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GC-MS analysis of bioactive compounds in the entire parts of ethanolic extract of *Gomphrena globosa* Linn.

*** P Yamuna, P Abirami, M Sharmila, P Vijayashalini**

PG and Research Department of Botany, Vellalar College for Women, Thindal, Erode, Tamil Nadu, India

Abstract
29 bioactive compounds were identified in entire plant of ethanolic extract of *Gomphrena globosa* Linn. by GC-MS analysis. The major bioactive compounds are Ethylenediamine N,N,N′-trimethyl-n′-(4-piperidyl) (51.81%); 9,12,15-Octadecatrienoic acid, methyl ester (z,z,z) (9.79%); Stigmasterol (6.80%); Hexadeconic acid (5.29%); Bis(trimethylsilyl)-oxazepam (5.02%); Hexadecanoic acid, 2-hydroxy-1-[hydroxymethyl] ethyl ester (2.48%); Squalene (2.35%); 2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]- (2.07%); (cis)-2-nonadecone (2.04%); Triethoxysilanol (1.55%); Phytol,acetate (1.30%) and d-Nerolidol (1.12%).

Keywords: *gomphrena*, GC-MS, ethanolic, methyl ester, acid, 5.29%

Introduction

Medicinal plants have been used by human being since ages in traditional medicine due to their therapeutic potential and the search on medicinal plants have led to the discovery of novel drug candidates used against diverse diseases. According to the World Health Organization (WHO) in 2008, more than 80% of the world's population relies on traditional medicine for their primary healthcare needs (Pierangeli *et al*., 2009) [1]. Traditional medicine is the sum total of knowledge, skills and practices based on the theories, beliefs and experiences indigenous to different cultures that are used to maintain health, as well as to prevent, diagnose, improve or treat physical and mental illness (WHO). Various types of traditional medicine and other medical practices referred to as complementary or alternative medicine are increasingly used in both developing and developed countries. Higher plants as sources of bioactive compounds continue to play a dominant role in the maintenance of human health. Reports available on green plants represent a reservoir of effective chemotherapeutants, these are non-phytotoxic, more systemic and easily biodegradable (Vyas, 1999; Kaushik *et al*., 2002; Chaman Lal and Verma, 2006) [3, 4, 5] Plants are a rich source of secondary metabolites with interesting biological activities. In general, these secondary metabolites are an important source with a variety of structural arrangements and properties (De-Fatima *et al*., 2006) [6].

Gas Chromatography Mass Spectroscopy, a hyphenated system is a very compatible technique and the most commonly used technique for the identification and quantification purpose. The unknown organic compounds in a complex mixture can be determined by interpretation and also by matching the spectra with reference spectra. There are at least two significant advantages for using GC-MS in the analysis of herbal medicines. First with the capillary column, GC-MS has in general very good separation ability, which can produce a chemical fingerprint of high quality and secondly with the coupled mass spectral database, quantitative composition information of the herb investigated could be provided by GC-MS, which will be extremely useful for the further research for elucidating the relationship between chemical constituents in the herbal medicine and its pharmacology in further research.

The family Amaranthaceae (Amaranth family) represents the most species-rich lineage within the flowering plant order of Caryophyllales. This family contains approximately 180 genera and 2,500 species (Brown, 1810). They are widespread and cosmopolitan from the tropics to cool temperate regions. The leaves and /or roots of many species, such as beet (*Beta vulgaris*), spinach (*Spinacia oleracea*), goosefoot (*Chenopodium* spp.) and pigweed (*Amaranthus* spp.) are eaten as vegetables. The seeds of several species of *Chenopodium* and *Amaranthus* are used to make flour. Many species in the family are used as ornamentals. e.g. cock's comb (*Celosia*), amaranth (*Amaranthus*), globe amaranth (Gomphrena), blood leaf (*Iresine)*. Species of *Alternanthera* and *Tilanthera* are grown as hedge plants. Some species, such as *Dysphania ambrosioides* and *D. anthelmintica* are used as medicinal herbs.

The genus *Gomphrena* of the family Amaranthaceae has many representative species found all over the world. It is commonly known as 'Bachelor's Button / Globe Amaranth' and has been recognized in different traditional system of medicines for the treatment of various diseases of human being. The phytoconstituents present in it are flavonoids, phytosterols, phenolic, alkaloids, carbohydrates, saponins, tannins, coumarins and terpenoids which vary from one plant to another. Therefore it can be considered that these plants may possess a lot of medicinal value which may be in one way or other beneficial for human. The different parts of this plant are traditionally claimed to be used for the treatment of broad spectrum of ailment including baby gripe, oligouria, body sore, malaria, bacterial infections, jaundice, urinary problems, high cholesterol, cough, fever, diarrhea, liver disorders, kidney disorders and cooling.

Gomphrena globose Linn. Is native to Brazil, Panama and

Guatemala. It is an annual plant that grows up to 24 inches in height. The true species as magenta bracts and cultivars have colors such as purple, red, white, pink, and lilac. The plant is an erect or ascending annual herb, up to 50 cm tall, branched from the base and also above, striate or sulcate with usually thickened nodes. Inflorescence is sessile above the uppermost pair of leaves, usually solitary. Fruit is a capsule, oblong-ovoid, compressed, 2.0 by 2.4 mm. Seeds are compressed-ovoid, brown, shining, almost smooth. Its leaves and flowers have application in folk medicine, and have been used in the treatment of hypertension, diabetes, kidney problems, hoarseness, cough, bronchitis and other respiratory diseases, mainly due expectorant action, and reproductive problems, due estrogenic activity (Camejo-Rodrigues *et al*., 2003; Lans, 2006; Agra *et al*., 2007) [8, 9, 10]. Decoction of leaves is used in cough, diabetes and hypertension. Infusion of flower is used in treating oliguria and empacho.

Materials and Methods

Collection of Plant materials

The entire parts of *Gomphrena globosa* Linn. were collected from Arachalur, Erode district, Tamil Nadu, India and were authenticated by using local floras Gamble, Mathew and Botanical Survey of India, Southern Regional centre, Coimbatore, Tamil Nadu, The herbarium specimens kept in the Herbarium of PG and Research Department of Botany, Vellalar College for Women, Erode (Tamil Nadu), India.

Preparation of plant extracts

Fresh plants were collected and air-dried at room temperature and then homogenized to obtain coarse powder. The powdered samples were extracted (Mukherjee, 2002) [11] with the solvent ethanol by hot extraction using Soxhlet apparatus. The solvent free extracts were collected and stored in a vial (-4˚c) for further analysis.

Gas Chromatography-Mass Spectrometry (GC-MS) Analysis

Ethanolic extract of entire parts of *Gomphrena globosa* Linn. were analyzed for the presence of different volatile compounds by Gas chromatography-Mass spectroscopy (GC-MS) technique. GC-MS analysis of some of the potent volatile constituents present in the extracts was performed at "The South India Textile Research Association (SITRA)", Coimbatore, Tamil Nadu, India. GC analysis of the extracts was performed using a GC-MS (Model; Thermo Trace GC Ultra Ver.5.0) equipped with a DB-35MS fused silica capillary column (30m length X outside diameter 0.25 mm X internal diameter 0.25 µm) and gas chromatograph interfaced to a Mass Selective Detector (MS-DSQ-II) with XCALIBUR software. For GC-MS detection, an electron ionization system with ionization energy of -70eV was used. Helium gas was used as a carrier gas at a constant flow rate of 1ml/min and the sample injected was 1µl; Injector temperature was 250oC; Ion source temperature was 200oC. The oven temperature was programmed from 70° to 200°C at the rate of 10°C/min, held isothermal for 1minutes and finally raised to 250°C at 10°C/min. Interface temperature was kept at 250oC. The relative percentage of each extract constituent was expressed as percentage with peak area normalization.

Identification of components

The identity of the components in the extract was assigned by the comparison of their retention time and mass spectra fragmentation patterns with those stored on the computer library and also with published literatures. NIST (Mc Lafferly, 1989) [12], (Stein, 1990) [13] library sources were also used for matching the identified components from the plant material.

Result

The GC-MS analysis of ethanolic extracts of entire parts of *Gomphrena globosa* revealed the presence of twenty nine constituents. The GC-MS running time was 40.53 minutes. The GC-MS chromatogram is presented in Fig.1. The active principles with their Retention Time (RT), molecular formula, Molecular Weight (MW) and peak area are presented in the Table 1. The spectra of the compounds are matched with Wiley 9.0 and NIST libraries. The nature and uses of the phytoconstituents are presented in the Table 2 and molecular structure and its hit spectrum are depicted in the Table 3.

The identified compounds and its peak area are Ethylenediamine N,N,N′-trimethyl-n′-(4-piperidyl) (51.81%); 9,12,15-Octadecatrienoic acid,methyl ester(z,z,z) (9.79%); Stigmasterol (6.80%); Hexadeconic acid (5.29%); Bis(trimethylsilyl)-oxazepam (5.02%); Hexadecanoic acid, 2-hydroxy-1-[hydroxymethyl] ethyl ester (2.48%); Squalene (2.35%); 2-Hexadecen-1-ol, 3,7,11,15- tetramethyl-, [R-[R*,R*-(E)]]- (2.07%); (cis)-2-nonadecone (2.04%); Triethoxysilanol (1.55%); Phytol,acetate (1.30%); d-Nerolidol (1.12%); Rhodoxanthin (0.83%); Ethyl 9,12,15-Octadecatrienoate (0.81%); Nonanal (0.56%); Hexadecane (0.53%); 3,7,11,15-Tetramethyl-2-hexadecen-1-ol (0.51%); 4-Vinyl-2-methoxy-phenol (0.46%); Arizonine (0.45%); Docosane (0.45%); 3-Propoxyphthalide (0.45%); Neophytadiene (0.44%); Irgacure 184 (0.41%); Hexadecanoic acid, ethyl ester (0.40%); Dodeconic acid (0.38%); Propanenidrile, 3-(dimethylamino)- (0.34%); 6-Hepatadecyl-5,6-dihydro-2H-pyran-2-one (0.33%) and 1,2-Bis(nitromethyl) adamantine (0.32%).

Similarly Shalini *et al*., (2016) [14] reported that *Calotropis gigantea* commonly known as 'Sweta Arka' is a highly medicinal drought resistant and relatively high degree salt tolerant wild plant species of the Indian Himalayan region. Present investigation deals with the determination of bioactive constituents from the leaf and latex of *C. gigantea* using GC-MS and their comparative analysis. The GC-MS analysis revealed the presence of total 46 bioactive compounds (24 from leaves and 22 from latex) with valuable activity. Most of the compounds were found to be similar in both leaf and latex, but small variation was also observed in their chemical profile. The chemical compounds observed in latex were 1-[(T-butyl) dimethyl silyl thin] butane, 1-Hexadecyne, Hexadecane, L-Glutamic acid, Phenol-3-isoproxy5-methyl, Trocosane and Z-1, 6-Tridecadiene. Compounds identified only from the leaves were Azulene, Benalaxyl, Cisvaccenic acid, Levomenol, Profenofos, β-Tocopherol and β-Sitosterol, whereas the rest of the compounds were similar in both leaf and latex.

Zanthoxylum zanthoxyloides revealed the presence of twelve chemical constituents were identified from GC-MS analysis of the sample by Aja *et al.,* (2016) [15] which include ethylcyclohexane (0.43%), 1,3-cyclopentadiene (0.60%), 5-(1-methylethylidene) (0.91%), heptane (2.94%), octa-1,3,5,7-tetraene (1.60%), isopropyl benzene (cumene) (2.64%), 3,5-dimethylhepta-3,-dien-l-yne (6.601%), oct-2-ene (12.517%), oct-2-ene (12.62%), heptanoic acid (16.44%), hepta-3,5-dien-l-ol (30.53%), and hept-3-en-1-ol(12.17%). Result obtained showed that the leaf extract of *Zanthoxylum zanthoxyloides* has hepta-3, 5-dien-l-ol (30.53%) as the highest and ethylcyclohexane (0.43%) as the lowest chemical compound. These relative diverse chemical constituents may be responsible for the medicinal properties of *Zanthoxylum zanthoxyloide* leaf.

A total of 62 phytochemicals were detected in the leaves of the six species analyzed by Vinod *et al*., (2016) *Rumex dentatus* (17), *Achyranthus aspera* (26), *Alternanthera philoxeroides* (12), *Lantana camara* (20), *Erigeron bonariensis* (19) and *Sesbania bispinosa* (17). The major compounds detected were androstan-3-ol, 9-methyl-(3 beta, 5 alpha) (R. dentatus), 2-propenoic acid, 3phenyl-methyl ester, cinnamic acid methyl ester (A. aspera), benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-methyl ester (A. philoxeroides), olean18-en-28-oic acid, 3-oxo-methyl ester methyl moronate (L. camara), 1-alpha-18 O-1, 25-dihydroxycholecalciferol (E. bonariensis) and glaucic acid (S. bispinosa). Plant as a source of herbal medicine is the oldest form of medicine known to mankind. It was the mainstay of many earlier civilization and still the most widely practiced form of medicine in the world currently. The GS-MS analysis of the leaf extract of *Spilanthes uliginosa* (Sw) was investigated by Uraku (2016) [18]. The analysis revealed the presence of six peaks from the chromatogram which showed six phytocompounds. The major phytocompounds identified in the leaf extract are hexadecanoic acid (8.68%), hepta-9, 10, 11-trienoic acid (19.36%), octadecenoic acid (8.14%), 5-hydroxylmethyl heptadecane (14.02%), docosane aldehyde (41.72%) and 1-ethoxyoctadecane (8.08%). The presence of these assorted chemicals may be responsible for the beneficial potentials of *Spilanthes uliginosa* (Sw) in tradomedicine.

Mohamed Saleem *et al*., (2017) [19] reviewed that the various phytoconstituents present in the unexplored plant *Rostellularia diffusa* (Willd.)Totally 40 compounds were identified and the chromatograph showed 40 peaks with 40 individual compounds. The major constituents were identified in the extract were 16-Hentriacontanone (22.59%), Hexadecanoic acid (11.23%), Stigmast-5-en-3-ol (6.78%), 9-Octadecenoic acid (6.30%) and many other compounds were identified as low level. This preliminary study gives an idea to isolate the major active constituents present in the plant and also helps to develop potential pharmacologically active compounds. Tulika and Mala (2017) [20] aimed to study the phytochemical screening from *Pistia stratiotes* L. and *Eichhornia crassipes* (Mart.) Solms and analysis of components present in it by gas chromatography-mass spectrometry (GC-MS). The plants were sequentially extracted in different solvents viz., ethanol, methanol, ethyl acetate, petroleum ether, chloroform, acetone, hexane, aqueous, and 1%HCl. The ethanolic crude extract of weed, *Pistia stratiotes* L. and *Eichhornia crassipes* (Mart.) Solms showed different types of high and low molecular weight compounds by GC-MS analysis. n-Hexadecanoic acid (7.18%), E-11-Hexadecenoic acid, ethyl ester (1.04%), Hexadecanoic acid, ethyl ester (13.29%), L- Glutamine (0.38%), Linolelaidic acid, methyl ester (2.41%), 9,12,15-Octadecatrienoic acid, methyl ester,(Z,Z,Z) (2.7%), Palmitic acid (12.09%), Phytol (2.12%), 9,12-Octadecadienoic acid, ethyl ester(3.79%), Linolenic acid, ethyl ester (26.26%), Stearic acid, ethyl ester (0.98%), α-Glyceryl linolenate (1.35%), Diisooctyl phthalate (53.84%), Stigmasterol (11.39%), 1-Monolinoleoylglycerol trimethylsilyl ether(1.52%). Most of the isolated and identified compounds by GC-MS in the crude extracts exhibit following bioactivities. Anticancer, Anti-inflammatory, Antimicrobial, Diuretic, Hepatoprotective, Anti-arthritic, Antiasthma, Antioxidant, Hypocholesterolemic, Nematicide, Pesticide, Lubricant, Anti-androgenic, Flavor, Hemolytic, 5-Alpha reductase inhibitor, Insectifuge, Antihistaminic, Anti-eczemic, Anti-acne, Anti-coronary, Antifouling effects so that they can be recommended as a plant of phytopharmaceutical importance. Therefore ethanol extract of *Pistia stratiotes* and *E. crassipes* proves as a potential source of bioactive compounds of pharmacological importance.

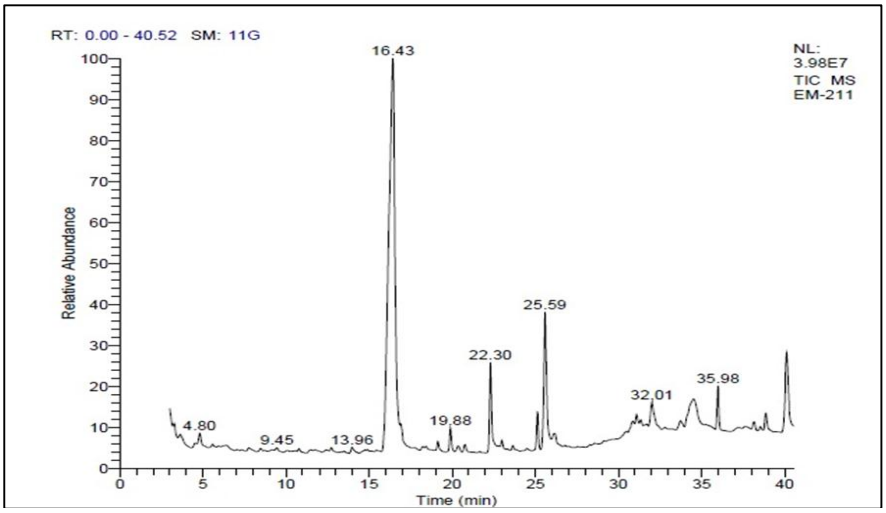


Fig 1: Chromatogram of ethanolic extract of *Gomphrena globosa* Linn.

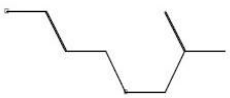
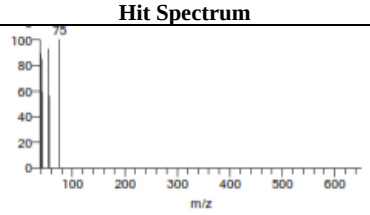
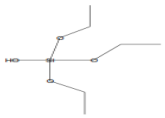
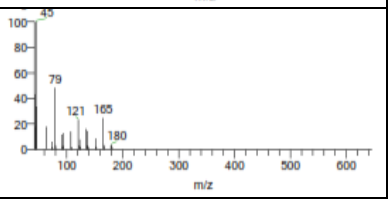
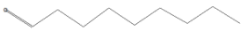
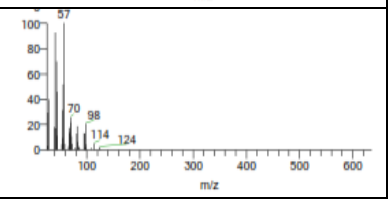
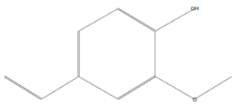
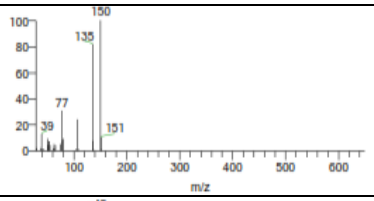
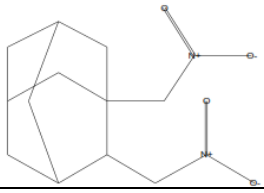
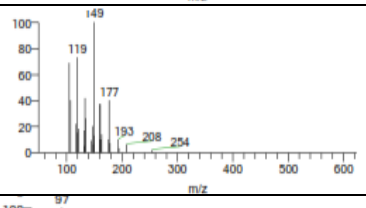
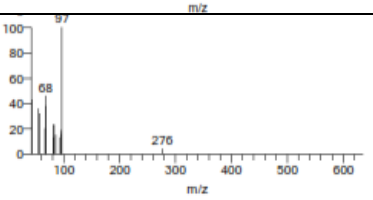
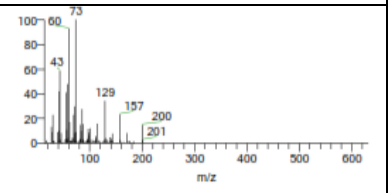
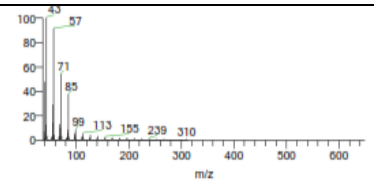
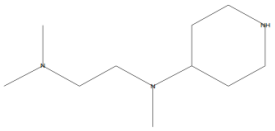
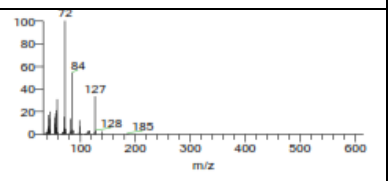
Table 1: GC MS analysis of ethanolic extract of *Gomphrena globosa* Linn.

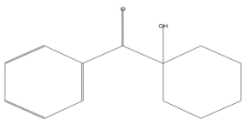
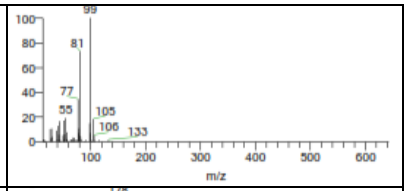
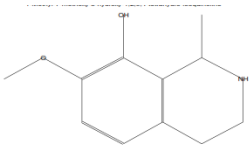
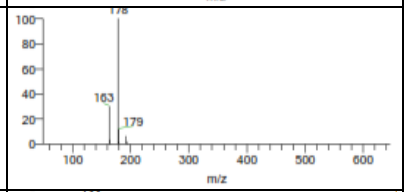
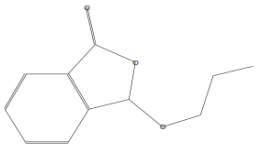
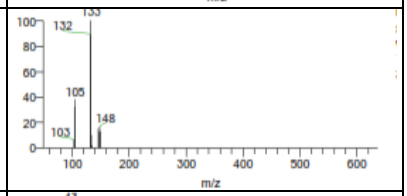
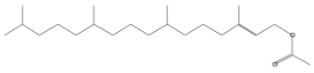
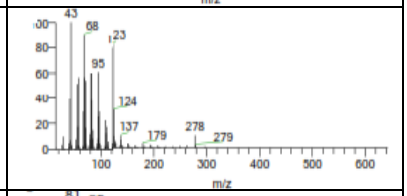
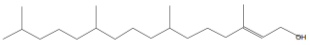
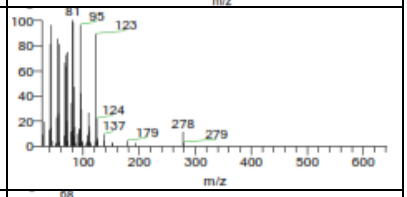
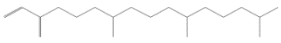
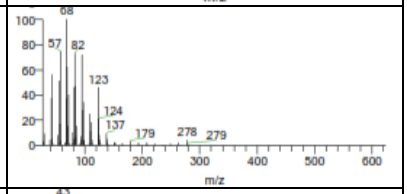
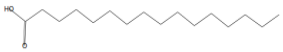
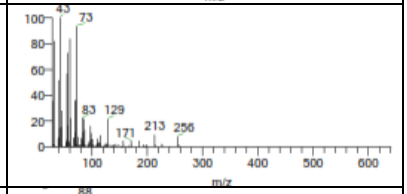
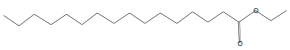
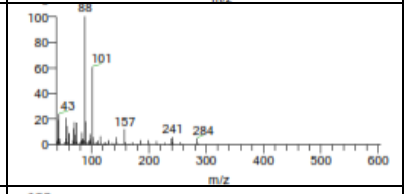
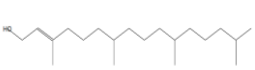
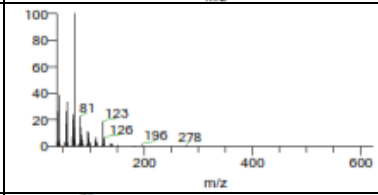
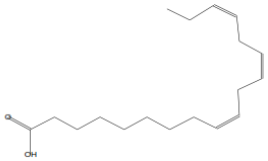
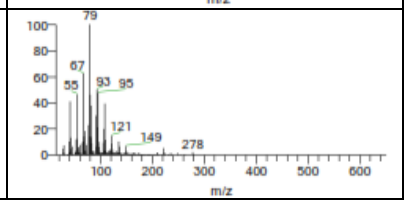
S. No.	Retention Time	Name of the Compound	Molecular Formula	Molecular Weight	Peak Area %
1	3.62	Trans-3-chloroallyl 2-methyl allyl ether	$C_7H_{11}O_{10}$	146	0.32%
2	4.80	Triethoxysilanol	$C_6H_{16}O_4Si$	180	1.55%
3	6.41	Nonanal	$C_9H_{18}O$	142	0.56%
4	9.43	4-Vinyl-2-methoxy-phenol	$C_9H_{10}O_2$	150	0.46%
5	10.59	1,2-Bis(nitromethyl)adamantine	$C_{12}H_{18}N_2O_4$	254	0.32%
6	11.78	6-Hepatadecyl-5,6-dihydro-2H-pyran-2-one	$C_{22}H_{40}O_2$	336	0.33%
7	13.96	Dodeconic acid	$C_{12}H_{24}O_2$	200	0.38%
8	14.90	Docosane	$C_{22}H_{46}$	310	0.45%
9	16.45	Ethylenediamine N,N,N′-trimethyl-n′-(4-piperidyl)-	$C_{10}H_{23}N_3$	185	51.81%
10	16.92	Irgacure 184	$C_{13}H_{16}O_2$	204	0.41%
11	18.42	Arizonine	$C_{11}H_{15}NO_2$	193	0.45%
12	19.13	3-Propoxyphthalide	$C_{11}H_{12}O_3$	192	0.45%
13	19.88	Phytol,acetate	$C_{22}H_{42}O_2$	338	1.30%
14	20.38	3,7,11,15-Tetramethyl-2-hexadecen-1-ol	$C_{20}H_{40}O$	338	0.51%
15	20.76	Neophytadiene	$C_{20}H_{38}$	278	0.44%
16	22.30	Hexadeconic acid	$C_{16}H_{32}O_2$	256	5.29%
17	22.99	Hexadecanoic acid,ethyl ester	$C_{18}H_{36}O_2$	284	0.40%
18	25.12	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]-	$C_{20}H_{40}O$	296	2.07%
19	25.59	9,12,15-Octadecatrienoic acid,methyl ester(z,z,z)-	$C_{18}H_{32}O_2$	292	9.79%
20	26.21	Ethyl 9,12,15-Octadecatrienoate	$C_{20}H_{34}O_2$	306	0.81%
21	30.50	Propanenidrile, 3-(dimethylamino)-	$C_5H_{10}NO_2$	98	0.34%
22	31.09	Hexadecanoic acid, 2-hydroxy-1-[hydroxymethyl]ethyl ester	$C_{19}H_{38}O_4$	330	2.48%
23	32.01	(cis)-2-nonadecone	$C_{19}H_{38}$	266	2.04%
24	33.72	Rhodoxanthin	$C_{40}H_{50}O_2$	562	0.83%
25	34.49	Bis(trimethylsilyl)-oxazepam	$C_{21}H_{27}ClN_2O_2Si_2$	430	5.02%
26	35.98	Squalene	$C_{30}H_{50}$	410	2.35%
27	38.16	Hexadecane	$C_{16}H_{34}$	226	0.53%
28	38.87	d-Nerolidol	$C_{15}H_{26}O$	222	1.12%
29	40.11	Stigmasterol	$C_{29}H_{48}O$	412	6.80%

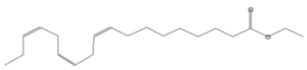
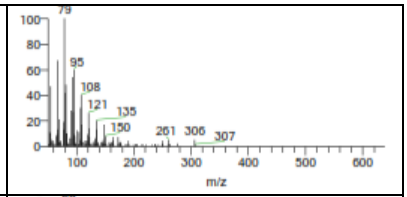
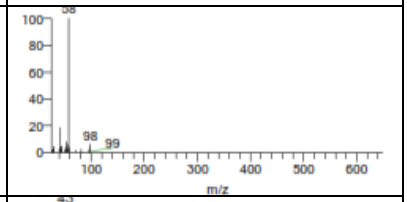
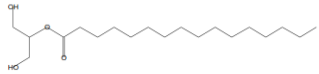
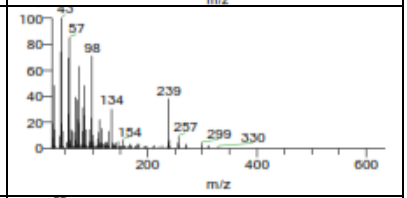
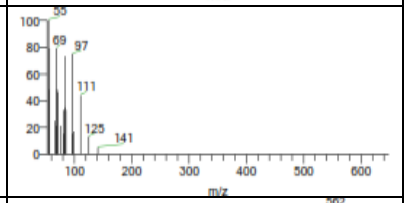
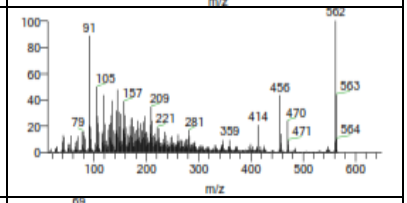
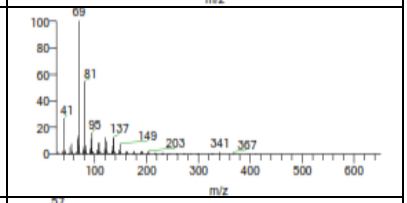
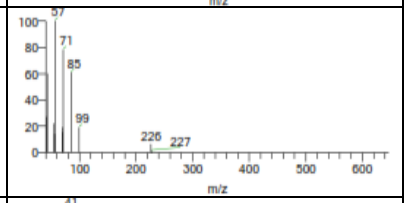
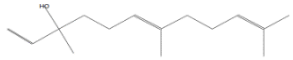
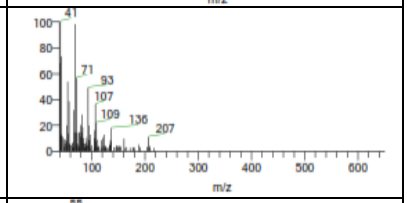
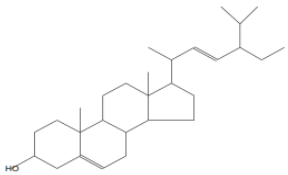
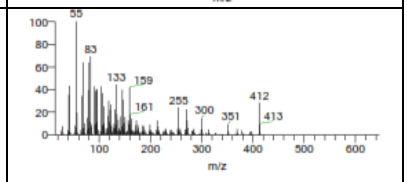
Table 2: Nature and the biological activities of phytoconstituents of ethanolic extract of *Gomphrena globosa* Linn.

S. No.	Retention Time	Peak area %	Name of the compound	Compound nature	Activity
1	3.62	0.32%	Trans-3-chloroally 2-methyl allyl ether	Ester compound	Anti-inflammatory, Fragrances
2	6.41	0.56%	Nonanal	Colourless oily liquid	Used as the compound of perfume
3	9.43	0.6%	4-vinyl-2-methoxy-phenol	Phenolic compound	Antimicrobial, Analgesic, Antioxidant, Anti-inflammatory.
4	13.96	0.38%	Dodecanoic acid	Saturated fatty acid	Treatment of acne
5	14.90	0.45%	Docosane	Hydrocarbons	Antibacterial
6	16.45	51.81%	Ethylenediamine,N,N,N′-trimethyl-N′-(4-piperidyl)	White powder	It is used as photoinitiator in UV-radiation curable technologies.
7	19.88	1.30%	Phytol,acetate	Oleic acid	Antitubercular activity against mycobacterium tuberculosis H37Rv at 500µg/mL by BACTEC460 Radiometric susceptibility assay.
8	20.76	044%	Neophytadiene	Hydrocarbons	Antipyretic, Analgesic, Anti–inflammatory, Antimicrobial, Anti-oxidant.
9	22.30	5.29%	Hexadecanoic acid	Saturated fatty acid	Anti –inflammatory
10	22.99	0.40%	Hexadecanoic acid ethyl ester	Palmitic acid ester	Anti –androgenic, Anti-oxidant, Hypocholesterlemic, Nematicide, Pesticide,5-alphareductase inhibitor, Nemolytic
11	25.12	2.07%	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]-	Phytol	Antimicrobial, Anticancer, Anti-inflammatory, Diuretic
12	25.59	9.79%	9,12,15-octadecatrienoate acid, methyl ester(Z,Z,Z)	Unsaturated fatty acid	Anti-inflammatory hypocholesterdenic, Cancer preventive hepatoprotective, nematicide, insectifuge, antihistaminic, antieczemic, anticancer, 5-alpha reductase inhibitor, antiandrogenic, antiarthristic, anticoronary, insectifuge.
13	31.09	2.48%	Hexadecanoic acid, 2-hydroxy-1-ydroxymethyl] ethyl ester	Ester	Hemolytic, pesticide, flavor, antioxidant
14	33.72	0.83%	Rhodoxanthin	Xanthophyll	Provitamin activity.
15	35.98	2.35%	Squalene	Saturated fatty acid	Anti –inflammatory, Anti –bacterial, Antitumor, Immunostimulant, Chemopresentive, Cancer preventive, Lipogenase –inhibitor Pesticide.
16	38.16	0.53%	Hexadecane	Alkane hydrocarbons	Diesel fuel
17	38.81	1.12%	d-nerolidol	Triterpene	Antimalarial, Pesticide, Antiageing, Analgesic, Antidiabatic, Anti-inflammatory, Antioxidant, Antidermatitic, Antileukemic, Antitumor, Anticancer, Hepatoprotective, Hypocholesterolemic, Antiulcerogenic, Vasodilator, Antispasmodic
18	40.1	6.80	Stigmasterol	Phytosterols	Antimicrobial, Anticancer, Antiarthritic, Antiasthma, Diuretion, Anti–inflammatory.

Table 3: The molecular structure and the molecular formula of the bioactive phytoconstituents of the ethanolic extract of *Gomphrena globosa* Linn.

S. No.	Peak Area	Name of the compound	Molecular structure	Hit Spectrum
1	0.32%	Trans-3-chloroally 2-methyl allyl ether		
2	1.55%	Triethoxysilanol		
3	0.56%	Nonanal		
4	0.6%	4-vinyl-2-methoxy-phenol		
5	0.32%	1,2-Bis(nitromethyl)adamantane		
6	0.33%	6-Hepatadecyl-5,6-dihydro-2H-pyran-2-one		
7	0.38%	Dodecanoic acid		
8	0.45%	Docosane		
9	51.81%	Ethylenediamine,N,N,N′-trimethyl-N′-(4-piperidyl)		

10	0.41%	Irgacure 184		
11	0.45%	Arizonine		
12	0.45%	3-Propoxy phthalide		
13	1.30%	Phytol, acetate		
14	0.51%	3,7,11,15-Tetramethyl-2-hexadecen-1-ol		
15	044%	Neophytadiene		
16	5.29%	Hexadecanoic acid		
17	0.40%	Hexadecanoic acid ethyl ester		
18	2.07%	2-Hexadecen-1-ol, 3,7,11,15-tetramethyl-, [R-[R*,R*-(E)]]-		
19	9.79%	9,12,15-octadecatrienoate acid, methyl ester(Z,Z,Z)		

20	0.81%	Ethyl 9,12,15-Octadecatrienoate		
21	0.34%	Propanenidrile, 3-(dimethylamino)-		
22	2.48%	Hexadecanoic acid, 2-hydroxy-1-[hydroxymethyl] ethyl ester		
23	2.04%	(cis)-2-nonadene		
24	0.83%	Rhodoxanthin		
26	2.35%	Squalene		
27	0.53%	Hexadecane		
28	1.12%	d-nerolidol		
29	6.80	Stigmasterol		

Conclusion

From the present study, it was concluded that the plant *Gomphrena globosa* is highly valuable in medicinal usage for the treatment of various human ailments along with clearly imply that the strength the chemical constituents present in it. Plants are important source of potentially useful compounds for the development of new chemotherapeutic agents.

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