extract, a few drops of iodine solution were added followed by a few drops of sulphuric acid. Dark brown (or) red colour observed, showed the presence of cellulose.

Test for Fixed Oil and Fat: To 1ml of extract, a few drops of Sudan III solution were added. A shining orange colour obtained showed the presence of fixed oil and fat.

## RESULTS AND DISCUSSION

The experiments conducted in *Psidium guajava* for analysis of phytochemical constituents showed the following results.

Preliminary Phytochemical Analysis Of Leaves Of *Psidium Guajava*: In the present study, a preliminary phytochemical analysis was carried out to identify the active constituents such as alkaloids, flavonoids, sterols, terpenoids, quinone, oil and fat, phenol, starch, anthocyanin, protein, carbohydrate and cellulose present in the leaves of guava plant. Preliminary phytochemical analysis of different extract (ethanol, chloroform, benzene and water) of *P. guajava* showed the following results.

The dried and powdered leaves of *P. guajava* were dissolved in different solvents viz., water, ethanol, chloroform and benzene and the extracts thus obtained were analyzed for the presence or absence of secondary metabolites.

In *P. guajava*, carbohydrate, cellulose, oil & fat and phenols were observed in all the four solvent extracts.

Alkaloids, sterols and anthocyanin were completely absent in all the four solvent extracts of leaves of *P. guajava*.

Protein and quinones were observed only in the ethanol extract. Except for water, starch content was observed in the other three solvent extracts of *P. guajava*. Among the four solvent extracts of the leaves of *P. guajava*, terpenoids were observed in water, ethanol and chloroform, but the presence of flavonoids were seen only in chloroform and benzene extracts (Table-1).

A study carried out on preliminary phytochemical screening of active leaf extract of *Aegle marmelos*,

Table 1: Preliminary Phytochemical Analysis of *Psidium guajava*

Test	H <sub>2</sub> O	EtOH	CHCl <sub>3</sub>	Benzene
Alkaloids	-	-	-	-
Flavonoids	-	-	+	+
Terpenoids	+	+	+	-
Quinones	-	+	-	-
Oil & fat	+	+	+	+
Sterols	-	-	-	-
Phenol	+	+	+	+
Starch	-	+	+	+
Anthocyanin	-	-	-	-
Protein	-	+	-	-
Carbohydrate	+	+	+	+
Cellulose	+	+	+	+

'+' - Present '-' - Absent

e been earlier studied in the plant, *Vigna mungo* by the use of leaf extracts of medicinal plants<sup>10</sup>. Earlier work have revealed the presence of alkaloids, flavonoids, glycosides, polyphenols, reducing compounds, saponins and tannins in the aqueous extract of *Psidium guajava* leaves<sup>14</sup>. The phytochemical analysis of *Psidium guajava* leaves showed the presence of more than 20 isolated compounds, including alkaloids, anthocyanins, carotenoids, essential oils, fatty acids, lectins, phenols, saponins, tannins, triterpenes and vitamin C<sup>12</sup>.

The present study is only a qualitative analysis of the medicinal plants. Further studies on the quantitative analysis of the various bioactive compounds present in guava could contribute significantly to the health management of man and could be recommended in our daily need of nutrition.

## REFERENCES

1. Blessy B Mathew, Suresh K Jataw and Archana Tiwari. (2012). Phytochemical analysis of *Citrus limonum* pulp and peel. *Int. J. Pharma. Pharma Sci.*, 4(2): 269 – 371.
2. Chen, K., Hsieh, C., Peng, C., Hsieh, L., Hsiu, M., Chiang, H., Huang, K. and Peng, R (2007). Brain derived metastatic prostate cancer Du – 145 cells are effectively inhibited *invitro* by guava leaf extract. *Nutr Cancer* 58(1): 93 -106.
3. Harborne, J.B. (1984). Phytochemical methods II. Ed. In Chapman and Hall, New York. pp. 21 - 26.
4. Jaiarj, P., Khoohaswan, P., Wongkrajang, Y., Peungvicha, P., Suriyawong, P., Saraya, M.L.S and Ruangasomboon, O. (1999). Anticough and *Annona squamosa*, *Ficus racemosa*, *Hibiscus rosa sinenses* and *Psidium guajava* revealed the presence of different type of compounds like alkaloids, coumarins, flavonoids and steroids which could be responsible for the antidiabetic activities<sup>11</sup>.  
The presence of flavonoids, terpenoids, quinone, sterols, oil and fat hav antimicrobial activities of *Psidium guajava* Linn. leaf extract. *J. Ethnopharmacol.*, 67(2): 208 -212.
5. Kumar, A., Ilavarasan, R., Jayachandran T., Decaraman, M., Aravindhan, P., Padmanaban, N. and Krishnan, M.R.V. (2009). Phytochemical investigation on a tropical plant. *Pak. J. Nutr.*, 8(1): 83-85.
6. Liu, R.H., (2003). *Am.J.Clin. Nutr.* 78: 517 S – 520S.
7. Moses, A.G., Maobe, Gatebe, E., Gitu, L. and Rotich, H. (2013). Preliminary phytochemical screening of eight selected medicinal herbs used for the treatment of diabetes, malaria and pneumonia in kisii region, Southwest Kenya. *Eur. J. Appl. Sci.*, 5(1): 01-06.
8. Nwogu, L.A., Alisi, C.S., Ibegbulem, C.O. and Igwe, C.U. (2007). Phytochemical and antimicrobial activity of ethanolic extract of *Landolphia owariensis* leaf. *Afric. J. Biotechnol.*, 6 (7): 890 -893.
9. Parekh Jigna and Sumitra, C.V. (2007). *Invitro* antimicrobial activity and phytochemical analysis of some Indian Medicinal Plants. *Turk. J. Biol.*, 31: 53-58.
10. Prabha Sherlina, F., Gayathri, V. and Radha, S.R. (2013). Preliminary phytochemical analysis of black gram, *Vigna mungo* L. *Int. J. Dev. Res.* 3(11): 147-149.
11. Sharma, R.R. (2012). Preliminary phytochemical screening of some indigenous medicinal plants leaves extract in regulation of antidiabetic activity. *Sci. Res. Rep.* 2(3): 307-310.
12. Suntornusk, L., Gritsanapun, W., Nilkamhank, S. and Paochom, A. (2002). Quantitation of vitamin C content in herbal juice using direct titration. *J. Pharm. Biomed. Anal.*, 28(5): 849 – 855.
13. Treasure, J. (2000). Medical Herb (online) [http:// www.herbological.com](http://www.herbological.com).
14. Uboh, F.E., Okon, I.E. and Ekong, M.B. (2010). Effect of aqueous extract of *Psidium guajava* leaves on liver enzymes, histological integrity and hematological indices in rats. *Gastroenterol. Res.*, 3(1): 32 – 38.
15. Vatsyayan, R. and Shiromni. (2002) Anar: fruit and Medicine. Health Tribune April 17: 13.