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Exploring the Phytoconstituents, Bioactivity, and Applications: Comprehensive Analysis of Methanol Leaf Extract from *Mangifera indica L.* using Gas Chromatography Mass Spectrometry

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ABSTRACT

The purpose of this study is to examine extraction, isolation and identification of useful phytochemicals from Methanol leaf extract of *Mangifera indica L.* by using GCMS. The Methanol extract of GCMS study shows the significant Phytoconstituents like triterpene, fatty acids, monoterpene, aromatic flavoring agent, esters, n-alkanes, saturated aliphatic hydrocarbon, diterpene, olefin, monoglyceride, monoterpenoid phenol, keton, poly unsaturated poly acid were found to present in major and minor amount. As per literature review most of components show various bioactivities with useful applications in different fields. *Mangifera Indica* plant leaves is capable to play a major role in medicine formulation and helps to build the capacity to form a secondary metabolite like steroids, alkaloids, flavonoides, phenols etc. These identified phytochemicals can be useful to heal many diseases and improvement of health of human beings. Across India, many plants are available with significant medicinal values, among them Mangifera indica L leaves having number of very useful phytochemicals present in its leaves material. *Mangifera indica L* is one of the most important plants with high medicinal value, which is manifested in present study.

Keywords *: Mangifera Indica L.,* Methanol extract, GCMS, Phytoconstituents, Bioactivity

I. INTRODUCTION

The mango, Magifera Indica L. is well known for its excellent exotic flavour and usually referred to as the king of fruit. it has been an important herb in the Ayurvedic and indigenous medical systems for over 4000 years[1]. It is a dicotyledonous plant belonging to the order sapindales in the family Anacardiaceae. It is a popular and economically important fruit, widely cultivated in the tropics and subtropics. Commercial mango production is reported in more than 87 countries. The prominent mango producing countries are India, China, Thailand, Indonesia, Philippines, Pakistan and Mexico[2]. Being commercially valuable

food crops, fresh as well as processed fruits form an important part of our diet. Fruits provide useful food reserves an important source of essential micronutrients, vitamins, and other phytochemicals, but they are generally low in protein and fat[3]. Fruits play a very important role in human nutrition, by providing a source of energy, necessary growth factors, carbohydrates, dietary fiber and antioxidants, which are essential for maintaining normal health. Fruits also contain a very high percentage of water as their fresh weight[3]. Mangoes are a good source of vitamins A, C, and E. They are also a good source of fiber and potassium[4].

II. METHODS AND MATERIAL

➢ Sample collection, preparation and extraction:

Plant sample was collected from the Kantala village - Kodinar (Gujarat), India. Mangifera indica Leaves were washed with tap water followed by distilled water and dried in shade. By use of electrical grinder get the fine powder of plant leaves and stored in air tight plastic bags and used for the further study. Now methanol extraction prepare by 10gm of *mangifera indica L.* leaves powder was packed in the thimble and 120ml solvent was added in round bottom flask. Joined soxhlet apparatus and heated using heating mantle and cooling water supply by electrical motor. Soxhlet run for 8 to 9 hours until the solution becomes colourless.

➢ GCMS Analysis:

The Gas chromatography-Mass spectrometry (GC-MS) analysis of Methanol extract of *Mangifera indica L.* leaves. The Shimadzu GC-MS QP2010 is the analytical instrument used. GCMS analyses determined the volatile constituents' composition. Using an SGE make BPX5WCOT (Wall coated open tubular) capillary column (30m,0.25mm i.d.,0.25µm film thickness), GCMS analyses were carried out on a Shimadzu GCMS-QP2010 system in EI mode with a split/split less injector (300.00°C) at a split ratio of 1/10. 2.5 ml/min of helium was used as the carrier gas. Each sample had an injection volume of 2µl.The temperature of the column oven was kept between 70.0°C and 300.0°C at a rate of 25.00 and a hold time (min) of 2.00. Career gas flowed at a rate of 1.47 mL/min. Figure 1 displays the chromatogram, which was recognized through comparison with the NIST and Willy chemical library, as stated in Table 1. Numerous analytical techniques, such as TLC, UV, NMR, and GCMS, were effective instruments for the identification, separation, and structural analysis of phytochemicals containing bioactive components. Mass spectrometry with hyphenated gas chromatography was the method we employed. The percentage with peak area normalization was used in this investigation to indicate the relative percentage of each of these extract elements.

➢ Determining the Phytocomponents:

The identification of bio component in methanol extract of *Mangifera indica L.* leaves was done by Mass Spectroscopy by view of the comparison of retention indices and mass spectra fragmentation patterns with stored in the computer library Wiley Registry of Mass Spectral Data's, New York (Wiley 8) were used for matching the identified compound in used in the above extract.

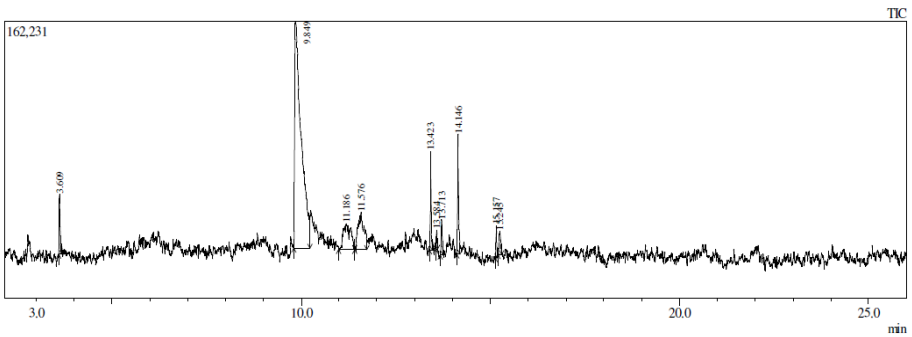

Figure 1: GC-MS Chromatogram of the Methanol Extract of *Mangifera indica L.* leaves

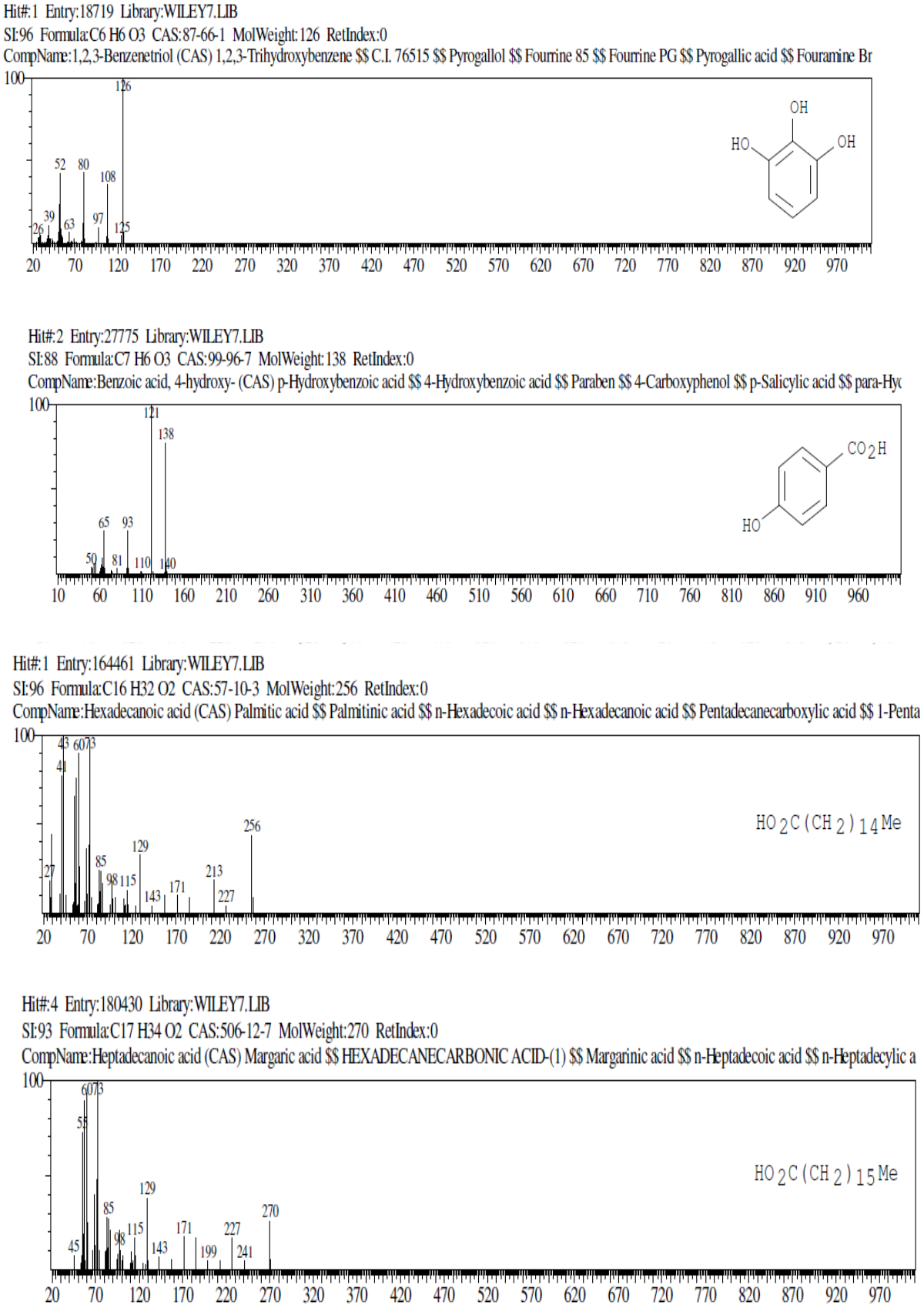

Figure 2 : GC-MS Spectra of Methanol Extract

Table 1: Components Identified and its Activity/Uses in the Methanol Extracts of *Mangifera indica L.* by GC-MS

R.Time	Area%	Hight%	Name	Application
9.849	65.92	33.42	Pyrogallic acid	Pyrogallic acid is used as a hair dyeing, dyeing of suturing materials and for oxygen absorption in gas analysis.[5]
11.186	8.38	3.81	Salicylic acid	Salicylic acid topical is used to to treat many skin disorders, such as acne, dandruff, psoriasis, seborrheic dermatitis of the skin and scalp, calluses, corns, common warts, and plantar warts, depending on the dosage form and strength of the preparation. This medicine is available without a prescription. [6]
11.576	9.14	5.48	Margaric acid	Margaric acid is a metabolite in glutamate and lipid metabolism in vivo. Blood-brain barrier permeable. Orally active. Possibly involved in anti-tumor activity.[7]
14.146	5.54	17.71	Palmitic acid	Palmitic acid is used to produce soaps, cosmetics, and industrial mold release agents.[8]

Phytochemical screening:

It refers to the extraction, screening and identification of the medicinally active substances found in plants. Some of the bioactive substances that can be derived from plants are flavonoids, alkaloids, carotenoids, tannin, antioxidants and phenolic compounds. Methanol solvent were used for extraction.

Phytochemical examinations were carried out for all the extracts as per the standard methods[9,10]

1. Detection of alkaloids :

Mayer's Test: Filtrates were treated with Mayer's reagent (Potassium Mercuric iodide). Formation of a yellow cream precipitate indicates the presence of Alkaloids.

2. Detection of carbohydrates:

Molisch's Test: Filtrates were treated with 2 drops of alcoholic α-naphthol solution in a test tube and 2 ml of conc. sulphuric acid was added carefully along the sides of the test tube. Formation of violet ring at the junction indicates the presence of Carbohydrates.

3. Detection of saponins:

Extracts were diluted with distilled water to 20ml and this was shaken in a graduated cylinder for 15 minutes. Formation of 1 cm layer of foam indicates the presence of saponins.

4. Detection of flavonoids:

Extracts were treated with few drops of lead acetate solution. Formation of a yellow colour precipitate indicates the presence of flavonoids.

5. Detection of tannins:

To the extract, 1% gelatin solution containing sodium chloride was added. Formation of white precipitate indicates the presence of tannins.

6. Detection of phenols:

Extracts were treated with few drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenols.

7. Detection of terpenoids:

Extracts were treated with few ml chloroform and few drops conc. Sulphuric acid was added. Formation of brown colour in middle.

8. Detection of quinone:

Extracts were treated with few ml chloroform and chloroform layer were separated to this 5% KOH solution well added occurrence of red colour.

9. Detection of steroids:

Extracts were treated with few ml chloroform and few drops conc. Sulphuric acid was added. Formation of two layer an upper red layer and lower yellowish green layer.

Table 2 : Phytochemical screening of *Mangifera indica L* :

Type of test:	Carbohydrate	Tannin	Saponin	Alkaloid	Flavonoid	Terpenoid	Quinone	Phenol	Steroid
Methanol extract:	+	+	++	+	++	+	+	+	++

Note: + = Present and ++ = More present

III.CONCLUSION

The present study confirms the various bioactive components, phytoconstituents present in Methanol leaf extract of plant *Mangifera indica L.* with the use of Phytochemical screnning and GCMS technique. The results show the various type of compound present that contain significant value in our day to day life. Major compound like various acid palmitic acid, Salicylic acid, Pyrogallic acid, Margaric acid that contain particular bioactivities. These have been also present carbohydrate, tannin, alkaloid, flavonoid, terpenoid, saponin, phenol, quinone and steroid that may be useful in many ways. So, in this study various type of compounds identified that have very important value in our normal life as well as in biological point of view. Above tables show that components identified which contain as above various bioactivity and application in various branch of science as well as in various field. There are also present many compounds that contain particular property to develop a novel drug that help to improve human health. So, there were many compounds that very useful to mankind in various ways. By use of plant various major and minor amount of compound present as described above. The present study also shows the important of medicinal plant specially *Mangifera indica L.* in various ways.

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