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GAS CHROMATOGRAPHY – MASS SPECTROSCOPIC ANALYSIS OF STEM OF *ACHRAS SAPOTA*

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ABSTRACT: This study was carried out to analyze the active constituents present in the stem of Achras sapota (Sapotaceae). Seventeen compounds in ethanolic extract were identified by Gas Chromatography – Mass Spectrometry (GC-MS) analysis.n-Hexadecanoic acid (27.03 %), Benzoic acid, 3-hydroxy-(20.89%), 9, 12, 15-Octadecatrienoic acid, (Z, Z, Z)-(9.71%) and 2-Furancarboxaldehyde, 5-(hydroxymethyl)-(8.55%) were the major constituents of ethanolic extract. This is the first report of identification of active constituents from the stem of Achras sapota by GC-MS.
Keywords: Achras sapota, GC-MS, n-Hexadecanoic acid

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 the 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[5,6].
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 [7,8,9].
Sapota belongs to the Sapotaceae family.Sapota (*Achras sapota*) commonly known as chiku is mainly cultivated in India for its fruit value.Sapota, being a tropical crop can be grown from sea level upto 1200 m. It needs warm (10-38^0 C) and humid climate (70% relative humidity) for growth and can be cultivated throughout the year. Coastal climate is best suited for its cultivation. Since there are no reports on the phytochemical aspects of stem of Achras sapota, 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 stem of Achras sapota using rapid fingerprint procedure.

MATERIALS AND METHODS

Plant material**:** Stem of Achras sapota 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.

EXPERIMENTAL

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.

RESULTS AND DISCUSSION

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.

Seventeen compounds in ethanolic extract were identified in the stem of Achras sapota by Gas Chromatography – Mass Spectrometry (GC-MS) analysis The active principles with their Retention time (RT), Molecular formula, Molecular weight (MW) and Concentration (%) are presented in (Table 1 and Fig 1).The prevailing compounds were n-Hexadecanoic acid (27.03 %), Benzoic acid, 3-hydroxy-(20.89%),9,12,15-Octadecatrienoic acid, (Z, Z, Z)-(9.71%) and 2-Furancarboxaldehyde, 5-(hydroxymethyl)-(8.55%).

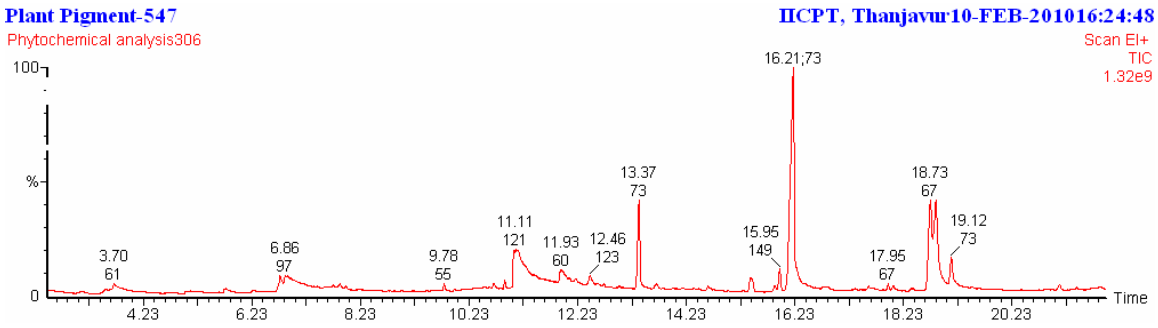

Fig.1 GC-MS chromatogram of ethanolic extract of the stem of Achras sapota

CONCLUSION

This investigation has helped to identify the compounds present in the stem of Achras sapota, a hitherto uninvestigated species.

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Table 1.Components identified in the stem of Achras sapota

No.	RT	Name of the compound	Molecular Formula	MW	Peak Area %
1	3.70	Carbamic acid, phenyl ester	$C_7H_7NO_2$	137	3.58
2	5.75	4H-Pyran-4-one, 2,3-dihydro-3,5-dihydroxy-6-methyl-	$C_6H_8O_4$	144	0.80
3	6.75	Benzofuran, 2,3-dihydro- [Synonyms: Coumaran]	C_8H_8O	120	1.72
4	6.86	2-Furancarboxaldehyde, 5-(hydroxymethyl)-	$C_6H_6O_3$	126	8.55
5	7.85	7-Oxabicyclo[4.1.0]heptan-2-one, 6-methyl-3-(1-methylethyl)- [Synonyms: Piperitone oxide]	$C_{10}H_{16}O_2$	168	0.98
6	9.78	1-Dodecanol	$C_{12}H_{26}O$	186	0.40
7	10.69	2(4H)-Benzofuranone, 5,6,7,7a-tetrahydro-4,4,7a-trimethyl-, (R)-	$C_{11}H_{16}O_2$	180	0.79
8	10.89	Dodecanoic acid	$C_{12}H_{24}O_2$	200	0.66
9	11.11	Benzoic acid, 3-hydroxy- [Synonyms: m-Salicylic acid]	$C_7H_6O_3$	138	20.89
10	11.93	(1R,3R,4R,5R)-(-)-Quinic acid	$C_7H_{12}O_6$	192	4.91
11	12.46	: 3-Buten-2-one, 4-(4-hydroxy-2,2,6-trimethyl-7-oxabicyclo[4.1.0]hept-1-yl)-	$C_{13}H_{20}O_3$	224	2.91
12	13.37	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	5.91
13	15.41	5,9,13-Pentadecatrien-2-one, 6,10,14-trimethyl-, (E,E)-	$C_{18}H_{30}O$	262	1.32
14	16.21	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	27.03
15	18.73	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	7.85
16	18.83	9,12,15-Octadecatrienoic acid, (Z,Z,Z)-	$C_{18}H_{30}O_2$	278	9.71
17	19.12	Octadecanoic acid	$C_{18}H_{36}O_2$	284	1.99

REFERENCES

1. Gupta, S.; *Indian J. Pharmacol.* 1994, **26**, 1.
2. Quisumbing, E.; Medicinal Plants of the Philippines, Manila Bureau of Printing, 1954, 1234.
3. Dipalma, J. R.; Drills Pharmacology Medicine,(1971) 4th edn. McGraw –Hill Book Ltd, London, 21-43.
4. Farnsworth, N.R.; Akarela, A.S.; Bingel, D.D.; Soejarto, Z.G.; Medicinal plants in therapy. Bull. WHO,1985, 965-981.
5. Padua, L.S.; Bunyaprapkatsara, N.; Lemmens, R.H.M.J.; Medicinal and Poisonous Plants Blachuys Publisher, Leiden,1999, 711.
6. Jamaran,I.; The role of science and technology on the development of medicinal plant agro industry. Proceeding of Coordination and Strategic Consultation on the development of Medicinal Plant Agroindustry, Bogor Agriculture University, Bogor, 1995, 233.
7. Corral, L.G.; Post, L.S.; Montville, T.J.; *J.Food Sci.,*1988, **53:**11-16.
8. Guerrero, R.D.;Guerrero, L.A.; Garcia, L.L.; *Philippines Technol. J*,1990, **15:**15-18.
9. Hema, R.; Kumaravel, S.; Gomathi, S.; Sivasubramaniam, C.; Newyork Science Journal,2010, 3(11),141-143.