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IDENTIFICATION OF PESTICIDE COMPOUNDS OF *CYNODON DACTYLON* BY GC-MS ANALYSIS

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ABSTRACT

Cynodon dactylon (L.) Pers. (Family–Poaceae), is traditionally used for curing different aliments like wound healing. In the present investigation, Gas Chromatography Mass Spectrometry (GC-MS) analyses of C. dactylon leaves were carried out to evaluate chemical composition which could be useful in future experimental studies. This analysis revealed that the leaves contain pesticide compounds like 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl- with the relative percentage of 48.36 % of the total compounds in total ion chromatogram. In conclusion, the identification of this compound will help the researchers in the development of several treatment formulations based on this plant.

KEYWORDS: ***Cynodon dactylon*, GC-MS analysis, pesticide compounds**

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INTRODUCTION

Most traditional medicines are developed from nature. The Plants are a rich source of secondary metabolites with interesting biological activities. A Distinguished example of these compounds includes flavonoids, phenols, saponins and cyanogenic glycosides[1-2]. *C.dactylon* (L.) Pers., commonly known as Bermuda grass or Durva in Hindi is a weed. It is traditionally used for diabetes[3]. Antibacterial Activity on different bacterial pathogens isolated from clinical samples[4] and the wound healing activity of flavonoid in *C. dactylon* in swiss albino mice[5] were proving that the plant having the active compounds. The whole plant is used for diuretic, dropsy, syphilis, wound infection and piles[6]. The juice of the plant is an astringent and is applied externally to fresh cuts and wounds. It is used in the treatment of catarrhal opthalmia, hysteria, epilepsy, insanity, chronic diarrhoea and dysentery[7]. The plant is a folk remedy for calcus, carbuncles, cough, hypertension, snake bites and gout[8]. The ethanolic extract of aerial parts of *C. dactylon* showed marked protection against convulsions induced by chemo convulsive agents in mice[9]. *C. dactylon* is a bitter, sharp hot taste, good odour, laxative, brain and heart tonic, aphrodisiac, expectorant, carminative and useful against grippe in children and for pains, inflammations and toothache[10] but no study on the insecticidal effects of the plant has yet appeared. Thus, the present study is the investigation of phytochemical composition of *C. dactylon* by GC-MS analysis for the presence of insecticidal compounds.

MATERIALS AND METHODS

(i) Sample source and extraction procedure

C. dactylon was collected from the local market in Chennai, Tamil Nadu, India. The powered leaf material (25g) was soaked in 50 ml of ethanol for 12 hours and then filtered through 2g sodium sulphate to remove the sediments and traces of water in the filtrate. The sample was filtered and concentrated through nitrogen flushing. 2 µl of prepared sample was injected into the GC-MS instrument.

(ii) Gas Chromatography Mass Spectrometry Analysis

GC-MS technique was carried out at Indian Institute of Crop Processing Technology (IICPT) Thanjavur, Tamil Nadu. The equipment details are as follows: GC Clarus 500 Perkin Elmer, Carrier gas: 1ml per min, Split: 10:1, Detector: Mass detector Turbo mass gold-Perkin Elmer, Software: Turbomass 5.2, Sample injected: 2µl, Column: Elite-5MS (5% Diphenyl / 95% Dimethyl poly siloxane), 30m x 0.25mm x 0.25µm df , Oven temperature Programme: 110° C with 2 min hold ,Up to 200° C at the rate of 10 ° C/min without hold, Up to 280 ° C at the rate of 5° C / min with 9 min hold, Injector temperature 250° C, Total GC running time 36 min, Inlet line temperature 200°C, Source temperature 200°C Electron energy:70 eV, Mass scan (m/z): 45-450,Solvent Delay: 0-2 min, Total MS running time: 36 min[11].

(iii) Interpretation of mass spectrum

In the MS Programme, NIST Version 2.0 library database of the National Institute of Standard and Technology (NIST) having more than 2,00,000 patterns was used for identifying the chemical components of the *C. dactylon* leaves. 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[12].

RESULTS & DISUCSSION

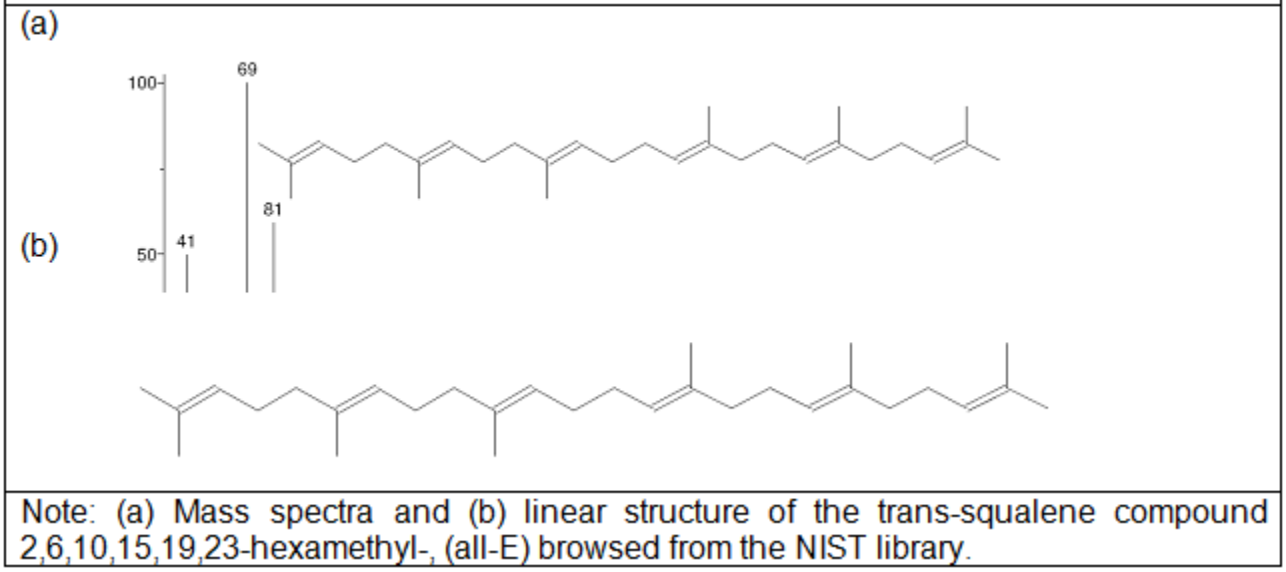
Table 1

Composition of chemicals and its biological activity in C. dactylon through GC-MS study

No.	RT	Name of the compound	Molecular formula	MW	Peak Area %	Compound Nature	*Activity
1	11.35	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	296	9.40	Terpene Alcohol	Antimicrobial , Anti-inflammatory
2	12.86	Dibutyl phthalate	$C_{16}H_{22}O_4$	278	1.37	Plasticizer compound	Antimicrobial, Antifouling
3	14.63	Phytol	$C_{20}H_{40}O$	296	3.28	Diterpene	Antimicrobial, Anti-inflammatory, Anticancer Diuretic
4	18.40	Hexanedioic acid, bis(2-ethylhexyl) ester	$C_{22}H_{42}O_4$	370	3.01	Fatty acid ester	No activity reported
5	20.43	1,2-Benzenedicarboxylic acid, diisooctyl ester	$C_{24}H_{38}O_4$	390	5.93	Plasticizer compound	Antimicrobial, Antifouling
6	21.29	1-Iodo-2-methylundecane	$C_{12}H_{25}I$	296	0.91	Iodo compound	Antimicrobial
7	22.67	Tridecane, 1-iodo-	$C_{13}H_{27}I$	310	1.37	Iodo compound	Antimicrobial
8	24.21	2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E)- [Synonyms: trans-Squalene]	$C_{30}H_{50}$	410	48.36	Triterpene compound	Antibacterial, Antioxidant, Antitumor, Immunostimulant, Chemo preventive, Lipoxygenase-inhibitor, Pesticide
9	28.44	Vitamin E	$C_{29}H_{50}O_2$	430	11.13	Vitamin compound	Antiageing, Analgesic, Antidiabatic, Antiinflammatory, Antioxidant, Antidermatitic, Antileukemic, Antitumor, Anticancer, Hepatoprotective, Hypocholesterolemic, Antiulcerogenic, Vasodilator, Antispasmodic, Antibronchitic, Anticoronary
10	30.41	Stigmasterol	$C_{29}H_{48}O$	412	4.74	Steroids	Antimicrobial, Anticancer Anti-inflammatory, Anti asthma, Diuretic, Antiarthritic
11	31.58	á-Sitosterol	$C_{29}H_{50}O$	414	10.49	Steroids	Antimicrobial Anticancer Anti-inflammatory Anti asthma, Diuretic Antiarthritic

Source:Dr.Duke's: Phytochemical and Ethnobotanical Databases

Figure 1. (a) Mass spectra and (b) structure of the trans - squalene compound



Note: (a) Mass spectra and (b) linear structure of the trans-squalene compound 2,6,10,15,19,23-hexamethyl-, (all-E) browsed from the NIST library.

Around eleven compounds were browsed from the GC/MS spectral data developed through the plant extract. According to the results, most of the compounds identified were of medicinally important. In the total ion chromatogram (TIC), the major compounds were of 3,7,11,15-Tetramethyl-2-hexadecen-1-ol, Phytol, 2,6,10,14,18,22-Tetracosahexaene, 2,6,10,15,19,23-hexamethyl-, (all-E), Vitamin E, Stigmasterol and á-Sitosterol. The activity of compounds was identified from Dr. Duke's Phytochemical and Ethnobotanical database[13] and given in Table 1. Interestingly, the trans - squalene compound 2,6,10,14,18,22-Tetracosahexaene which is having a major relative percentage among the compounds in TIC possesses pesticide activity. The structure of the compound derived from the NIST library was given in figure 1(b).

CONCLUSION

In the present study, the GC-MS study of *C. dactylon* leaf extract revealed the presence of pesticide activity compound and its percentage composition in the total ion chromatogram. The active compounds in the plant could be developed into consistently effective pesticides with additional research into triterpenoid chemistry and entomology. The future study should focus on field and laboratory research to evaluate the LC_{50} at different exposures and treatments.

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