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A Pauldasan
Department of Botany, Bishop Heber College, Tiruchirappalli, Tamil Nadu, India

I Arockiyaehil Therese
Department of Botany, Bishop Heber College, Tiruchirappalli, Tamil Nadu, India

V Anand Gideon
Department of Botany, Bishop Heber College, Tiruchirappalli, Tamil Nadu, India

Corresponding Author:
A Pauldasan
Department of Botany, Bishop Heber College, Tiruchirappalli, Tamil Nadu, India

Phytochemical screening and GC-MS studies of *Cyperus compressus* Rottb.

A Pauldasan, I Arockiyaehil Therese and V Anand Gideon

Abstract
Cyperus corymbosus Rottb. is a potential species with wide range of medicinal and pharmacological application. Apart from the medicinal values the *Cyperus* is used as an important traditional handicraft of Tamil Nadu which is famous for its Korai - a dry grass mat, *Cyperus corymbosus* has been cultivated in the few districts of Tamil Nadu naturally grown in the banks of rivers and marshy areas. In the present study, methanol extract from leaves, stem and rhizomes were analyzed for preliminary test for secondary metabolites and the chemical constitution of the rhizome extract was analyzed by Gas Chromatography Mass - spectroscopy (GC- MS). The preliminary phytochemical screening of various extracts showed the presence of secondary metabolites. GC-MS analysis of the methanol extracts of rhizome revealed the presence of twenty six chemical compounds. The major chemical compounds were n-Hexadecanoic acid and Cyclopropanepentanoic acid, 2- undecyl-, methyl ester (21.45 %) followed by Oleic acid (13.02 %), Z-8- Methyl-9- tetradecenoic (10.16 %), 4,5-di-epi-aristolochene (7.388), Trans,-13-octadecenoic (4.877 %), and least chemical compounds were 5-octadecene, Caryophyllene oxide (2.363), alfa-copaene (0.411 and ledene oxide-(II) (0.007). Thus, the study may possess *C. corymbosus* to be an important source of photochemical of immense pharmaceutical significance.

Keywords: Antimicrobial, flavonoids, rhizome, methanol and GC-MS

Introduction
Medicinal plants are the potential resource of raw materials which are used in the manufacturing of many drugs (Abishek and Saini Avinash, 2013) [1]. They play a significant role in maintaining our human health. Plant medicines are used worldwide in the traditional treatment for many diseases (Vyas *et al.*, 2011) [21]. The medicinal plants are useful for healing as well as for curing human diseases due to the presence of the phyto constituents (Vijaya Packirisamy *et al.*, 2014) [20]. Phytochemicals are biologically active, naturally occurring chemical compounds found in plants, which provide health benefits for humans further than those attributed to macronutrients and micronutrients (Harler and Blumberg, 1999). Different phytochemicals have been found to possess a wide range of activities.

The family Cyperaceae, is the third largest monocot family, consisting of an estimated 5000 species in 104 genera (Goetghebeur, 1998) [11]. They have a cosmopolitan distribution, with more concentration in tropics region of world. Sedges are grass-like flowering plants with linear leaves, parallel venation and mostly wind-pollinated flowers. Sedges are utilized for erosion control, revegetation after natural disturbances, controls soil erosion and to amend and improve soil fertility (Fagotto, 1987) [9].

Among the genus Cyperus, *C. rotundus* is a multivalent drug plant possessing phytochemicals of pharmacological properties like, analgesic, antibacterial, antidiarrheal, antidiabetic, anti-inflammatory, antioxidant, antipyretic, antisaturative, appetizer, diaphoretic, digestant, lactodepurant, thirst relieving and tranquilizing effect Several related species in Cyperus with medical values and high biomass producing capability exist. However a detailed scientific study is required to use these plants as an alternative to *C. rotundus*. The literature search reveals that still no work have been conducted on this plant species. The present study was carried out with the objective; to screen phytochemical present in leaves, stem and rhizome and phytochemical profiling of methonalic extract of rhizome using by Gas chromatography-Mass spectrum (GC-MS).

Materials and Methods

Collection and preparation of Plant Materials

The healthy plant materials of *Cyperus corymbosus* Rottb. was collected from farm land near to Nachalur village (Latitude:-10.9343 ^{O}N: Longitude:- 78.4125 ^{O}E and Altitude: 78.18m) Karur District, Tamil Nadu. Fresh leaves, stem and rhizome were rinsed several times with clean tap water to make it dust and debris free. Then the plant parts were dried in the shady condition at the room temperature for 15 days until they become crispy while still retaining the brownish coloration. Dried leaves, stem and rhizome were ground in electric chopper and made into coarse powder, stored in an air tight container. The dried samples were subjected to size reduction to a coarse powder by using dry grinder and passed through a sieve. 50 grams of air-dried plant material was subjected to extraction by soxhlet apparatus with Methanol. Plant extracts were stored in sterile conical flasks for further analysis.

Phytochemical Screening

Phytochemical screening of eluted samples were subjected to identify different secondary metabolites alkaloids, glycosides, flavonids, lignin, steroids, saponins, phenolic acid, terpenoids and taniins lignin, phenols and steroids, flavonoids, glycosides, terpenoids and saponins and tannins as described by Harborne (1982) [12], Trease and Evans (1989) [18] and Sofowara (1993) [17].

GC - MS Analysis

The rhizome extract was used for GC-MS analysis. The Clarus 500 GC-MS used in the analysis employed a fused silica column packed with Elite-1 (100% dimethyl poly siloxane, 30nm X 0.25nm ID X 1 m df) and the components were separated using Helium as carrier gas at a constant flow rate of 1ml/min. The 2 µl sample extract injected into the instrument was detected by the Turbo gold mass detector (Perkin Elmer) with the aid of the Turbo mass 5.1 software. During the 36th minute GC-MS extraction process, the oven was maintained at a temperature of 110 ^{0}C with 2 minutes holding. The injector temperature was set at 2500C (mass analyzer). The different parameters involved in the operation of the clarus 500 GC-MS were also standardized (Inlet temperature: 2000C; Source temperature: 2000C). Mass spectra were taken at 70 eV; a scan interval of 0.5 s and fragments from 45 to 450 Da. The MS detection was completed in 36 minutes. The detection employed the NIST Ver. 2.0 – year 2012 library. The relative percentage of each extract constituents was expressed as percentage with peak area. The name, molecular formula and weight of the compounds of the test samples were ascertained.

Results and Discussion

Phytochemical Analysis

Methanol extracts of the Stem, leaves and rhizome of *C.corymbosus* showed the presence of alkaloids, glycosides, lignin, saponins, tannins and phenolic compounds Table 1. The methanol extracts of stem showed the presence of alkaloids, glycosides, flavoinds, lignin, sterols, and tannins. On the other hand, methanol extracts of leaf showed the presence of alkaloids, saponins and phenols. The other compounds such as glycosides, flavonids, lignin, steroids and terpenoids were absent. In case of rhizome, methanolic extracts showed the presence of alkaloids, flavonoids, steroids, phenols, terpenoids and tanins. The compounds like glycosides, flavoinds and lignin were absent in rhizome extract. Phenolics acid possesses diverse biological activities, for instance, antiulcer, anti- inflammatory, antioxidant (Silvaet *et al.*, 2007), cytotoxic and antitumor, antispasmodic, and antidepressant activities (Ghasemzadeh *et al.*, 2010) [10]. Alkaloids are heterocyclic indole compounds which have proved to be having pharmacological properties such as hypotensive activity (Ali and Ghatak, 1975) [2], anticonvulsant activity (Singh and Kapoor, 1980) [16], antiprotozoal, antimicrobial and antimalarial activities (Frederich, 2002) [8]. Tannin and flavonoid are thought to be responsible for antidiarrheal activity (Enzo, 2007) [7]. Usman and Osuji reported that tannin has been widely used topically to sprains, bruises and superficial wounds as such. Saponins which are one of the active constituents involved in plant disease resistance because of their antimicrobial activity (Barile *et al.*, 2007) [8] Traditionally, saponins are subdivided into triterpenoid and steroid glycoside. Tannins are phenolic compound which act as primary antioxidants or free radical scavengers (Ayoola *et al.*, 2008) [3].

GC-MS Analysis

The components present in the methanol extract of plant of *Cyperus corumbosus* rhizome were identified by GC-MS analysis (Figure 1). The active principles with their retention time (RT), molecular formula, molecular weight (MW), peak area and concentration of peak area (%) in the ethanol extract of plant of *C. corymbosus* rhizome are presented in the Table 2.

GC-MS chromatogram of the methanol extract of *Cyperus corymbosus* tubers evealed the presence of 26 chemical constituents. The major components prevailing in the methonal rhizome extract was identified as n-Hexadecanoic acid was known to posseses the anti- inflammatory activity (Hema nidugala *et al*., 2015) n-Hexadecanoic acid (21.456%) followed by Cyclopropanepentanoic acid, 2-undecyl-, methyl ester, trans-(21.456%), Oleic acid(13.026%),Z-8-Methyl-9-tetradecenoic acid (10.169%), 4,5-di-epiaristolochene (7.388%),Oleic acid(5.372%),2H-Benzocyclohepten-2-one, 3,4,4a,5,6,7,8,9-octahydro-4a-methyl(4.685%), trans-13-Octadecenoic acid(4.877%),Spiro[4.5]dec-7-ene,1,8-dimethyl-4-(1-methylethenyl)-,[1S-(1.alpha.,4.beta.,5(3.576%), Caryophyllene oxide(2.363%),5-Octadecene, (E)- (2.363%),Ledene oxide-(II)(2.022%),1H-Cycloprop[e]azulene, 1a,2,3,4,4a,5,6,7b- octahydro-1,1,4,7-tetramethyl(0.889%), Guaia-1(10),11-diene (0.651%), (-)-.alpha.- Panasinsen (0.055%),alfa.-Copaene(0.411%), 2(3H)-Naphthalenone, 4,4a,5,6,7,8- hexahydro-4,4a-dimethyl-6-(1-(0.369%),Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester (0.344%), Octadecanoic acid(0.344%),Oleic Acid (0.311%),1,12-Tridecadiene(0.311%), Tricyclo[20.8.0.0(7,16)]triacontane, 1(22),7(16)-diepoxy-(0.129%), Hexadecanoic acid, 15-methyl-, methyl ester(0.129%), Ledene oxide-(II)(0.007%), Ledene oxide-(III)(0.007%),9,12,15- Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester,(0%).

Among the identified phytochemicals, Hexadecanoic acid and oleic acid has antioxidant, hypochloesterolemic, nematicide, pesticide, lubricant, anti- androgenic, hemolytic and 5- α reductase inhibitor. Oleic acid has 5-α reductase inhibitor, allergenic, anti-inflammatory, anti-androgenic, cancer preventive, anemiagenic, anti-alopecic, anti-leukotriene-D4, choleretic, dermatitigenic, hypocholestrolemic, insectifuge, perfumery, propecic and flavour (Mendoza *et al*., 2002 and Elezabath and Arumugam, 2014) [14, 6]. Linolenic acid has anti-inflammatory, Insectifuge, hypochloesterolemic, cancer

preventive, nematicide, hypatoprotective, anti-histaminic, anti-androgenic, anti- eczemic, anti-acen, 5- α reductase inhibitor, anti-arthritic and anti-coronary (Duke, 1992-1996) [5].

Table 1: Preliminary phytochemical screening methonal extract of *C corymbosus*

Phytochemical/Parts	Stem	Leaf	Rhizome
Alkolides	+	+	+
Glycosides	+	-	-
Falvonids	+	-	
Lignin	+	-	-
Steroids	+	-	+
Saponins	-	+	-
Phenols	-	+	+
Terpenoids	-	-	+
Tannins	+	-	+

(+) Present :(-) Absent

Table 2: The chemical compounds present in methonal rhizome extract of *C. corymbosus*

S. No.	Chemical name	Chemical Formula	Molecular Wt	Peak Area (%)	Retention Time (min)
1.	9,12,15-Octadecatrienoic acid, 2,3-bis(acetyloxy)propyl ester,	$C_{25}H_{40}O_6$	436	0	7.934
2.	.alfa.-Copaene	$C_{15}H_{24}$	204	0.411	14.078
3.	1H-Cycloprop[e]azulene, 1a,2,3,4,4a,5,6,7b-octahydro-1,1,4,7-tetramethyl	$C_{15}H_{24}$	204	0.889	14.697
4.	Spiro[4.5]dec-7-ene, 1,8-dimethyl-4-(1-methylethenyl)-, [1S-(1.alpha.,4.beta.,5	$C_{15}H_{24}$	204	3.576	16.583
5.	4,5-di-epi-aristolochene	$C_{15}H_{24}$	204	7.388	17.232
6.	Guaia-1(10),11-diene	$C_{15}H_{24}$,	204	0.651	17.567
7.	(-)-.alpha.-Panasinsen	$C_{15}H_{24}$	204	0.055	18.450
8.	2H-Benzocyclohepten-2-one, 3,4,4a,5,6,7,8,9-octahydro-4a-methyl	$C_{12}H_{18}O$	178	4.685	19.489
9.	Caryophyllene oxide	$C_{15}H_{24}O$	220	2.363	20.767
10.	5-Octadecene, (E)-	$C_{18}H_{36}$	252	2.363	21.345
11.	Ledene oxide-(II)	$C_{15}H_{24}O$	220	2.022	23.473
12.	Ledene oxide-(II)	$C_{15}H_{24}O$	220	0.007	24.171
13.	Ledene oxide-(II)	$C_{15}H_{24}O$	220	0.007	24.601
14.	2(3H)-Naphthalenone, 4,4a,5,6,7,8-hexahydro-4,4a- dimethyl-6-(1-	$C_{15}H_{22}O$	218	0.369	26.722
15.	Tricyclo[20.8.0.0(7,16)]triacontane, 1(22),7(16)- diepoxy-	$C_{30}H_{52}O_2$	444	0.129	28.267
16.	Hexadecanoic acid, 15-methyl-, methyl ester	$C_{18}H_{36}O_2$	284	0.129	29.461
17.	Oleic Acid	$C_{18}H_{34}O_2$	282	13.026	30.485
18.	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	21.456	31.050
19.	Cyclopropanepentanoic acid, 2-undecyl-, methyl ester, trans-	$C_{20}H_{38}O_2$	310	21.456	32.770
20.	Oleic Acid	$C_{18}H_{34}O_2$,	282	5.372	34.244
21.	Octadecanoic acid	$C_{18}H_{36}O_2$	284	0.344	34.573
22.	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl)ethyl ester	$C_{19}H_{38}O_4$	330	0.344	35.554
23.	Z-8-Methyl-9-tetradecenoic acid	$C_{15}H_{28}O_2$	240	10.169	36.276
24.	Oleic Acid	$C_{18}H_{34}O_2$,	282	0.311	37.463
25.	1,12-Tridecadiene	$C_{13}H_{24}$	180	0.311	39.213
26.	trans-13-Octadecenoic acid	$C_{18}H_{34}O_2$	282	4.877	40.480

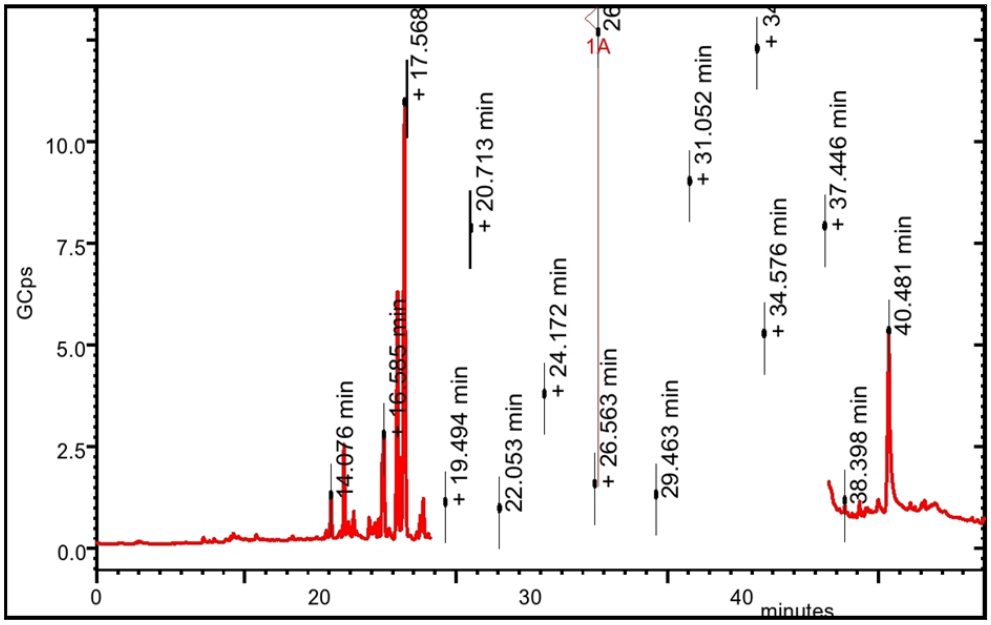

Fig 1: GC-MS chromatogram of the methanol rhizome extract of *C. corymbosus*

Conclusion

Several other compounds were detected through GC- MS chromatogram having notable medicinal property. Thus this type of GC-MS analysis is the first step towards understanding the nature of active principles in the medicinal plants and this type of study will be helpful for further detailed study According to our results, it could be concluded that the rhizome of *C. corymbosus* has various compounds. However, isolation of individual phytochemical constituent and subjecting it to biological activity that may have lead to the popular use of these species in medicine.

References

1. Abhishek, Saini Avinash. Evaluation of Physiochemical Screening and Standardization on the Root of *Rotula aquatic* Lour. Indian Journal of Pharmaceutical and Biological Research 2013;1:63-68.
2. Ali MM, Ghatak BRJ. Indian Journal of Expermental Biology 1975;13:163.
3. Ayoola GA, Coker HAB, Adesegun SA, Adepoju–Bello AA, Obaweya K, Ezennia EC, *et al*. Phytochemical screening and antioxidant activities of some selected medicinal plants used for malaria therapy in South Western Nigeria. Tropical Journal of Pharmaceutical Research 2008;7(3):1019-1024.
4. Barile E, Bonanomi G, Antignani V, Zolfaghari B, Ebrahim Sajjadi S, *et al*. Saponins from Allium minutiflorum with antifungal activity Phytochemistry. 2007;68:596-603.
5. Duke's Phytochemical and Ethnobotanical Databases U.S. Department of Agriculture, Agricultural Research Service, 1992-1996.
6. Elezabeth VD, Arumugam S. GC – MS analysis of ethanol extract of *Cyperus rotundus* leaves. International Journal of Current Biotechnology 2014;2(1):19-23.
7. Enzo AP. Traditional plants and herbal remedies used in the treatment of diarrheal disease: Mode of action, quality, efficacy and safety considerations. In: Ahmad I, Aqil F, Qwais M, Modern Phytomedicine Turning Medicinal Plants in to Drugs. WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim, 2007, 248-260.
8. Frederich M, Jacquier MJ, Thepenier P, De Mol P, Tits M, Philippe G, *et al*. journal of Natural Products 2002;65:1381.
9. Fagotto F. Sand-dune fixation in Somalia. Environm. Conservation 1987;14:15-163.
10. Ghasemzadeh A, Jaafar HZE, Rahmat A. Antioxidant activities, total Phenolics and flavonoids content in two varieties of Malaysia Young Ginger (*Zingiber officinale* Roscoe). Molecules 2010;15:4324-4333.
11. Goetghebeur P. Cyperaceae. In: K.Kubitzki, the families and genera of vascular plants 1998;4:164.
12. Harborne JB. Phytochemical methods, London. Chapman and Hall, Ltd. 1982, 49-188.
13. Hasler CM, Blumberg JB. Symposium on Phytochemicals: Biochemistry and Physiology. Journal of Nutrition 1999;129:756S-757S.
14. Mendoza L, Tapia L, Wilkens M, Urzúa A. Antibacterial activity of 13-epi-sclareol, a labdane type diterpene isolated from *Pseudognaphalium heterotrichium* and *P. cheiranthifolium* (Asteraceae). Boletín de la Sociedad Chilena de Química 2002;47(2):91-98.
15. Silva EM, Souza JNS, Rogez H, Rees JF, Larondelle Y. Antioxidant activities and polyphenolic contents of fifteen selected plant species from the Amazonian region. Food Chemistry 2007;101:1012-18.
16. Singh H, Kapoor VK. Planta Med 1980;38:133.
17. Sofowara A. Medicinal plants and Traditional medicine in Africa. Spectrum Books Ltd, Ibadan, Nigeria 1993, 289.
18. Trease GE, Evans WC. Pharmacognsy. 11th edition. Brailliar Tiridel Can. Macmillian publishers, 1989.
19. Usman H, Osuji JC. Phytochemical and *in vitro* antimicrobial assay of the leaf extract of Newbouldia leavis. African Journal of Traditional, Complementary and Alternative Medicines 2007;4(4):476-480.
20. Vijaya Packirisamy, Vijayalakshmi Krishna Moorthy. Antibacterial and Phytochemical Evaluation of *Pergularia daemia* from Nagapattinam region, International Journal of Scientific and Research Publications 2104;4:1-6.
21. Vyas BA, Vyas RB, Joshi SV, Santani DD. Antiurolithiatic Activity of Whole-Plant Hydroalcoholic Extract of *Pergularia daemia* in Rats. Journal of Young Pharmacist 2011;3(1):36-40.