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PHYTOCHEMICAL INVESTIGATION OF CYPERUS ALOPECUROIDES ROTTB. LEAVES EXTRACT

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Abstract: The main objective of the present study is to investigate the chemical constituents present in the leaves extract of *Cyperus alopecuroides* Rottb. by phytochemical screening and Gas Chromatography Mass Spectrometry. The methanolic extract of leaves of Cyperus alopecuroides Rottb. is assess for phytochemical screening which revels the presence of various useful phytochemicals like Glycosides, tannins, flavonoids, alkaloids, terpenoids etc. Also extract was investigated by Gas Chromatography- Mass Spectrometry which shows the presence of various bio active chemical constituents like (-)-.beta.-Bourbonene, (3Z)-Cembrene-A, (-)-.beta.-caryophyllene, bicyclo[3.3.1] nonan-1-ol, (2E,5E)-7-ehydroxyocta-2,5-dien-4-one, 3-dodecylcyclohexan-1-one, 3-(4-pivaloxybutyl) cyclohexanone, etc.

KEY WORDS: Methanolic Extract, Gas Chromatography-Mass Spectrometry, Phytochemical Screening.

INTRODUCTION

As we see with animals, plants also produce a wide variety of chemical compounds, which is called as metabolites, as part of their normal life processes. These compounds perform different functions. For example, some are protective against disease or predators while some enable plants to store energy in the form of sugar.

Primary metabolites include compounds such as carbohydrates and lipids - substances essential to the structure and life of the plant, as well as essential for human nutrition. Carbohydrates are largely made up of sugars - saccharides. Glucose and fructose are examples of monosaccharides - they consist of a single saccharide molecule. Polysaccharides consist of several saccharide molecules linked together. Lipids - commonly known as fats - provide a reservoir of fuel for cells. They also form a major component of cell membranes in both plants and animals. A group of lipids known as

fatty acids are important for human health. There are some fatty acids that the body cannot produce, and which must be sourced through the diet. These are known as essential fatty acids. Using the primary metabolites, plants produce secondary metabolites, which are largely responsible for the plant's individual properties such as aroma, flavour, colour and medicinal actions. Secondary metabolites include terpenes, polyphenols, alkaloids and some glycodsides. The medicinal actions of herbs are largely due to these groups of chemicals.

Secondary metabolites include antioxidants, which defend the body against the effects of reactive free radicals. A large group of secondary metabolites known as terpenes provide us with many medicinal compounds, such as anti-inflammatory agents, expectorants and sedatives. The carotenoids - precursors of vitamin A – belong to the terpene group of compounds. Flavonoids - an important sub group of polyphenols - contain a number of important antioxidant compounds. In addition, certain of them are known to protect against heart disease and cancer.

Cyperus alopecuroides is sedge of the Cyperaceae family that is native to Australia. (Flora Base. Western Australian Government Department of Parks and Wildlife). In Western Australia it is mostly found near to the lakes and wetlands in the eastern Kimberley region.

Mahmoud I. Nassar et al (2002) isolated benzoquinone, named alopecuquinone, from the ethanol extract of the inflorescences of *Cyperus alopecuroides.* Its structure was mainly elucidated by spectroscopic analysis including 1H, 13C NMR, APT, HMQC, 1H–1H COSY and CIMS. The known flavonoids, vicenin 2, orientin, diosmetin, quercetin 3,3′-dimethyl ether and its 3,4′-dimethyl ether, were also isolated and analyzed. The ethanol extract of the plant material reveals moderate estrogenic activity using a strain of *Saccharomyces cerevisiae*.[1]

MATERIALS AND METHOD:

COLLECTION OF PLANT MATERIALS:

The fresh plants were collected from the Bakadari area of village Bela of Melghat region of Amravati District (Maharashtra). Amravati district is a district of Maharashtra state in central India. The species were collected during the period of flowering and fruiting of the plant.

Leaves are then separated and dried over ambient temperature. Further the dried sample was grind properly and dried powder sample was extracted in Methanol at 65ºC, by using Soxhlet apparatus and

extracts was concentrated by gradually evaporating the solvent on rotary evaporator. The concentrated extract was collected in sterile bottle and kept in a cool and dark place prior to analysis.[2]

The further investigation was carried out by phytochemical screening of methanolic extract of studied plant using various methods. Also GC-MS analysis was carried out to investigate the presence of Bio-active chemical constituents.

RESULTS AND DISSUCION:

PHYTOCHEMICAL SCREENING:

When the phytochemical screening of methanolic extracts of leaves of *Cyperus alopecuroides* Rottb. is carried out, it shows the presence of various phytochemicals like glycosides, saponins, alkaloids, tannins, proteins, free amino acid, carbohydrate, phytosterols/terpenoid, Phenol, coumarins and chalcones.[3-9].

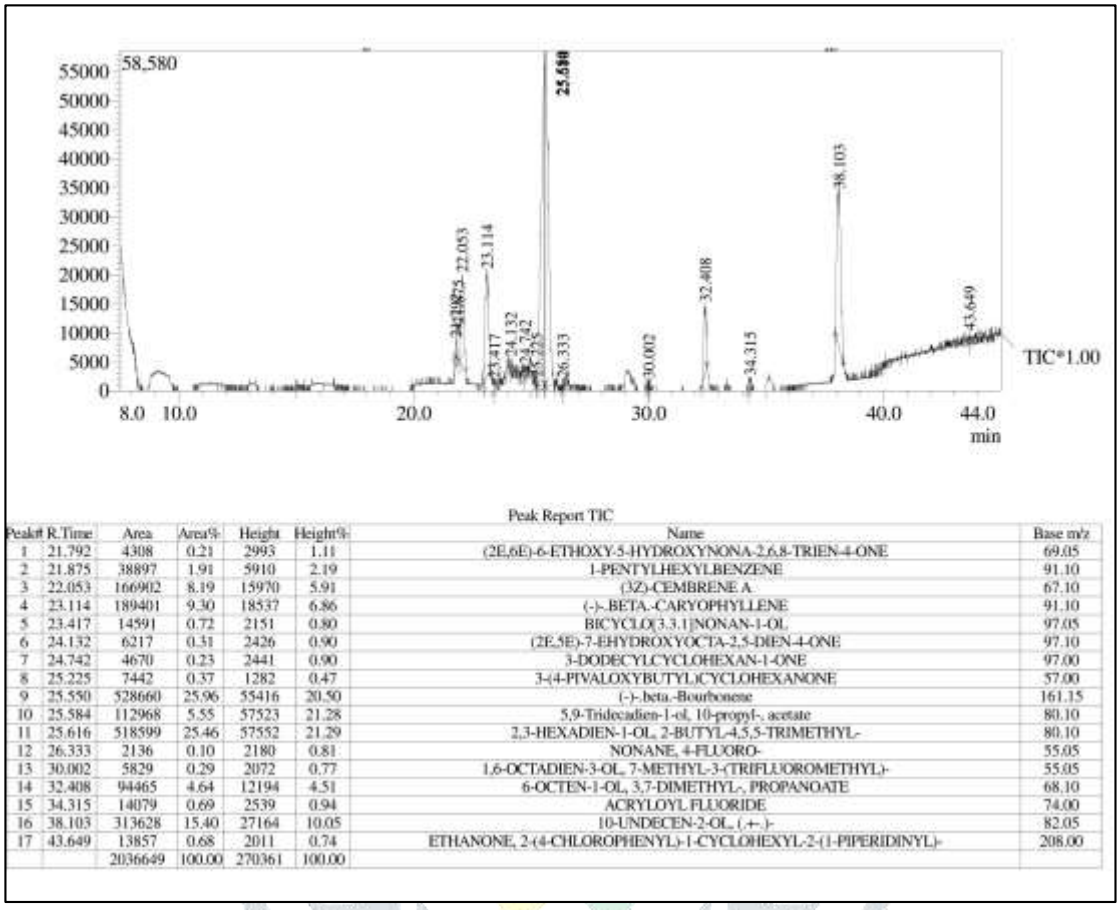
The results of phytochemical screening of methanolic extract of *Cyperus alopecuroides* are summarized in table no. 1

Table 1: Phytochemical Screening of Leaves Extract of Cyperus alopecuroides Rottb.

Sr. No.	Phytochemical	Test Performed	Observations
			Leaves
1	Glycosides	Legal's Test	+
2	Saponins	Foam Test	++
3	Alkaloids	Hager' Test	++
		Mayer's Test	++
		Wagner's Test	++
		Dragen Droff's	++
4	Flavonoids	Ferric Chloride Test	-
		Lead Acetate Solution Test	++
5	Tannins	Gelatine Test	++
6	Proteins	Biuret Test	+
		Xanthoproteic Test	+
7	Free Amino Acid	Ninhydrin	+
8	Carbohydrate	Molisch's Test	+
		Fehling's Test	+
9	Phytosterols/ Terpenoid	Salkowski's Test	++
		Liebermann Burchard's Test	++
10	Phenols	Ferric Chloride Test	++
11	Coumarins		++
12	Chalcones		+

GAS-CHROMATOGRAPHY-MASS SPECTROMETRY (GC-MS):

When GC-MS analysis of methanolic extract of leaves of *Cyperus alopecuroides* Rottb. is carried out. The mass spectra on comparion with NIST & WILEY libraries revels the presence of various important bio active chemicals which contributes to the medicinal activities like antimicrobial, antioxidant, anti-inflammatory as per graph 1, which are noted in the table 2.

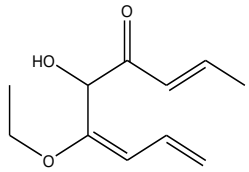
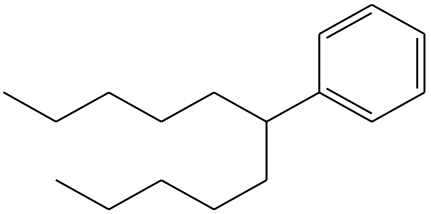
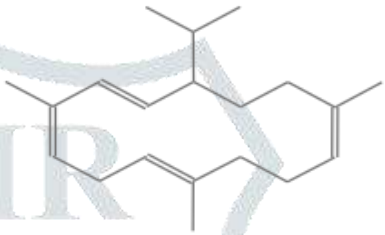
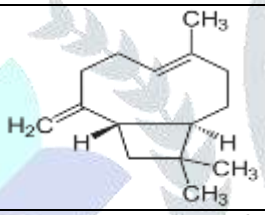
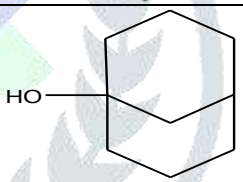
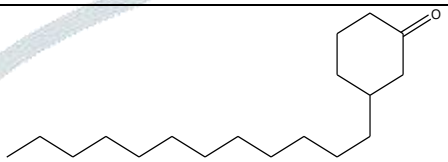
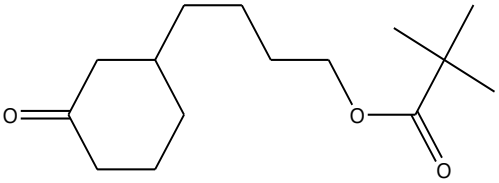
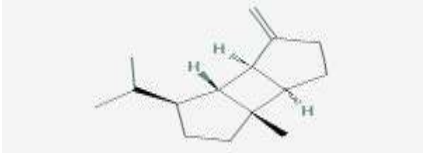


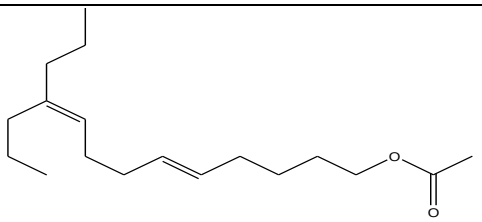
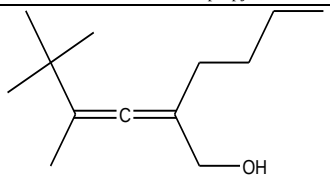
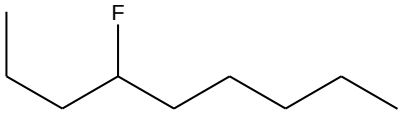
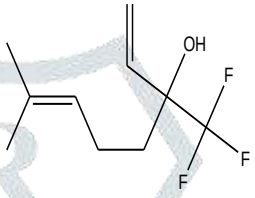
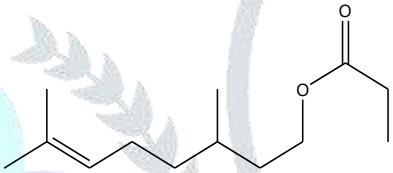
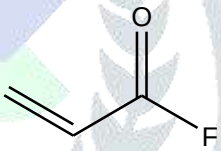
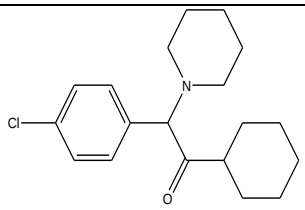
Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Height%	Name	Base m/z
1	21.792	4308	0.21	2993	1.11	(2E,6E)-6-ETHOXY-5-HYDROXYNONA-2,6,8-TRIEN-4-ONE	69.05
2	21.875	38897	1.91	5910	2.19	1-PENTYLHEXYLBENZENE	91.10
3	22.053	166902	8.19	15970	5.91	(3Z)-CEMBRENE A	67.10
4	23.114	189401	9.30	18537	6.86	(-)-.BETA.-CARYOPHYLLENE	91.10
5	23.417	14591	0.72	2151	0.80	BICYCLO[3.3.1]NONAN-1-OL	97.05
6	24.132	6217	0.31	2426	0.90	(2E,5E)-7-EHYDROXYOCTA-2,5-DIEN-4-ONE	97.10
7	24.742	4670	0.23	2441	0.90	3-DODECYLCYCLOHEXAN-1-ONE	97.00
8	25.225	7442	0.37	1282	0.47	3-(4-PIVALOXYBUTYL)CYCLOHEXANONE	57.00
9	25.550	528660	25.96	55416	20.50	(-)-.beta.-Bourbonene	161.15
10	25.584	112968	5.55	57523	21.28	5,9-Tridecadien-1-ol, 10-propyl-, acetate	80.10
11	25.616	518599	25.46	57552	21.29	2,3-HEXADIEN-1-OL, 2-BUTYL-4,5,5-TRIMETHYL-	80.10
12	26.333	2136	0.10	2180	0.81	NONANE, 4-FLUORO-	55.05
13	30.002	5829	0.29	2072	0.77	1,6-OCTADIEN-3-OL, 7-METHYL-3-(TRIFLUOROMETHYL)-	55.05
14	32.408	94465	4.64	12194	4.51	6-OCTEN-1-OL, 3,7-DIMETHYL-, PROPANOATE	68.10
15	34.315	14079	0.69	2539	0.94	ACRYLOYL FLUORIDE	74.00
16	38.103	313628	15.40	27164	10.05	10-UNDECEN-2-OL, (+-)-	82.05
17	43.649	13857	0.68	2011	0.74	ETHANONE, 2-(4-CHLOROPHENYL)-1-CYCLOHEXYL-2-(1-PIPERIDINYL)-	208.00
		2036649	100.00	270361	100.00		

Graph 1 : GC-MS of Leaves Extract of Cyperus alopecuroides Rottb.

Table 2. GC-MS Analysis of Leaves Extract of Cyperus alopecuroides Rottb

Sr. No	Retention Time	Area %	Name	Structure
1	21.792	0.21	(2E,6E)-6-Ethoxy-5-hydroxynona-2,6,8-trien-4-one	 (2E,6E)-6-ETHOXY-5-HYDROXYNONA-2,6,8-TRIEN-4-ONE
2	21.875	1.91	1-Pentylhexylbenzene	 1-PENTYLHEXYLBENZENE
3	22.053	8.19	(3Z)-Cembrene A	
4	23.114	9.30	(-)-.Beta.-caryophyllene	
5	23.417	0.72	Bicyclo[3.3.1]nonan-1-ol	 BICYCLO[3.3.1]NONAN-1-OL
6	24.132	0.31	(2E,5E)-7-Ehydroxyocta-2,5-dien-4-one	
7	24.742	0.23	3-Dodecyl cyclohexan-1-one	 3-DODECYLCYCLOHEXAN-1-ONE
8	25.225	0.37	3-(4-Pivaloxybutyl)cyclohexanone	 3-(4-PIVALOXYBUTYL)CYCLOHEXANONE
9	25.550	25.96	(-)-.Beta.-Bourbonene	

10	25.584	5.55	5,9-Tridecadien-1-ol, 10-propyl-, acetate	 5,9-Tridecadien-1-ol, 10-propyl-, acetate
11	25.616	25.46	2,3-Hexadien-1-ol, 2-butyl-4,5,5-trimethyl-	 2,3-HEXADIEN-1-OL, 2-BUTYL-4,5,5-TRIMETHYL-
12	26.333	0.10	Nonane, 4-fluoro-	 NONANE, 4-FLUORO-
13	30.002	0.29	1,6-Octadien-3-ol, 7-methyl-3-(trifluoromethyl)-	 1,6-OCTADIEN-3-OL, 7-METHYL-3-(TRIFLUOROMETHYL)-
14	32.408	4.64	6-Octen-1-ol, 3,7-dimethyl-, propanoate	 6-OCTEN-1-OL, 3,7-DIMETHYL-, PROPANOATE
15	34.315	0.69	Acryloyl fluoride	 ACRYLOYL FLUORIDE
16	38.103	15.40	10-Undecen-2-ol, (.+-.)-	 10-UNDECEN-2-OL, (.+-.)- Caution: Stereochemical terms discarded: +
17	43.649	0.68	Ethanone, 2-(4-chlorophenyl)-1-cyclohexyl-2-(1-piperidinyl)-	 ETHANONE, 2-(4-CHLOROPHENYL)-1-CYCLOHEXYL-2-(1-PIPERIDINYL)-

CONCLUSION:

GC-MS analysis of methanolic extract of *Cyperus alopecuroides* Rottb.reveals the presence of (2e,6e)-6-ethoxy-5-hydroxynona-2,6,8-trien-4-one, 1-pentylhexylbenzene, (3z)-cembrene A, (-)-.beta.-caryophyllene, bicyclo[3.3.1] nonan-1-ol, (2E,5E)-7-ehydroxyocta-2,5-dien-4-one, 3-dodecylcyclohexan-1-one, 3-(4-pivaloxybutyl) cyclohexanone, (-)-.beta.-Bourbonene, 5,9-

Tridecadien-1-ol, 10-propyl-, acetate, 2,3-hexadien-1-ol, 2-butyl-4,5,5-trimethyl-, nonane, 4-fluoro-, 1,6-octadien-3-ol, 7-methyl-3-(trifluoromethyl)-, 6-octen-1-ol, 3,7-dimethyl-, propanoate, acryloyl fluoride, 10-undecen-2-ol, (.+-.)- and ethanone,2-(4-chlorophenyl)-1-cyclohexyl-2-(1-piperidinyl)-.

(-)-.Beta.-Bourbonene is obtained at retention time of 25.550 min. It is also known as β-bourbonene, belongs to the class of organic compounds known as sesquiterpenoids. These are terpenes with three consecutive isoprene units. Beta-Bourbonene is neutral and is reported as a flavouring agent.[10]

(-)-Beta-caryophyllene a sesquiterpene is another bioactive compound obtains in methanolic extract of leaves of *Cyperus alopecuroides* at a retention time of 23.114 minutes. It is most commonly found in many essential oils, particularly oil of cloves. It has a role as a non-steroidal anti-inflammatory drug, a fragrance, a metabolite and an insect attractant.[11]

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REFERENCES:

[1] Mahmoud, I.Nassar, Ayman F. Abdel-Razik, Ezz El-Din A M.El-Khrisy, Abdel-Aziz M.Dawidar, Amy Bystrom, Tom J Mabry. 2002. A Benzoquinone and Flavonoids from Cyperus alopecuroides, Phytochemistry. Vol 60: 385-387.

[2] Khandekar, U.S., Tippat, S.K., Ghongade, R.A. and Dudhe, K. 2015. Chemical Composition and Pharmacognestic study of crude plant extract of Vernonia elaeagnifolia. International Journal of Pharma and Bio Sciences.6(3):(B)7-15.

[3] Harborne, J.B. 1967. Comparative biochemistry of the flavonoids-VI. : Flavonoid patterns in the bignoniaceae and the gesneriaceae, Phytochemistry. Volume 6: Issue 12: 1643-1651.

[4] Harborne, J.B. 1970. Methods of Plant Analysis, Phytochemical Methods. 1-32.

[5] Harborne, J.B. 1971. Distribution and taxonomic significance of flavonoids in the leaves of the cyperaceae, Phytochemistry. Volume 10: Issue 7: 1569-1574.

[6] Harborne, J.B. 1972. Phytochemical Methods. Phenolic Compounds. 33-88.

[7] Harborne, J.B. 1973. Phytochemical methods: A guide to modern techniques of plant analysis. Edn 2, Chapman and Hall, New York, 88-185.

[8] Sofowora, A. 1993. Medicinal Plants and Traditional Medicine in Africa. Spectrum Books Ltd., Ibadan, 191-289.

[9] Evans, W.C. and Trease, G.E. 1989. Textbook of Pharmacognosy. 11th ed. Macmillian Publishers. BraillIar Tiridel Canada.

[10] Arn, H. and Acree, T.E., 1998. Flavornet: a database of aroma compounds based on odor potency in natural products. Developmentsin Food Science, Elsevier Publication. 40:27.

[11] Ju rg Gertsch, Marco Leonti, Stefan Raduner, Ildiko Racz, Jian-Zhong Chen, Xiang-Qun Xie, Karl-Heinz Altmann, Meliha Karsak, and Andreas Zimmer. 2008. Beta-caryophyllene is a dietary cannabinoid PNAS vol. 105**:** no. 269099 –9104 PHARMACOLOGY**.**