

# Phytochemical Screening and GC-MS Analysis of the Leaves of *Pongamia Pinnata* Linn

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**ABSTRACT:** The aim of the present studies was to carry out the phytochemical screening and GC-MS analysis of the leaves of *Pongamia Pinnata* Linn. Phytochemical screening of the aqueous and ethanolic extracts of the leaves revealed the presence of alkaloids, carbohydrates, reducing sugars etc. GC-MS analysis of the ethanolic extract indicated the presence of many constituents in the leaves of *Pongamia Pinnata* Linn.

**KEYWORDS:** *Pongamia Pinnata* Linn, Phytochemical screening, GC-MS

## I. INTRODUCTION

Various plants have been used for many years in daily life to treat disease in all over the world. Plants produce a diverse range of bioactive molecules, making them a rich source of different types of medicines. Natural products provide crucial, unmatched chemical diversity to modern drug discovery programs. Natural products play an important role in drug development programs in the pharmaceutical [1]. The role of traditional medicines in the solution of health problems is invaluable on a global level. Medicinal plants continue to provide valuable therapeutic agents, both in modern and traditional medicine [2]. With the associated side effects of the modern medicine, traditional medicines are gaining importance and are now being studied to find the scientific basis of their therapeutic actions [3].

*Pongamia* (Papilionaceae) is a monospecific genus, namely *Pongamia pinnata*. The tree is distributed throughout India in tidal and beach forests. It is used as a medicine in India, China, Australia and the Philippines. Literature survey shows the innumerable medicinal applications of the tree *Pongamia pinnata*. In the Indian traditional system of medicine Ayurveda, *Pongamia pinnata* has been used in the treatment of bronchitis, whooping cough, rheumatic joints and quench dipsia in diabetes. All parts of the plant have been used as a crude drug for the treatment of tumours, piles, skin diseases, itches, abscess, painful rheumatic joints wounds, ulcers, diarrhea [4,5]. Its Seed oil is applied to skin disease, in scabies, sores, herpes; decoction of leaves is applied as bath or fomentation to rheumatic joints. Leaves are also used in diarrhea and in cough; juice of stem in remedy for gonorrhoea; pulp of seed is an application in leprosy, also used in bronchitis and whooping cough. Bark of the tree is useful internally in bleeding piles; flowers in combination with other ingredients are given as decoction in diabetes to quench thirst. Fruits are used for abdominal tumors [6].

Thus as the plant possesses immense medicinal properties, the aim of the present work was to identify the phyto-components present in the aqueous and ethanolic extracts of the leaves of *Pongamia Pinnata* by qualitative photochemical testing and to identify the compounds present in the ethanolic extract of the leaves by Gas chromatography-Mass spectrum (GC-MS) analysis.

## II. MATERIALS AND METHODS

### A. Plant collection

Plant leaves were collected in Hunasamarahalli, Bengaluru. It was ensured that the plant was healthy and uninfected. Leaves were washed under running tap water to remove any traces of soil particles and other dirt. Then washed with distilled water, air dried and cut in to small pieces and dried for 10-15 days in shade. The leaves were powdered using mixer grinder and sieved to get fine powder.

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### B. Preparation of aqueous and ethanolic extracts

All the chemicals and reagents used in this study were of analytical grade. The powdered leaves (20 g) were extracted successively in double distilled water and absolute ethanol using Soxhlet apparatus. The solvents used were recovered under pressure until dry extracts were obtained.

### C. Phytochemical screening

The phyto-components of the aqueous and ethanolic extracts of the leaves of *Pongamia Pinnata* were qualitatively analyzed in detail as per the standard methods [7-10].

### D. GC-MS analysis of the ethanolic extract of *Pongamia pinnata* leaves

The chemical composition of ethanolic extract of the leaves was analyzed by GC-MS. The analysis was carried out on Jeol spectrometer (Model: Accu TOF GCV). Split ratio was 20: 1. Column temperature program: Initial temperature 80°C for 5 min. Ramp: 10°C/min to 260°C. Again isothermal for 5 min, then ramp at 30°C/min. to 280°C, isothermal for 5 min. Solvent used was ethanol. Column used was HP5, 30 m long, 0.25 mm id and 0.25 µm film thickness. The injector temperature was 250°C, detector temperature was 280°C. Helium was used as carrier gas at 1 mL/min.

## III. RESULTS AND DISCUSSIONS

### A. Qualitative phytochemical analysis of the aqueous and ethanolic extracts of *Pongamia pinnata* leaves

The results of qualitative phytochemical analysis of aqueous leaf extract (ALE) and ethanolic leaf extract (ELE) of *Pongamia Pinnata* are given in Table 1. Results indicate the presence of many phyto-components in both the extracts. The results of present studies are almost in agreement with the results published by the other research groups [11-14].

**Table 1**

**Results of Qualitative Phytochemical Screening of aqueous and ethanolic extracts of the leaves of *Pongamia Pinnata***

Sl. No.	Constituent	Test	Result		Sl. No.	Constituent	Test	Result	
			ALE	ELE				ALE	ELE
1	Alkaloids	Mayer's reagent test	+	+	6	Glycoside	Bomtrager's test	-	-
		Wagner's reagent test	+	+			Killer-Killiani test	-	-
		Hager's reagent test	+	+			Ferric chloride test	+	+
2	Carbohydrates	Molish's test	+	+	7	Tannins and Phenolic compounds	Lead acetate test	+	+
		Barfoed's test	+	+			Dilute iodine solution test	+	+
3	Reducing sugars	Fehling's test	+	+	8	Saponins	Froth test	-	+
		Benedicts test	+	+	8	Proteins and Amino acids	Biuret test	-	-

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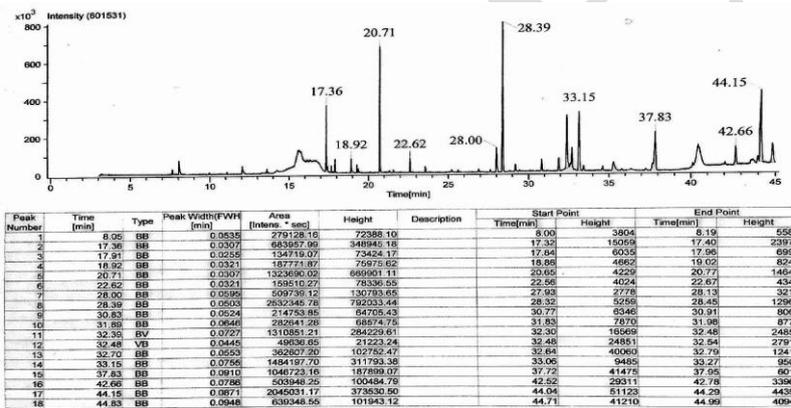
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4	Flavanoids	Alkaline reagent test	-	+	9	Triterpenoids and Steroids	Ninhydrin test	-	-
		Lead acetate test	-	+			Salwonski test	-	-
5	Glycoside	Legal's test	-	-			Liebermann and Burchard's test	-	-

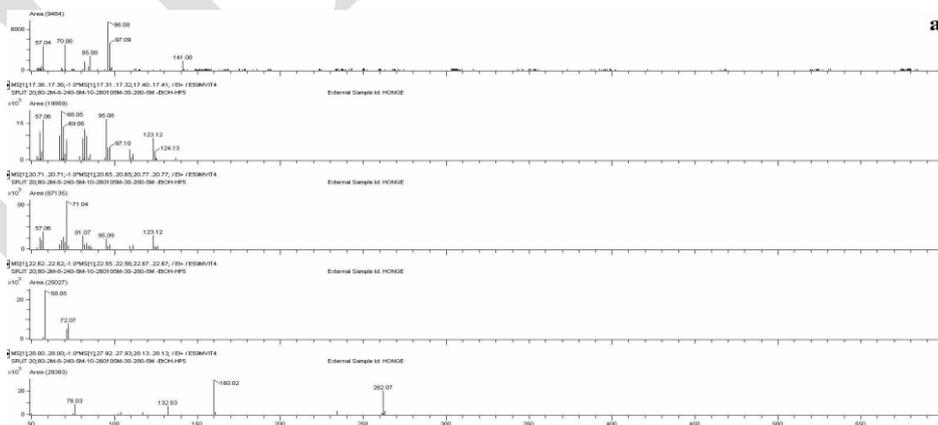
+ is present - is absent

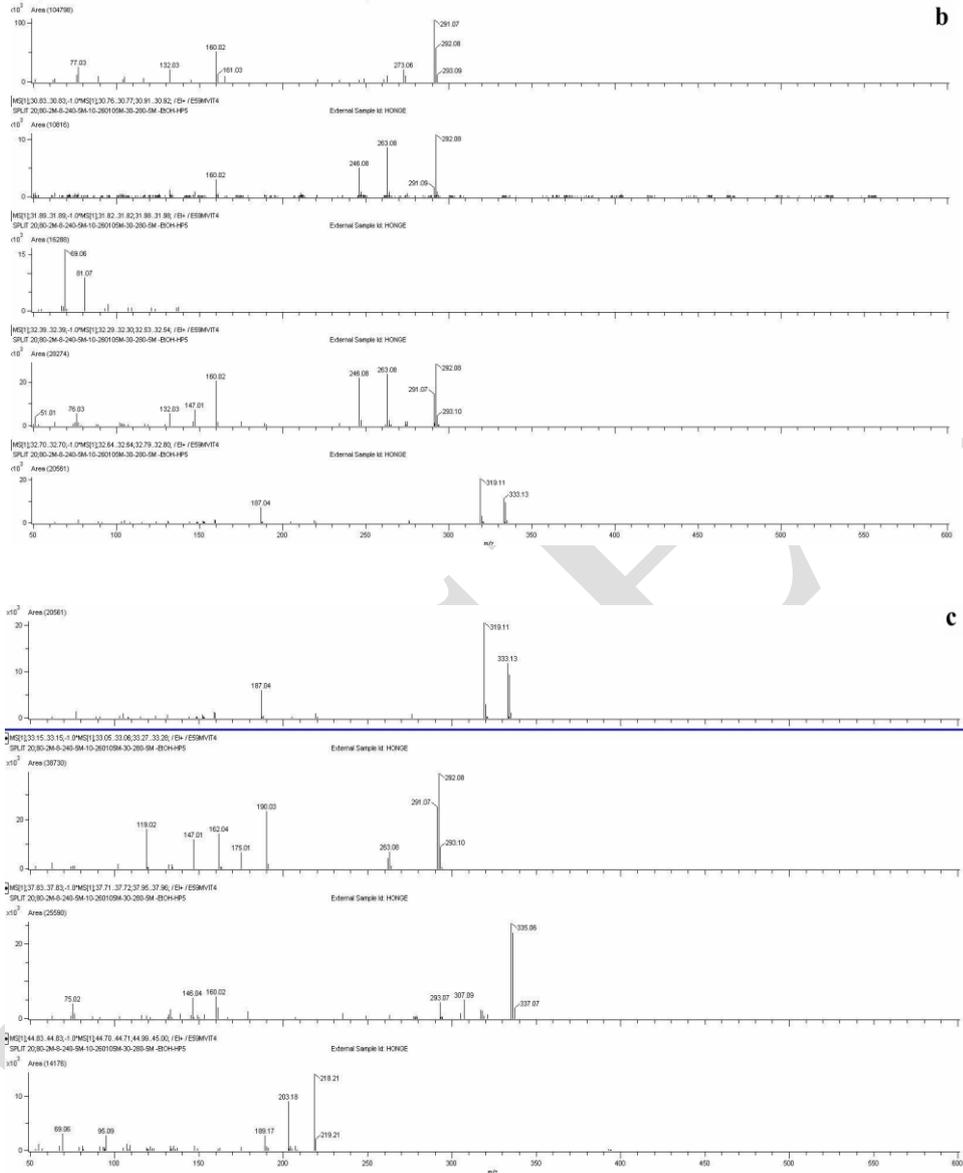
### B. GC-MS analysis

GC-MS of the ethanolic extract of the leaves of *Pongamia Pinnata* is presented in Fig. 1. Mass spectra of the ethanolic extracts of the leaves are depicted in Fig. 2 (a-c). The fragmentation patterns of the mass spectra were compared with those of the known compounds stored in the National Institute of Standards and Technology (NIST) research library. In the GC-MS analysis 14 active components were detected. The identification of photochemical compounds is based on peak area, molecular weight and molecular formula. The results are presented in Table 2.



**Fig. 1 GC-MS of the ethanolic extract of the leaves of *Pongamia Pinnata***





**Fig. 2 (a-c) Mass spectra of the ethanolic extract of the leaves of *Pongamia Pinnata***

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**Table 2**
**Results of GC-MS analysis of ethanolic extract of the leaves of *Pongamia Pinnata***

Sl. No.	Name of the Phytochemical	Molecular Formula
1	4-Piperidinamine, N, 1-dimethyl-	C <sub>7</sub> H <sub>16</sub> N <sub>2</sub>
2	Myo-Inositol, 4-C-methyl-	C <sub>7</sub> H <sub>14</sub> O <sub>6</sub>
3	Myo-Inositol, 2-C-methyl-	C <sub>7</sub> H <sub>14</sub> O <sub>6</sub>
4	3,7,11,15-tetramethyl-2-hexadecen-1-ol	C <sub>20</sub> H <sub>40</sub> O
5	Pentadecanal-	C <sub>15</sub> H <sub>30</sub> O
6	Carda-16,20 (22)-dienolide, 3-[(6-deoxy-3,4-O-methylenehexopyranos-2-ulos-1-yl)oxy]-7,8-epoxy-11, 14-dihydro	C <sub>30</sub> H <sub>36</sub> O <sub>11</sub>
7	3-Pyridine carboxylic acid, 2,7,10-tris (acetyloxy)-1,1a,2,3,4,6,7,10,11,11a-decahydro-1,1,3,6,9-pentamethyl-4-0	C <sub>32</sub> H <sub>39</sub> NO <sub>10</sub>
8	Phytol	C <sub>20</sub> H <sub>40</sub> O
9	2-methylamino-3-(N-methyl-N-phenylamino)1,4-naphthoquinone	C <sub>18</sub> H <sub>16</sub> N <sub>2</sub> O <sub>2</sub>
10	2-Anilino-3-dimethylamino-1,4-naphthoquinone	C <sub>18</sub> H <sub>16</sub> N <sub>2</sub> O <sub>2</sub>
11	3,6-diamino-2-benzoyl-4-isopropylthieno [2,3-b] pyridine-5-carbonitrile	C <sub>18</sub> H <sub>16</sub> N <sub>4</sub> OS
12	1H-Benzoimidazole, 2-(3,5-diphenyl-1H-pyrazol-4-yl)-	C <sub>22</sub> H <sub>16</sub> N <sub>4</sub>
13	β- Amyrin	C <sub>30</sub> H <sub>50</sub> O
14	9,11-dimethyltetracyclo [7.3.1.0(2.7).1(7.11)] tetradecane	C <sub>16</sub> H <sub>26</sub>

#### IV. CONCLUSION

The leaves of *Pongamia Pinnata* contain many important phytochemical components such as alkaloids, carbohydrates, flavanoids. The GC-MS analysis of ethanolic extract showed a number of medicinal active components. The present GC-MS work establishes the presence of many constituents in one variety. Further studies are needed to isolate the bioactive compounds that could be used to formulate new and more potent drugs of natural origin. Hence, this study may be useful to explore the pharmacological and biosynthetic activity of *Pongamia Pinnata* Linn further.

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