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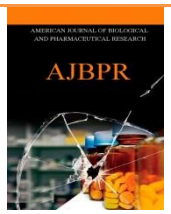

BIOACTIVE COMPOUNDS PROFILING OF *Musa paradisiaca* L. ROOT EXTRACT BY GAS CHROMATOGRAPHY– MASS SPECTROMETRY

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ABSTRACT

Medicinal plants constitute an important natural wealth of a country. They play a significant role in providing primary health care services to rural people. They serve as therapeutic agents as well as important raw materials for the manufacturing of traditional and modern medicine. Banana root has a long history of medicinal usage in the treatment of various acute and chronic diseases. The present study was undertaken to explore the potential bioactive components present in the banana root which have been evaluated using Gas Chromatography–Mass Spectrometry analysis. The analysis of banana root revealed the existence of 4H-Benzo[f]pyrrolo[1,2-a],[1,Benz[a]anthracene-7-carboxyl cobaltocene,1,1-diacetyl-octadecanoic acid,docosyle-2-Methoxy-6-4-pentylphenyl) pyrimidine,2,4-diamino-5-[[Benz(a)anthracene,7-ethoxy- Benz(a)anthracene .The results of this study supports that *Musa paradisiaca* L.. root extract as alternative source for various diseases.

INTRODUCTION

Medicinal plants are an expensive gift from nature to human which are the sources of essential therapeutic aids for alleviate human ailments [1]. India is called the botanical garden of the world for its rich natural resources. Over 6,000 plants in India are used in traditional, folklore and herbal medicine. The Indian system of medicine has identified 1500 medicinal plants of which 500 are commonly used. The banana plants are used to cure many skin diseases .It contains good source of vitamins A,B and C and they also have a high content of Carbohydrates and potassium and enormous Phytochemicals [2].

Phytochemicals are the chemicals extracted from plants. These organic chemicals are classified as primary or secondary constituents, depending on their role in plant metabolism. Primary constituents include the common sugars, amino acids, proteins, purines and pyrimidines of nucleic acids, chlorophyll's etc. Secondary constituents are the remaining plant chemicals such as alkaloids (derived from amino acids), terpenes (a group of lipids) and phenolics (derived from carbohydrates) [3]. Plant produces these chemicals to protect itself but recent research demonstrates that emphasizes the plant source of most of these protective, disease-preventing compounds. A true nutritional role for phytochemicals is becoming more probable every day as research uncovers more of their remarkable benefits [4].

Within a decade, there was a number of dramatic advances in analytical techniques including TLC, UV, NMR and GC-MS that were powerful tools for separation identification and structure determination of Phytochemicals [5].

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The aim of this study is to determine the organic compounds present in the *M. paradisiaca* root extract with the aid of GC-MS technique, which may provide an insight in its use in tradition medicine.

MATERIALS AND METHODS

Plant materials collection

Musa paradisiaca were collected from kovilambakkam ,Tambaram ,Chennai of Tamil Nadu, India and identified to confirm by the botanist Mrs. Dr. A.M. Sabitharani, Professor Prince Shri Venkateswara Arts and Science College , Gowrivakkam, Chennai.

Plant sample Extraction

The *M. paradisiaca* roots were collected and they were cut into pieces and shade dried at room temperature. The dried roots were subjected to size reduction to a coarse powder by using dry grinder and passed through sieve. 100 g of crushed roots were continuously extracted with petroleum ether using soxhlet up to 48 h. The extract was filtered and concentrated in rotatory evaporator at 35-40ºC under reduced pressure to obtain a semisolid material, which was then lyophilized to get a powder (28.5%, w/v).

Phytochemical analysis

Phytochemical tests were carried out on the petroleum ether extract of *M. paradisiaca* using standard procedures to identify the constituents described by Malick and Singh, 1980 (6), Segelman *et al.*,1969(7) Harborne(8,9) . The Banana root was analysed for various phytochemical analysis like alkaloids, tannins, phenolic compounds, flavonoid, anthraquinones, glycosides, steroids, aminoacids, saponins, terpenoid. **(Table-1)**

Gas Chromatography-Mass spectrometry (GC-MS) analysis

The GC-MS analysis was carried out using a Clarus 500 Perkin- Elmer (Auto System XL) Gas Chromatograph equipped and coupled to a mass detector Turbo mass gold – Perking Elmer Turbomas 5.2 spectrometer with an Elite-1 (100% Dimethyl ply siloxane), 300 m x 0.25 mm x 1 µm df capillary column. The instrument was set to an initial temperature of 110°C, and maintained at this temperature for 2 min. At the end of this period, the oven temperature was raised upto 280°C, at the rate of an increase of 5°C/min, and maintained for 9 min. Injection port temperature was ensured as 250°C and Helium flow rate as 1 ml/min. The ionization voltage was 70 eV. The samples were injected in split mode as 10:1. Mass Spectral scan range was set at 45-450 (mhz). The chemical constituents were identified by GC-MS. The fragmentation patterns of mass spectra were compared with those stored in the spectrometer database using National Institute of Standards and Technology Mass Spectral database (NIST-MS). The percentage of each component was calculated from relative peak area of each component in the chromatogram.

Identification of Compounds

The identity of the components in the extract was assigned by the comparison of their retention indices and mass spectra fragmentation patterns with those stored on the computer library and also with published literatures. National Institute of Standards and Technology library sources were also used for matching the identified components from the plant material.

RESULTS AND DISCUSSION

Medicinal plants are being used as valuable sources of food and medicine for the prevention of illness and maintenance of human health. In India, many indigenous plants are widely consumed as food and home remedies especially in the treatment or management of common diseases. The GC-MS analysis supports the presence of important bioactive compounds. The relative concentrations of various compounds were calculated by the use of gas chromatogram which gives the many peaks. The height of the peak corresponds to the relative concentration of compound. The compounds which are eluted at different timings through gas chromatogram are picked up by the mass analyzer and produce particular fragmentation pattern. This fragmentation pattern is compared to the compounds present in reference library (NIST) on which the structure of compounds is determined. This provides the unique chemical fingerprint that shows the importance of plant under study.

GC-MS chromatogram of the petroleum ether extract of *M. paradisiaca* root showed Eight major peaks (Figure-1) and have been identified after comparison of the mass spectra with NIST library (Table-2), 4H-Benzo[f]pyrrolo[1,2-a],[1,Benz [a]anthracene-7-carboxyl cobaltocene,1,1-diacetyl-octa decanoic acid,docosyle2-Methoxy-6-4-pentylphenyl) pyri mi dine,2,4-diamino-5-[Benz(a) anthrax cene, 7-ethoxy Benz(a)anthracene indicating the presence of various phytocomponents. From the results, it was observed that presence of the major components in the extract. The phytochemicals that contribute to the medicinal property. These are reported to have antioxidant [10], antiallergic [11] antiseptic[12,13], anti-inflammatory [14,15], nematicide [16,17] and larvicidal activities [18,19] docosyle2-Methoxy-6-4-pentylphenyl)pyrimidine having nematicide and larvicidal activity [20], Benz(a)anthracene,7-ethoxy-having antimalarial and antifilarial activity, 4H-Benzo[f]pyrrolo1,2 also having larvicidal activity.

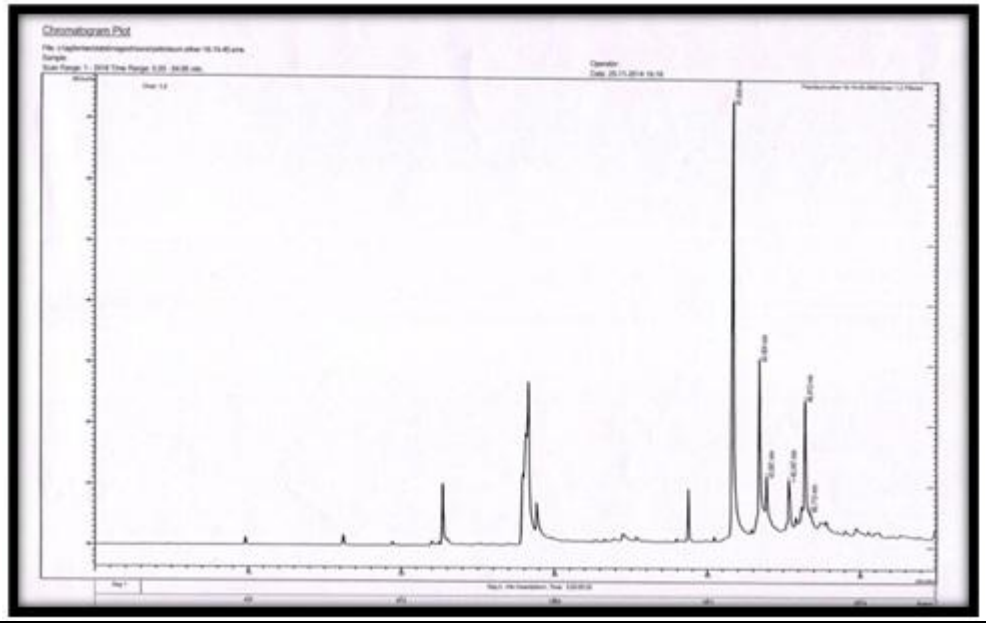
Table 1. **Phytochemical Analysis of *Musa paradisiaca L***

S.No	Phytochemical	*M.Paradisiaca*
1	Alkaloids	+
2	Flavonoids	+
3	Glycosides	+
4	Steroids	+
5	Phenols	+
6	Saponins	+
7	Tannins	+
8	Phytosterols	+
9	Terpenoids	+
10	Phlobatannins	-

Table 2. **GC-MS Analysis of *Musa paradisiaca.L***

S.No	Compounds	Retention time	Peak Area	%Peak Area
1	4HBenzo[f]pyrrolo[1,2-a]	41.658	4.478	43.240
2	[1,Benz[a]anthracene7carboxyl	43.404	2.016	19.470
3	cobaltocene,1,1-diacetyl-	43.881	4.070	3.930
4	Octadecanoicacid,docosyle	45.204	444641	0.429
5	1-tripropylsilyloxyundecane	45.347	6.611	6.383
6	2-methoxy-6-(4-pentylphenyl)	45.882	1.152	1.113
7	pyrimidine,2,4-diamino-5-	46.190	3.109	3.002
8	Benz(a)anthracene,7-ethoxy	46.413	1.967	18.990

Fig 1.GC-MS CHROMATOGRAM OF *Musa paradisiaca.L*



CONCLUSION

In the present study, eight chemical constituents have been identified from petroleum ether extract of *Musa paradisiaca* by Gas Chromatogram-Mass spectrometry (GC-MS) analysis. The presence of various chemical constituents justifies the use of the whole plant for various ailments by traditional practitioners.

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