



Phytochemical Studies and GC-MS Analysis of the Leaf Extracts of *Melia Azedarach Linn*

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Abstract:

The present study was aimed to carry out the detailed phytochemical analysis of the leaves of Melia azedarach L. Qualitative phytochemical screening of the aqueous and ethanolic extracts of the leaves revealed the presence of many components such as alkaloids, carbohydrates, flavanoids, reducing sugars. GC-MS analysis was also carried out to detect the phyto constituents present in the ethanolic extract of the leaves Melia azedarach L.

Keywords: *Melia azedarach Linn*, Phytochemical screening, GC-MS

Introduction:

Medicinal plants are widely used by the traditional medicinal practitioners to cure different diseases due to their world-wide availability and fewer side effects. The herbal medicines occupy distinct position right from the primitive period to present day. Medicines that are used today are not definitely the same as those that were used in ancient times or even in the recent past. India has a wealth of medicinal plants most of which have been traditionally used in Ayurveda, Unani systems of medicine and by tribal healers for generation. The medicinal value of this plant lies in the bioactive phytochemical constituents that produce definite physiological effect on human body. These natural compounds signify the base of modern drugs as we use today. Phyto components are the natural bioactive compounds found in the plants. These phyto components work with nutrients and fibers to form an integrated part of human defense system against various disease and stress condition.



Melia azedarach is a species of deciduous tree in the mahogany family Meliaceae. It is an evergreen tree, cultivated in various parts of the Indian subcontinents.

Taxonomy of *Melia azedarach*

Kingdom: Plantae

Division: Magnoliophyta

Class: Magnoliopsida

Family: Meliaceae

Genus: *Melia*

Species: *Melia azedarach*

Binomial name: *Melia azedarach* Linn

According to the literature, *Melia azedarach* possesses a number of medicinal properties. The plant is used for the treatment of leprosy, inflammations, and cardiac disorders. Its fruits extracts possess ovicidal and larvicidal activity [1,2]. The leaf extract possesses antiviral and antifertility activity [3-5]. A diluted infusion of leaves and trees has been used in the past to induce uterus relaxation [6]. The plant possesses antioxidant, antimalarial, antihepatotoxic, antibacterial, antiparasitic, antiulcer properties [7-12].

Thus as the plant possesses immense medicinal properties, the aim of the present work was to identify the phytochemicals present in the aqueous and ethanolic extracts of the leaves of *Melia azedarach* 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.

EXPERIMENTAL DETAILS

Plant collection

Plant leaves were collected in Vidyaranyapura, Bangalore. It was ensured that the plant as 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 15-20 days in shade. The leaves were powdered using mixer grinder and sieved to get fine powder.

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 separately in double distilled water and absolute ethanol using Soxhlet apparatus.

Phytochemical screening

The phyto-components of the aqueous and ethanolic extracts of the leaves of *Melia azedarach* were qualitatively analyzed in detail as per the standard methods [13-15].

GC-MS analysis of the ethanolic extract of *Melia azedarach* 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 80⁰C for 5 min. Ramp: 10⁰C/min to 260⁰C. Again isothermal for 5 min, then ramp at 30⁰C/min. to 280⁰C, 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 250⁰C, detector temperature was 280⁰C. Helium was used as carrier gas at 1 mL/min.

RESULTS AND DISCUSSIONS

Qualitative phytochemical analysis of *the aqueous and ethanolic extracts of Melia azedarach leaves*. The results of qualitative phytochemical analysis of aqueous leaf extract (ALE) and ethanolic leaf extract (ELE) of *Melia azedarach* are given in Table 1. Results indicate the presence of many phyto-components in both the extracts.

Table 1

Results of Qualitative Phytochemical Screening of aqueous and ethanolic extracts of the leaves of *Melia azedarach*

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	-	+	Biuret test	-			+
4	Flavanoids	Alkaline reagent test	-	+	9	Proteins and Amino acids	Ninhydrin test	-	+
		Lead acetate test	-	+			Salwonski test	-	-
5	Glycoside	Legal's test	-	+			Liebermann and Burchard's test	-	-

+ is present - is absent

GC-MS analysis

GC-MS of the ethanolic extract of the leaves of *Melia azedarach* 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, 5 active components were detected. The identification of photochemical compounds was based

on peak area, molecular weight and molecular formula. The compounds detected were 3,7,11,15-tetramethyl-2-hexadecen-1-ol ($C_{20}H_{40}O$), Ethanol, 2-(9-octadecenyloxy)-,(Z)- ($C_{20}H_{40}O_2$), Phytol ($C_{20}H_{40}O$), psi., psi.- Carotene, 1,1',2,2'-tetrahydro-1,1'-dimethoxy- ($C_{42}H_{64}O_2$), Rhodoxanthin ($C_{40}H_{50}O_2$).

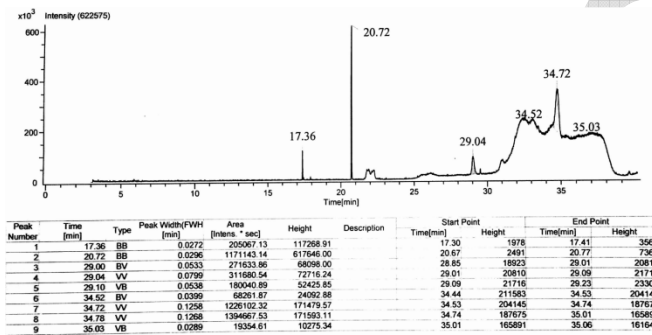


Fig. 1 GC-MS of the ethanolic extract of the leaves of *Melia azedarach*

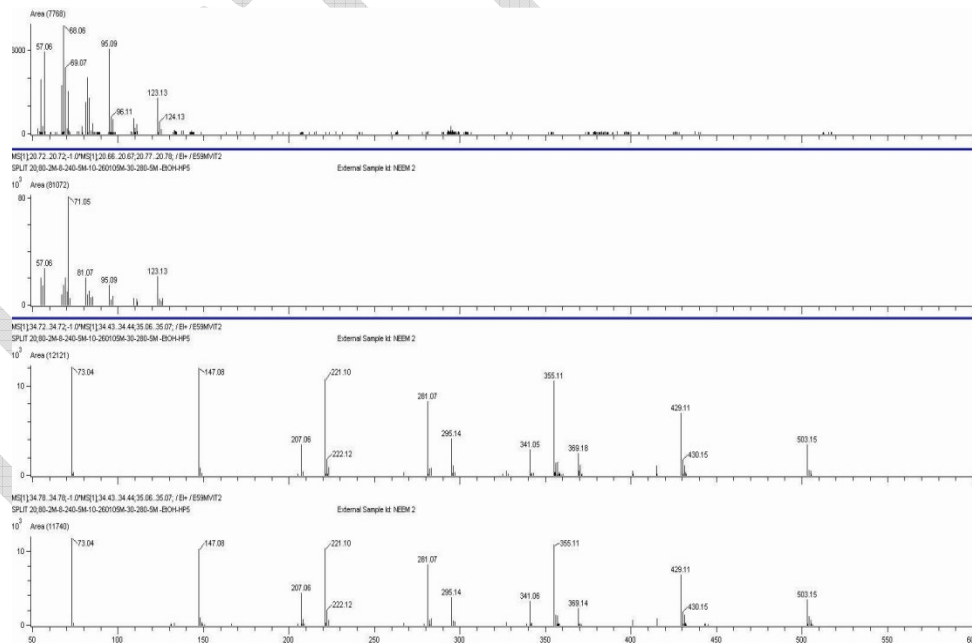


Fig. 2 Mass spectra of the ethanolic extract of the leaves of *Melia azedarach*



CONCLUSION

The leaves of *Melia azedarach* contain many important phytochemical components such as alkaloids, carbohydrates, flavanoids, glycosides, saponins. The GC-MS analysis of ethanolic extract showed the presence of only 5 components. Further studies are needed to detect the presence of bioactive compounds in the leaves of *Melia azedarach* using various other solvents such as methanol, petroleum ether.

ACKNOWLEDGEMENT

The authors thank the Management of Sri Krishnadevaraya Educational Trust and Dr. M.S. Indira, Principal of Sir MVIT for the support and encouragement extended towards this work. The authors acknowledge SAIF, IITB for GC-MS analysis.

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