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Chemical investigation of flower of Spathodea campanulata by GC-MS

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ABSTRACT

This study was carried out to analyze the active constituents present in the flower of Spathodea campanulata (Bignoniaceae). Four compounds in ethanolic extract were identified by Gas Chromatography – Mass Spectrometry (GC-MS) analysis. Butane, 1, 1-diethoxy-3-methyl- (35.11 %) and n-Hexadecanoic acid (30.22%) were the major constituents of ethanolic extract. This is the first report of identification of active constituents from the flower of Spathodea campanulata by GC-MS.

Keywords: Spathodea campanulata, GC-MS, Butane, 1, 1-diethoxy-3-methyl-, n-Hexadecanoic acid

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INTRODUCTION

Most traditional medicines are developed from nature. They have not yet fulfilled the scientific requirements so as to be classified as modern medicines [1,2]. For purposes of scientific back up, a study is needed to examine their bioactive components, their efficacy and safety [3,4]. Usually, most components that are useful for medicinal purposes are secondary metabolites [5].

In the development of medicinal plant industry, plant medicines are classified into three groups: herbs (Jammu), standardized extracts and phytopharmaceuticals. There are strict requirements for standardizing the extracts. Some of them include correctness and proven restorative power, uniformity of active constituents, their efficacy, safety and assurance, both in quality and quantity [6,7,8].

Spathodea is a monotypic genus in the flowering plant family Bignoniaceae [9].

Spathodea campanulata is commonly known as the Fountain tree, African tulip tree. It is native to tropical Africa. It grows between 7-25 m (23-82 ft) tall. This tree is planted extensively as an ornamental tree throughout the tropics and is much appreciated for its very showy reddish-orange or crimson (rarely yellow), campanulata flowers.

It is commonly planted as a street tree in India. It is considered evergreen but it sheds leaves in dry summers and hence it is a dry season deciduous tree. The generic comes from the Ancient Greek words.

Since there are no reports on the phytochemical aspects of flower of Spathodea campanulata, it was chosen as the subject for this study. The aim of this paper is to validate a rapid method for the quantitative determination of organic compounds in the flower of Spathodea campanulata using rapid fingerprint procedure.

MATERIALS AND METHODS

Plant material

Flower *of* Spathodea campanulata was collected in Erode of Tamilnadu.

Plant Sample Extraction

5gm powdered plant material was soaked in 20ml of ethanol overnight and then filtered through Whatmann filter paper No.41 along with 2gm Sodium sulfate to remove the sediments and traces of water in the filtrate. Before filtering, the filter paper along with sodium sulphate was wetted with ethanol. The filtrate is then concentrated by bubbling nitrogen gas into the solution and was concentrated to 1ml. The extract contains both polar and non-polar phytocomponents.

GC-MS Analysis

GC-MS analysis was carried out on a GC Clarus 500 Perkin Elmer system and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument employing the following conditions: Column Elite-1 fused silica capillary column (30mm×0.25mm ID ×1 µMdf, composed of 100% Dimethyl poly siloxane), operating in electron impact mode at 70 eV; Helium (99.999%) was used as carrier gas at a constant flow of 1ml/min and an injection volume of 2 µl was employed (split ratio of 10:1); Injector temperature 250°C; Ion-source temperature 280°C. The oven temperature was programmed from 110°C (isothermal for 2 min.), with an increase of 10°C/min, to 200°C, then 5°C/min to 280°C, ending with a 9 min. isothermal at 280°C. Mass spectra were taken at 70 eV; a scan interval of 0.5 seconds and fragments from 45 to 450 Da. Total GC running time was 36 min.

Identification of Components

Interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard and Technology (NIST) having more than 62,000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The Name, Molecular weight and Structure of the components of the test materials were ascertained.

RESULTS AND DISCUSSION

Four compounds were identified in the flower *of* Spathodea campanulata by GC-MS analysis .The active principles with their Retention time(RT),

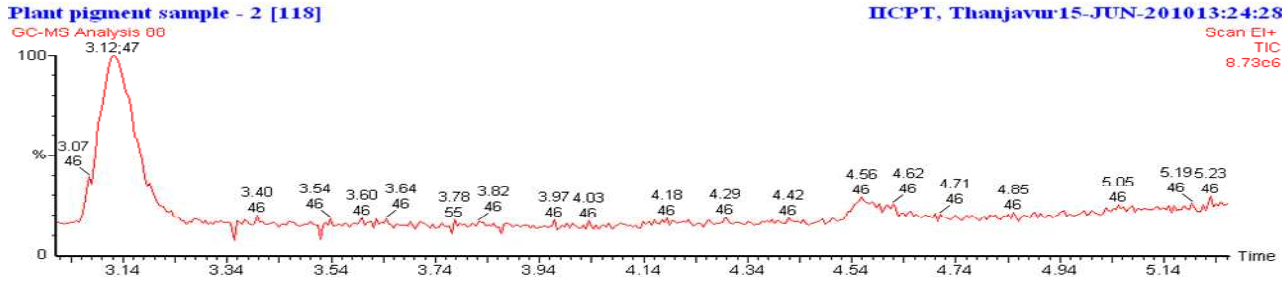

Fig.1 GC-MS chromatogram (Part-1) of ethanolic extract of flower of Spathodea campanulata

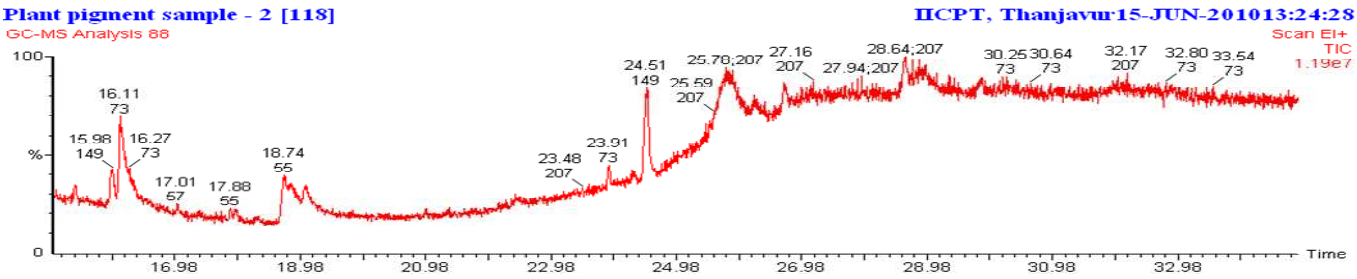

Fig.2 GC-MS chromatogram (Part-2) of ethanolic extract of flower of Spathodea campanulata

Table 1.Components identified in Flowers *of* Spathodea campanulata

No.	RT	Name of the compound	Molecular Formula	MW	Peak Area %
1.	3.12	Butane, 1,1-diethoxy-3-methyl-	$C_9H_{20}O_2$	160	35.11
2.	16.11	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	30.22
3.	18.74	Oleic Acid	$C_{18}H_{34}O_2$	282	12.89
4.	24.51	1,2-Benzenedicarboxylic acid, diisooctyl ester	$C_{24}H_{38}O_4$	390	21.78

Molecular formula, Molecular weight (MW) and Concentration (%) are presented in (Table 1 and Fig 1 and 2).The prevailing compounds were Butane,1,1-diethoxy-3-methyl-(35.11%), n-Hexadecanoic acid(30.22%), 1,2-Benzenedicarboxylic acid, diisooctyl ester(21.78%) and Oleic Acid(12.89%).

CONCLUSION

This investigation has helped to identify the compounds present in the flower *of* Spathodea campanulata, a hitherto uninvestigated species.

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