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Pharmacognostic and GC-MS studies on *Psidium guajava* L. *(Guava)*

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Abstract
The guava is common and major fruits plant, whole plant useful to human. The purpose of current study was identifying the primary phytochemicals and pharmacognostic study of leaves, stem and fruits of guava. Guava plant collected from the Nanded District. The leaves, stem and fruits powder were successively extracted with methanol as a solvent. Soxhlet's extraction methods was used. In the present study of pharmacognostic investigation including morphology of plant, macroscopic, microscopic, fluorescence analysis and physico-chemical studies have been done. In microscopic investigation stomatal index, T. S. of leaves and T. S. of stem were done. In physico-chemical studies including moisture content, swelling index and foaming index were done. Primary phytochemical screening of *P. guajava*, leaf, stem and fruits extract revealed the presence of flavonoids, saponins, alkaloid, triterpenoids, steroid, saponin, glycosides, tannins, anthraquinone, phenol and carbohydrates, while cardiac glycosides, coumarin, glycosides protein and fixed oil, test were absent. The guava fruits extract analysed by gas chromatography coupled with mass spectrometry (GC-MS) and the components of the plant extract were identified. There are twenty tree components are identified by GC-MS method. The findings of this study proved that the *P. guajava* plant contain many medicinally important components which regulate the nutritional value to human.

Keywords: Pharmacognostic study, study of guava, *Psidium guajava L, GC-MS analysis*

Introduction

Psidium guajava L. commonly known as Guava. Guava is a most common and major fruit of India used as food and herbal medicine. Guava is growing tropical and sub-tropical region of world**.** Origin of guava is tropical America. In India guava grow as cultivated crops in many states of country. The plant has many medicinal properties, which is used in folk medicine from the ancient periods (Rukmaji et. al. 2024). *P. guajava* belong to the Myrtaceae family. Plants happen to be serving human beings as a natural source of cure for various ailments and diseases since ages. The world has seen huge increase in plant research in recent times, and numerous evidences show vast potential of medicinal plants used in various traditional medicine (Neelofar Majid *et al*. 2021) [19]. Medicinal plants are important with respect to new medicine and pharmacological research development. They are widely used and accepted as home medicine and raw materials for the pharmaceutical industry (Garode *et al*. 2014*)* [3]. *Psidium guajava L*. commonly known as guava and in Marathi Peru. Guava is used as food and medicine from the ancient period. Guava fruits mainly used for as food in world wide. Guava plants is a native plant of tropical America. The guava grows all tropical and sub-tropical region of world. Guava plant is cultivated all over in India. Most of the farmer grow guava for their fruits. Guava fruits contain many medicinal properties. Most of the guava plants is cultivated in home garden and in farm few plants grow in wild area, near to the bank of river. Many varieties found in guava plants. Guava is perineal plants, grow up to the 30 m height. *Psidium guajava* belongs to family**:** Myrtaceae is one of the plants which is widely cultivated for its fruits. it is decided to study *P. guajava* in various aspects to exploit it for medicinal purposes. according to World Health Organization reported that over 80% of the world's population uses medicinal plants or its bioactive compounds for the prevention, management, or treatment of several diseases. *P. guajava* plant is a well-known traditional medicinal plant used in various indigenous systems of medicine. The leaves and bark of *P. guajava* plants have long history of medicinal uses, that is still used today.

Phytochemicals are chemical compounds derived from plants that are non-nutritive secondary metabolic compounds occurring in different parts of plants. Phytochemicals are important as protective and disease fighting compounds which help the body to prevent from diseases and so are required by the human body to sustain life. (Offor 2015) [4]. The treatments usually involve decoction of parts of the plant, such as leaf, bark, stem, fruit and seeds. Recent works have reported compounds from guava leaves elucidated using various solvent systems that have antidiabetic and antioxidant properties (Adelina *et al*. 2018).

Secondary metabolites are organic compounds that are not directly involved in the normal growth, development or reproduction of an organism. Unlike primary metabolites, absence of secondary metabolites does not result in immediate death, but rather in long term impairment of the organism's survivability or perhaps in no significant change at all (SRUTHI *et al*. 2019) [6]. Phytochemical screening of different guava extracts has revealed numerous bioactive compounds. Guava leaf contains broad spectrum of bioactive compounds including tannin, flavonoid, terpenoid steroid, steroids, glycoside, cardiac glycoside, alkaloid, phlobatannin, polyphenol, saponin anthraquinones, Phytosteroid and carbohydrate (Dereje *et al*. 2021). The ethno-medicinal uses included the crushing of the leaves and the application of the extract on wounds, boils, skin and soft tissue infectious site. Stem, bark and root-bark are astringent. Unripe fruit is indigestible, causes vomiting and feverish. Fruit is laxative, leaves are astringent (Shruthi *et al*. 2013) [7]. The guava leaves have a plethora of beneficial phenolic phytochemicals such as guaijaverin, quercetin, kaempferol, chlorogenic acid, apigenin, catechin, gallic acid, hyperin, epicatechin, myricetin, caffeic acid, and

epigallocatechin gallate (Kumar *et al*., 2021) [10]. P. guajava is the rich source of Vitamin C, B2 and minerals like phosphorus, calcium, and iron. The vitamin C content of P. guajava is 2-5 times higher than oranges.

Method and material

Collection and Plant Authentication

The plant material collected from the different part of Nanded district. Fresh leaves, stem and fruits are collected from region of Shita-khandi, Mahur and Kinvat forest. Collected plant material was washed with tap water and shade air dry in laboratory. From the Collected plant sample prepared a standard herbarium. The plant authenticated by PG department of Botany, BAMU university Aurangabad (Chhatrapati Sambhaji Nagar). The standard herbarium deposited to PG department of Botany, BAMU university Aurangabad (Chhatrapati Sambhaji Nagar) with voucher specimen number (accession no.)**:** 00897.

Extraction of material

Collected plant material clean and shade air dry after the drying make a powder by electrical grinder. The fine grinded powder is stored for further uses. Soxhlet extraction method was used for the extraction of plant material. Methanol were used as solvent system. 25g dry powder was weighing and 250ml methanol were used. The extraction was carried out for 24 hr at 50-70 ^{0}C temperature. Access methanol removed by rotary evaporator at 70 ^{0} C temperature. The concentrated extract stored at 4 ^{0}C in refrigerator for further uses (Mahire *et al*. 2020) [12].

Macroscopic Study

Macroscopic study were subjected to morphological observation with the help of sensory organ. It is the study of external morphology of plants and plant part seen by naked eyes. Which included the study of size, shape, colour, habitat, root, stem leaf, margin, venation, base, apex, petiole, point of attachment, composition of lamina, flower, fruits, and seeds of plant.

Microscopic Study

The microscopic study were the anatomical examination of plant section. The plant part such as T. S. of leave, T. S. of stem is done by free hand sectioning. The leaves and stem thin hand section taken by razor blade and stain it by safranin and green fast stain. After staining the section was fixed in glycine and the section observe under the 10X eye piece and 45X objective of microscope.

Number of Stomata and Stomatal index

The study of stomatal number and stomatal index was done by the help of epidermal peel. For the study of stomatal index, epidermal peel was removed and stained it by Safranin and observed under the 10 eye-piece and 45X objective of light Microscopes. Counted the total number of stomata at specific area of objective and counted the number of epidermal cells. (Shyam Baboo et.al. and Vijay *et al*. 2017).

$$\text{Calculation of Stomatal index is } = \frac{S+E}{s} \text{x} 100$$

Where, S= stomatal cell, E=epidermal cell

Organoleptic study

The organoleptic study was done by the leaves, stem and fruit dry powder of *Psidium guajava L.* The study was included the colour, shape, Odour, teste and texture of the powder.

Physico-chemical study

The physico-chemical studies of leaves, stem and fruit powder is included the study of fluorescence analysis, moisture content, swelling index and foaming index.

Fluorescence analysis

The Guava leaves, stem-bark and fruits powder were treated with various chemical reagents and passing through the visible light and UV light. The powder of leaves, stem and fruits was prepared after passing it through mesh 40 and its fluorescence character was studied both in daylight and in UV light (254 and 366 nm) using different solvents like sulphuric acid, hydrochloric acid, ferric chloride acetic acid etc (Tanwar et. al. 2012) [14].

Moisture content

The moisture content of plant powder is carried out by the loss on drying. In that physico-chemical properties of plant powder determine the moisture content. The moisture present in guava leaves, stem and fruits was determined by 1g drying the sample in hot air oven at 110^{0}C till constant weight. Following equation was followed to determine the moisture content (Ahmad Raza 2015) [13].

$$Moisture\ \% = \frac{Initial\ \ weig\,ht - Final\ \ weig\,ht}{Initial\ \ weig\,ht}$$

Swelling index

According to World Health Organisation guideline swelling index done by following method with slight modification. Accurately weighed 1g powder, into a 100- ml measuring cylinder. Marked in 0.2-ml divisions from 0 to 10 ml in an upwards direction. Unless otherwise indicated in the test procedure, added 100 ml of water and shook the mixture thoroughly. Allowed to stand for 12 hours at room temperature. Measured the volume in ml occupied by the plant material. Calculated the mean value of the individual determinations, related to 1 g of plant material.

Foaming index

According to World Health Organisation Guideline Foaming index done by following method with slight modification. One gram of fine powder (leaf, stem and fruits) was transferred into separate conical flask (500 ml). 100 ml of boiling water was poured into the flask and maintained in the temperature at 80- 90° C by heating for 30 minutes. Then allowed to cool at room temperature and sufficient amount of water added into the decoction to make the volume up to 100 ml. 10 clean test tubes were taken and are marked with 1 to 10. The successive portions of 1 ml, 2 ml up to 10 ml of powder was taken in separate tubes and adjusted remaining volume with the distilled water up to 10 ml in each tube. Then shook them for 15 seconds and allowed to stand for 15 minutes, then the height of the foam was measured. If the height of the foam is less than 1cm in each tube, the foaming index is considered as less than 100 (not significant). If the foam is more than 1cm height after the dilution of plant material in the 6th tube, then

corresponding number of the test tube was the index sought (significant). If the height of the foam in every tube is more than 1cm, the foaming index is more than 1000 (more significant).

Foaming Index was calculated by using the following formula,

Foaming Index = 1000/a

Where, a = Volume (ml) of decoction used for preparing the dilution in the tube where exactly 1 cm or more foam was observed.

Preliminary phytochemical analysis of crude extracts

The preliminary phytochemical screening of leaves, stem and fruit was done by the following test for secondary metabolites (M Hasanuzzaman 2016 [15], Abdullahi Adamu 2021 [18], Madhurima Yadav *et al*. 2020 [16], Nureen Zahra *et al*.2017) [17].

1. **Alkaloids: Mayer's Test:** In 1ml of plant extract 1ml of Mayar's reagent were added by the side of test tube. Formation of white or creamy precipitate indicates the positive result for alkaloids.

2. **Flavonoids: Alkaline Reagent Test:** for the detection of flavonoids take 1 ml of plant extract was treated with few drops of 5% NaOH solution. If the filtrated turn into yellow colour, then it becomes colourless when addition of few drops of 10% HCl solution, which indicates the presence of flavonoids.

3. **Steroids; Libermann-Burchard's test:** 1ml acetic anhydride solution was added into the filtrate then 1ml of concentrated sulphuric acid. a brown ring is formed at the junction of two layers. The upper layer turned into green or blue colour indicates the presence of steroids.

4. **Triterpenoids; Libermann-Burchard's test:** 1ml acetic anhydride solution was added into the filtrate then add 1ml of concentrated sulphuric acid. a brown ring is formed at the junction of two layers. The formation of deep red colour in lower layer indicates the presence of triterpenoids.

5. **Saponin; Froth Test:** for the detection of Saponins few ml of filtrated was mixed with the same amount of distilled water. The suspension is shacked for 15 to 30 seconds and allowed to stands. After that formation of 1cm. foam indicates the presence of saponins.

6. **Tannins; Ferric Chloride Test:** About 0.5g of plant extract was boiled in 20 ml of distilled water in a test tube, then filtered it. After that 1ml of 0.1 % ferric chloride solution into the filtrate. Appearance of brownish green or blue-black colour indicates presence of tannins.

7. **Glycosides; Keller-kiliani test:** For the detection of glycosides, 1ml of filtrate was treated with 1ml of glacial acetic acid, few drops of ferric chloride solution and few drops of concentrated sulphuric acid was added. Appearance of green blue colour indicates the positive result of cardiac glycosides.

8. **Anthraquinones; Sanker-Nahar test:** One ml of filtrate was treated with the same volume of aqueous base NaOH or Ammonium hydroxide solution. Appearance of pink or violet colour in the base layer of solution indicates presence of anthraquinones.

9. **Coumarins:** A little amount of extract is dissolved in methanol and 3-4 ml alcoholic KOH was added to it. Formation of a yellow colour which disappeared on adding concentrated HCl indicates the presence of coumarins.

10. **Oil and fats/lipid; Spot test:** For this detection, few drops of filtrate was pressed between two filter paper indicates the presence of fixed oil.

11. **Phenol; Ferric chloride test:** In 1ml of plant extract, few drops of diluted ferric chloride solution was added. Formation of violet or blue, green and red colour indicates the presence of phenol.

12. **Protein; Millions reagent test:** In 1 ml of plant extract, 1 ml of million's reagents was added in test tube. Formation of radish brown colour indicate the presence of protein.

13. **Carbohydrates; Iodine test:** 1ml of plant extract treated with few drops of iodine solution. Formation of blue colour indicates presence of carbohydrates.

GC-MS Analysis method

GC-MS analysis was carried out on sampler and gas chromatograph interfaced to a mass spectrometer instrument employing the following conditions was used as carrier gas at a constant flow of 1 ml /min and an injection volume of 0.5 µI was employed injector temperature 250 ºC; ion-source temperature 200 ºC. The oven temperature was programmed from 110 ºC (isothermal for 2 min), with an increase of 10 ºC/min, to 200 ºC, then 5 ºC/min to 280 ºC, ending with a 9min isothermal at 280 ºC. Mass spectra were taken at 70eV; a scan interval of 0.5 seconds and fragments. Total GC running time is 45min (Thenmozhi 2015) [19].

Results and Discussion

Macroscopic character

The guava plant found all over the country. *P. guaj*ava is belong to the Myrtaceae family. It is the perennial; evergreen small tree grows up to 10 to 12 m in height. Most of the plants are cultivated as commercial farming and few numbers of plant found in wild. Stem is branched, bark is light to radish brown, thin and smooth, superficial extensive tap root system, Leaves are simple, opposite, exstipulate, petiolate short, blade oblong, apex acuminate, margin entire, veins prominent, gland dotted. The inflorescence is axillary. The P. guajava bears flowers solitary or in cymes, 1 to 3 flowers, calyx is 2 to 4 lobes, petal 4 to 5, stamens many in numbers, filaments white in colour, ovary inferior, ovules numerous, Fruit is pear-shaped berry green in colour, after ripe fruit is yellow in colours. The fruits ripe from November to January in the winter. The fruits obtained during winter are excellent in quality

Microscopic character

Stomatal Number and Stomatal index

The upper epidermis of guava leaf is devoid of stomata the lower epidermis shows the numerous of stomata. Paracytic type of stomata present on lower epidermis. Unicellular to multicellular uniseriate trichomes present on both surfaces. The result of stomatal numbers and stomatal index mention in following table.

T. S. of Leaves

Leaf lamella consists of dorsi-ventrally flattened, both the epidermis is single cell layer. Both the epidermis covered by thin cuticle**.** Unicellular to multicellular non-glandular trichome present on upper and lower epidermis. Hypodermis consist of 2 to 3 layers of collenchymatous cells. The cortical tissue of the midrib consists of 2-3 rows of collenchymatous cells beneath the upper epidermis. Palisade cells consist of two rows of columnar cells below to epidermis in lamella region. Ground tissues composed of 6 to 9 layers of small spherical, parenchymatous cells. Oil glands embedded in spongy tissue. Vascular tissues present in midrib region of leaf. Bi-collateral type of vascular bundles found. Sickle shaped xylem found in middle of vascular bundle and phloem consist of two-part present above and lower to the xylem.

T.S. of Stem

The transvers section of *P. guajava* stem consist of epidermis covered by thick cuticle and corks. Epidermis consists of thick, compact single layer of cells. Epidermis followed by the few layers of cortex, cortex composed from collenchyma and parenchyma cells. Bi-collateral type of vascular bundles present. In vascular bundles xylem present in between of phloem and phloem present in upper and lower region of xylem. Pith present in centre of stem and composed from parenchymatous storage cells. There are also many secretory glands and cavities present inside the cortex and spongy tissues.

Table 1: Stomatal number and Stomatal index

Sr.no.	Epidermis	Stomatal no.	Stomatal index
1	Upper epidermis	Devoid	Devoid
2	Lower epidermis	19	16 %

Fig 1: Shows guava plants and flower

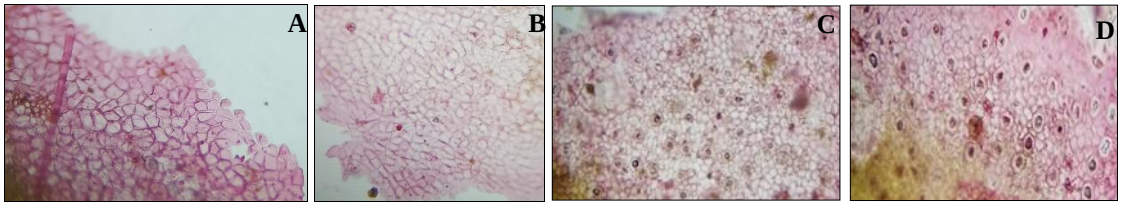

Fig 2: A & B upper epidermis no stomata, C & D lower epidermis with stomata

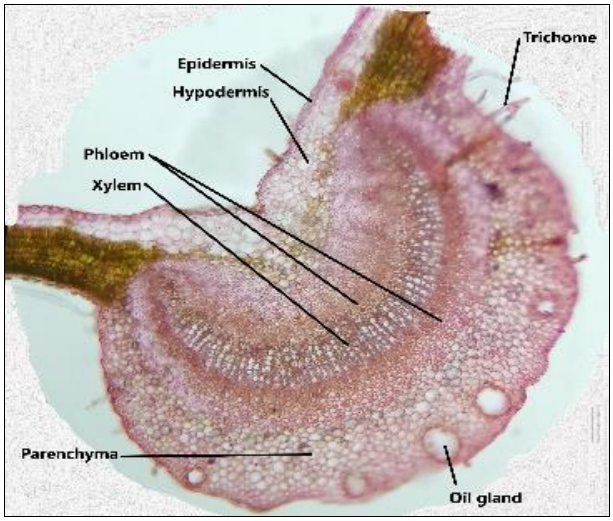

Fig 3: shows the T.S. of P. guajava leaves

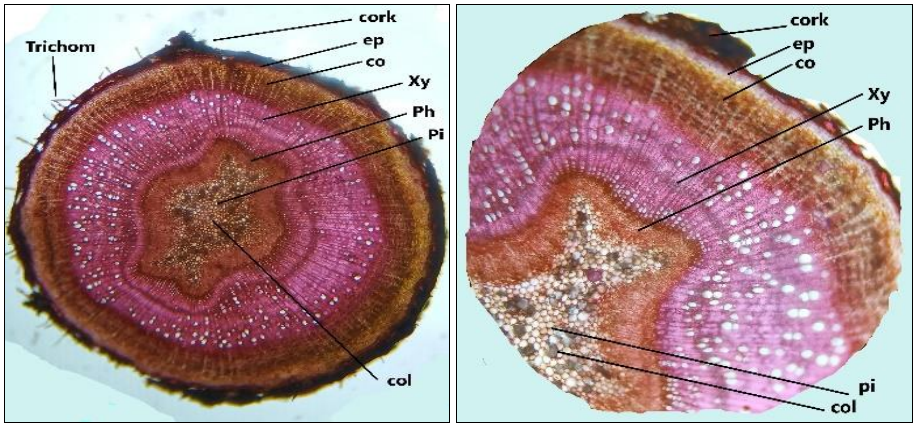

Fig 4: Shows the T. S. of P. guajava L Stem. where, ep-epidermis, co-cortex, xy-xylem, ph-phloem, pi-pith, col-collenchyma

Organoleptic study

Organoleptic study was done by physical observation on the basis of colour, odour, taste and texture of crude powder of Stem, leaves and Fruits. Observation of organoleptic study mention in following table no. 2.

Physico-chemical property of powder

Moisture content, Swelling index, Foaming index of leaves, stem and fruit powder of *P. guajava L*. is represented in following tables.

Fluorescence analysis of powder

The *P. guajava L*. powder treated with various chemical and observed under day light and fluorescence light (UV light 245 nm), the result is mentioning the table no. 6

Table 2: Organoleptic study of powder

Sr. no.	Character	Plants Parts		
		PG-L	PG-S	PG-F
1	Colour	Deep green	Greyish	Light purple
2	Odour	Pungent	Odourless	Slight pungent
3	Teste	Not significant	Tasteless	Light sweet
4	Texture	Smooth	Friable	Smooth and Granular

Table 3: Moisture content

Sr. no.	Plant part	Moisture content%
1	PG-L	4.19 %
2	PG-S	4.85 %
3	PG-F	4.94 %

Table 4: Observation of swelling index

Sr. no.	Sample	Quantity of sample	Initial volume	Final volume	Swelling index
1	PG-L	1 g	5	11	6
2	PG-S	1 g	8	22	14
3	PG-F	1 g	7	15	08

Table 5: Observation of Foaming index

Sr. no.	Sample	Foaming index	
1	PG-L	1000.00	Significant
2	PG-S	200.00	Significant
3	PG-F	Less than 100	Not significant

Table 6: Fluorescence analysis of P. guajava L. powder under visible light and UV light (254nm)

Sr. no.	Reagent with powder	PG-L		PG-S		PG-F	
		Visible light	UV Light	Visible light	UV Light	Visible light	UV Light
1	P +Alone	Pale green	Green	Pale brown	Brown	Pale brown	Light green
2	P + water	Pale green	Green	Light yellow	Brown	Light green	Yellowish green
3	P + ethanol	Light green	Brown	Pale yellow	Light brown	Pale yellow	Light green
4	P + methanol	Green	Brown	Light yellow	Brown	Brown	Light green
5	P + NaOH	Dark brown	Dark brown	Dark brown	Brown	Pale yellow	Light brown
6	P + HCl	Brown	Light green	Brown	Brown	Light green	Yellowish
7	P + H2SO4	Dark brown	Dark brown	Greenish yellow	Black	Light green	Yellowish green
8	P + HNO3	Orange	Dark green	Yellowish brown	Yellowish green	Brownish	dark green
9	P + KOH	Orange	Dark red	Light brown	Brown	Light brown	Dark brown
10	P+ acetic acid	Brown	Green	yellowish	Brown	Light green	Yellowish green

Preliminary phytochemical screening of material

The results of preliminary phytochemical analysis of *P. guajava* are mention in table no. 7.

Table 7: Preliminary phytochemical analysis of P. guajava.

Sr. no.	Chemical constitute	Test	Plant's part		
			PG-L	PG-S	PG-F
1	Alkaloids	Mayers test	+	+	+
2	Flavonoids	NaOH and HCl test	+	+	+
3	Tannin	Ferric chloride test	+	+	+
4	Steroids	Lebermann- Burchards test	+	+	+
5	Triterpenoids	Lebermann- Burchards test	+	+	+
6	Saponins	Foam test	+	+	-
7	Glycosides	Keller-Kiliani test	-	-	-
8	Anthraquinones	Sanker-Nahar test	-	-	-
9	Coumarins	KOH, HCl test	+	-	-
10	Fixed oil and fats	Spot test	-	-	-
11	Phenol	Ferric chloride test	+	+	+
12	Protein	Million's reagent test	-	-	-
13	Carbohydrates	Iodine test	+	+	+

GC-MS analysis

Twenty three compounds were identified in *Psidium guajava* fruits by GC-MS analysis. The active principles with their retention time (RT), Area, Area %, name of compounds and concentration (%) are presented in table 8 and fig. 6. The GC-MS method confirms that *Psidium guajava* L. contains Furfural, alpha.-Pinene, Bicyclo[3.1.1]heptane, 6,6-dimethyl-2-methyle, 2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-on, Caryophyllene etc (Thenmozhi 2015) [19]. The following component are conformed to high area % such as 5-Hydroxymethylfurfural, 4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6, Caryophyllene, Furfural, 1,2,3,5-Cyclohexanetetrol, (1.alpha.,2.beta.,3.a) and low area % compound are D-Limonene, alpha.-Pinene, Naphthalene, 1,2,4a,5,6,8a-hexahydro-4,7-di, Bicyclo[3.1.1]heptane, 6,6-dimethyl-2-methyle and 9-Octadecenoic acid, methyl ester, (E).

Table 8: GC-MS analysis of Psidium guajava Fruits extract.

Peak#	R.Time	Area	Area%	Name
1	5.045	6524892	3.46	Furfural
2	7.141	286398	0.15	.alpha.-Pinene
3	8.460	373942	0.20	Bicyclo[3.1.1]heptane, 6,6-dimethyl-2-methyle
4	8.761	736536	0.39	2,4-Dihydroxy-2,5-dimethyl-3(2H)-furan-3-on
5	10.063	169104	0.09	D-Limonene
6	10.163	437696	0.23	Eucalyptol
7	14.387	10464110	5.55	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-
8	17.334	146750057	77.81	5-Hydroxymethylfurfural
9	20.548	1813714	0.96	.alfa.-Copaene
10	21.787	8718434	4.62	Caryophyllene
11	22.754	857046	0.45	Humulene
12	23.857	345203	0.18	Naphthalene, 1,2,4a,5,6,8a-hexahydro-4,7-di
13	24.359	790560	0.42	Naphthalene, 1,2,3,5,6,8a-hexahydro-4,7-dim
14	24.471	427867	0.23	Naphthalene, 1,2,3,4-tetrahydro-1,6-dimethyl-4
15	24.744	1238695	0.66	Naphthalene, 1,2,3,4,4a,7-hexahydro-1,6-dim
16	26.085	1068461	0.57	Caryophyllene oxide
17	27.160	536511	0.28	Cubenol
18	27.534	1706359	0.90	.tau.-Cadinol
19	27.890	609057	0.32	.tau.-Muurolol
20	29.081	2295599	1.22	1,2,3,5-Cyclohexanetetrol, (1.alpha.,2.beta.,3.a
21	34.706	669470	0.35	Hexadecanoic acid, methyl ester
22	38.499	1337591	0.71	9,12-Octadecadienoic acid (Z,Z)-, methyl este
23	38.636	433592	0.23	9-Octadecenoic acid, methyl ester, (E)-

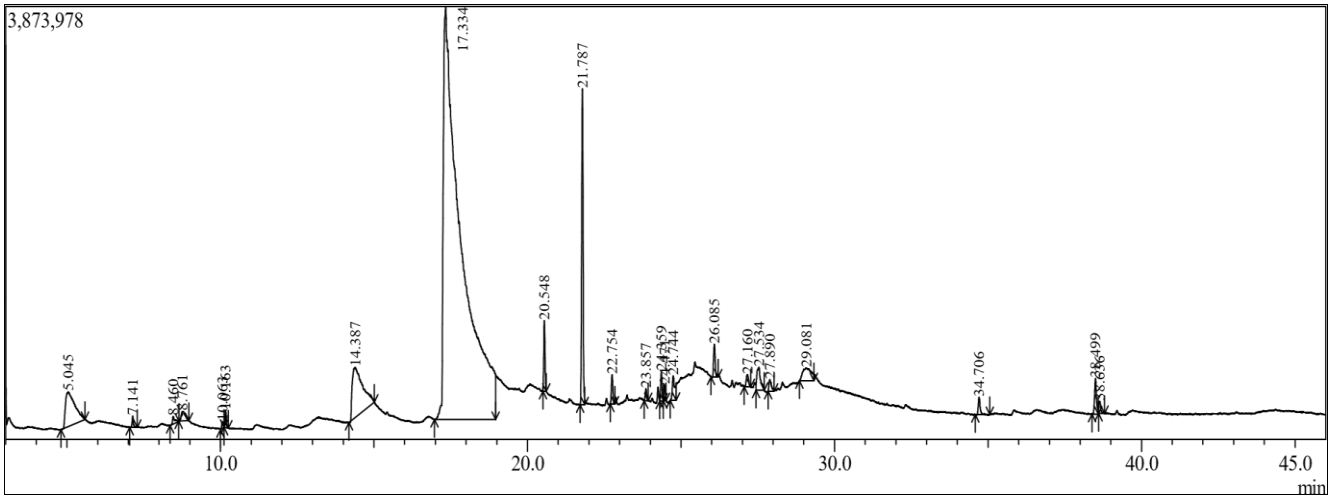

Fig 5: Chromatogram obtained from the GC-MS with the extract of Psidium guajava fruits.

Conclusion

The guava is most common and impotent fruits. It's had a high nutrient value and rich in vitamins. All part of plant useful in medicine and other purpose. Origin of guava is tropical America. Guava is belonged to Myrtaceae family. In microscopic studies, upper epidermis devoid the stomata and lower epidermis paracytic stomata present. Lower epidermis consists of 18 to 19 numbers of stomata, stomatal index is 16%. Organoleptic study was done by physical observation on the basis of colour, odour, taste and texture of crude powder of Stem, leaves and Fruits. Observation of organoleptic study mention in following table no. 2. Transvers sections of leaves consist of epidermis, palisade cells, hypodermis, cortex, bi-collateral vascular bundles and piths. In transvers section of stem composed from thick cork, cuticle, epidermis, cortex, endodermis, bi-collateral vascular bundles and centrally pith.

Moisture content of guava leaves is 4.19%, guava stem is 4.85% and fruits is 4.94%. the guava fruits show high moisture content as compare to leaves and stem. The foaming index of P. guajava, leaves and stem shows the Significant foaming index and fruits show the NOT Significant foaming index as mention in table no. 5. The swelling index of guava stem show the high swelling index 14 ml and guava leaves and fruits shows the moderate swelling index such as 06 ml and 08 ml respectively. Fluorescence analysis of powder of *P. guajava L*. powder treated with various chemical and observed under day light and fluorescence light (UV light 245 nm), the result is mentioning the table no.6. In Preliminary phytochemical screening of P. guajava show the presence of alkaloids, flavonoids, tannin, triterpenoids, phenol, carbohydrates in leaves, stem and fruits. Saponin present in leaves and stem but absent in fruits. Coumarins present in leaves and absent in stem and fruits. Glycosides, anthraquinones, fixed oil and protein test were absent. In GC-MS analysis there are 23 compounds were identified their retention time (RT), Area, Area %, name of compounds and concentration (%) are presented in table 8 and fig. 6.

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