



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; 6(5): 1518-1520  
Received: 27-07-2017  
Accepted: 28-08-2017

**Dauda K Richard**  
Quality Assurance Department,  
Plateau State Water Board  
P.M.B 2198 Jos, Nigeria

**John B Nvau**  
Department of Chemistry,  
Plateau State University,  
Bokkos, Nigeria

**IY Chindo**  
Department of Chemistry  
Abubakar Tafawa Balewa  
University Bauchi, Nigeria

## GC-MS and FT-IR Analysis of Methanol crude Extract of *Cyathula prostrata* Linn Blume

**Dauda K Richard, John B Nvau and IY Chindo**

### Abstract

The present study was aimed at analysis of bioactive constituent of whole plant of *Cyathula prostrata*. The methanol extracts of the plant was subjected to Fourier transform infrared spectroscopy (FT-IR) and Gas Chromatography-Mass Spectroscopy (GC-MS) analysis. GC-MS analysis of the plant extract was performed using Perkin-Elmer GC clarus 500 system and interpretation on mass spectrum GC-MS was conducted using the database of National Institute Standard Technology (NIST). The IR spectrum was recorded in the spectrophotometer (Thermo Scientific NICOL-ISS). The GC-MS analysis reveals a total of twenty-four compounds, such as Benzene (1-methyl decyl). Tetracosanoic acid methyl ester, Dibenzo[b,f][1,4] diazone, Docosanoic acid methyl ester, formic acid -3, 7, 11- tri methyl -1, 6, 10-dodecatriene-3-yl ester, cis-vaccinic acid, 1-phenol-3,4-dihydroisoquinoline. 9-octadecanoic acid (2) methyl ester and Heptacosanoic acid methyl ester. FT-IR analysis of methanol extract was carried-out and the compounds indicated shows absorption peaks at 3392cm<sup>-1</sup>(OH), 2892cm<sup>-1</sup> (C-H), 1731cm<sup>-1</sup> (C=O) 1680cm<sup>-1</sup> (C=C) and 1039cm<sup>-1</sup> (C-O). From the study, it can be concluded that phytochemicals were observed in methanol extract of *Cyathula prostrata*. Which reveals that the plant is highly valuable in medicinal usage for the treatment of various human ailment.

**Keywords:** Phytochemical profile, FT-IR, GC-MS, *Cyathula prostrata*

### Introduction

In recent years the use of plants in the management and treatment of diseases has gained considerable importance. Plants and fruits are considered as one of the main sources of biologically active compounds. An estimate of the World Health Organization (WHO) states that around 85-90% of the world's population consumes traditional herbal medicines WHO, (2002) [15]. Plants are capable of synthesizing an overwhelming variety of low-molecular weight organic compounds called secondary metabolites, usually with unique and complex structures. Many metabolites have been found to possess interesting biological activities and find applications, such as pharmaceuticals, insecticides, dyes, flavors and fragrances.

*Cyathula prostrata* (Lume).Blumeis a member of Amaranthaceae family. In Nigeria it is commonly known as "agbrigba" in igbo "Kebbe doombe" in Fulfulde, "cawere pepe" in Yoruba and "da' nka dafi" in Hausa.It is a parental herb and found in Nigeria, India, China tropical and sub-tropical region of all continents Bougnet and Daizel, (1969) [6]. The plant has various biological active secondary metabolites which confirms pharmacological and medicinal properties Anthony, *et al.*, (2016) [3].

*Cyathula prostrata* is extensively utilized traditionally for the treatment of cholera, vomiting, skin disease, dysentery, cough, leprosy, snake bites Bougnet and Daizel, (1969) [6] and Burkill, (1985) [5].

Scientifically the methanol extract of the plant has been documented to be relative non-toxic kannppan and sundaram (2009) [8]. A rich source of antioxidant agent in the fight against incidence of free radical implication in so many degenerative disease Olawale *et al.*, (2012) [13]. Anti ulcer agent Dauda (2017) [7] and anti-hypertensive herbal medicine Anthony *et al.*, (2016) [3]. This research was conducted to investigate the phytochemical constituent of methanol crude extract of *Cyathula prostrata* using FT-IR and GC-MS

### Material and Method

#### Collection of Plant material and Extraction

Fresh whole plant of *Cyathula prostrata* were collected from Umuosisi- Obizi in Mbase Local Government of Imo state Nigeria. The plant was identified through its macro morphological feature and botanical profile at the Herbarium section of forestry research institute of Nigeria Ibadan where vouches specimen FHI110263 was deposited.

The whole plants were air-dried under shade and ground into powder using mortar and pestle.

**Correspondence**  
**Dauda K Richard**  
Quality Assurance Department,  
Plateau State Water Board  
P.M.B 2198 Jos, Nigeria

Seventy- eight (78g) grams of the powdered plant sample was extracted in a soxhlet apparatus for eight (8) hours using methanol. The crude extract was evaporated with rotary evaporation under reduced pressure at 40c<sup>0</sup> and the crude extract was kept in a desiccators to dry for further analysis.

### GC-MS Analysis

Gas chromatography (GC) analysis was carried out using Agilent 6890N gas chromatography equipped with mass selective detector coupled to front injector type 1079. The chromatography was fitted with DB 5 MS capillary column (30 m x 0.25 mm i.d., film thickness 0.25 µm). The injector temperature was set at 280 °c and the oven temperature was initially at 45 °C then programmed to 300 °C at the rate of 10°C/min and finally held at 200 °C for 5 min. Helium was used as a carrier gas with the flow rate of 1.0 ML/min. One microlitre of the sample (diluted with acetone 1:10) was injected in the split mode in the ratio of 1:100. The percentage of sample was calculated by the GC peak area. GC-mass spectrometry (GC-MS) analysis of sample was equipped with JEOL GC MATE-11 HR Mass spectrometer. GC conditions where the same as reported for GC analysis and the same column was used. The mass spectrometer was operated in the electron impact mode at 70Ev. Ion source and transfer line temperature was kept at 250°C. The mass spectra were obtained by centroid scan of the mass range 40 to 1000 amu. The spectra was identified based on the comparison of their retention indices (RI), Retention time (RT), mass spectra of WILEY, NIST library data of the GC-MS system and literature data (Adams, 2009) [1].

### Fourier Transform Infra-red Spectra

IR spectrum was recorded in spectrophotometer (Thermo Scientific NICOLET-Is5). The active principle was mixed with KBr and pellet technique was adopted to record the spectra.

### Result and Discussion

In the present study, the Gc-Ms analysis of the methanol crude extract of *Cyathula prostrata* showed the presence of Twenty-four compounds. With different retention time and retention factor as showed in table 1 These compounds are known to exhibits various biological activities. Formic acid 3,7,11-trimethyl 1,6,10 -clodecatrien 3-yl ester is a preservative and Antibacterial agent Ajayi, *et al.*, (2007) [2]. Heptacosanoic acid is an antioxidant. Ajayi *et al.*, (2007) [2].

Antioxidants are molecules that inhibit the oxidation of other molecules. Oxidation reaction can produce free radical which can start chain reaction causing death of cell Nawar, (1996) [12], also phenyl-acetic acid derivative are known for their Antioxidant activities Nahar, *et al.*, (2005) [11].

6,9,12-octadecatrienoic acid is an anti-inflammatory and can prevent cancer. Bharathy, *et al.*, (2012) [4]. D-mannitol-1-decylsulfanyl ester is also an Anticancer, and Antimicrobial Bharathy *et al.*, (2012) [4].

1,1,3,3,5,5,7,7,9,9,11,11,13,13,15,15,tetra decamethyl octasiloxane is an antimicrobial venkatesh *et al.*, (2014) [14]. 9, octadecenoic methyl ester is anticarcinogenic Yeong *et al.*, (1989) [16], Anti-peptic ulcer Dauda, (2017) [7], Anti-oxidant mohammed *et al.*, (2013) [9]. 13, 16-octadecadienoic acid methyl ester is an Anticancer agent Mustapha and Runner (2016) [10]. Tetracosanoic acid methyl acid methyl and docosanoic acid methyl ester are antioxidants and anti peptic ulcer agent, Dauda (2017) [7].

FT-IR analysis of methanol extract of *Cyathula prostrata* was carried out and presented in fig 2. The compounds indicated shows bands at 3392cm<sup>-1</sup>(broad) 2892cm<sup>-1</sup>, 1731cm<sup>-1</sup>, 1680cm<sup>-1</sup>, 1039cm<sup>-1</sup>. The broad band adsorption at 3392cm is due to OH stretching in alcohols, 2892cm<sup>-1</sup> due to aliphatic (C-H) stretching, 1731cm<sup>-1</sup> due to carbonyl stretching, 1680cm<sup>-1</sup> due to C=C absorption and 1039cm<sup>-1</sup> due to C-O stretching absorption. The potential of anti-oxidant compounds depends on their ability to donate hydrogen atom to scavenge radicals. The presence of OH functional group in FT-IR analysis of methanol extract of *Cyathula prostrata* make the plant is important source of Anti-oxidant.

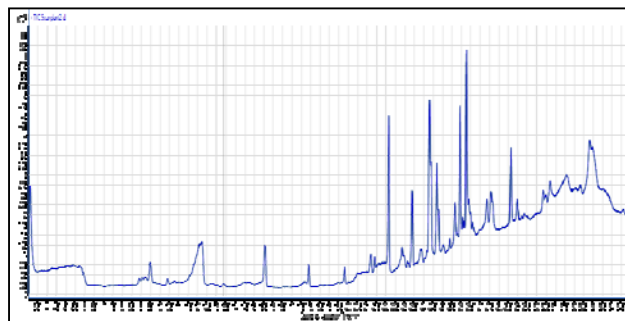
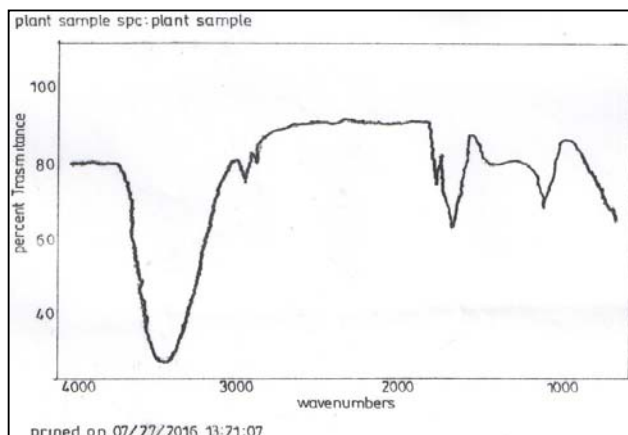


Fig 1: Phyto compounds identified from methanol extract of *Cyathula prostrata* by GC-MS analysis.

Table 1: GC-MS analysis of methanol extract of *Cyathula prostrata* plant.

S/NO	RT	Name of compound	%area
1	5.73	Benzene (1-methyl decyl)	1.199
2	8.83	Thiazio-4 (5H) one-5-(4 Nitrobenzyl denol-2-phenyl	0.38
3	9.46	N-3,5, intropyridine-2-ylglutamine acid	2.31
4	10.39	12-methyl-E,E,13-octadecadien-1-ol	0.46
5	12.20	3 Benzoyl-3-benzyl-2,4C (1H,3H)-quineline dione	13.37
6	13.38	2-methyl cyclopentanone	0.31
7	14.78	Nonanoic acid	1.13
8	15.57	Tetracosanoic acid	4.24
9	17.85	Eicosanoic acid phenyl methyl ester	1.03
10	19.79	Cis 5,8,11-Eicosatrienoic acid methyl ester	0.99
11	21.17	Dibenzo [b,f] [1,4] diazocine	1.58
12	22.13	13,16-octadecadienoic acid methyl ester	9.17
13	22.86	1,1 Bicycloroprop-2-octanoic acid, 2' hexyl methyl ester	3.01
14	23.38	Docosanoic acid methyl ester	4.24
15	23.96	Formic acid -3,7,11-trimethyl-1,6,10-dodecatriene-3-yl ester	1.52
16	24.21	d-mannitol-1-decylsulfanyl ester	0.54
17	26.28	Cis-Vaccinic acid	9.57

18	29.34	1-(Decylsulfonyl)-1-deoxy-d-mannitol	0.71
19	30.72	Heptacosanoic acid, methyl ester	2.38
20	31.57	1,1,3,3,5,5,7,7,9,11,11,13,13,15,15-hexadeca methyl octasiloxane	5.15
21	32.32	Phenyl acetic acid, 2-(1-admantyl) ethyl ester	0.63
22	32.81	1-phenyl-3,4-dihydroisoquinoline	28.35
23	25.93	9-octadecenoic acid (z) methyl ester	7.33
24	34.58	6,9,12-octadecatrienoic acid phenyl methyl ester	0.42



**Fig 2:** FT-IR spectrum of methanol extract of *Cyathula prostrata*

### Conclusion

The natural products provide less side effects and cure diseases effectively from ancient period. In this study, the methanol crude extract of *Cyathula prostrata* and their compounds act as anticancer, anti-peptic ulcer, anti microbial and is a potential source of natural antioxidant.

Finally it can be concluded that photochemical were observed in methanol crude extract of *Cyathula prostrata* which reveals that this plant is highly valuable in medicinal usage for the treatment of various human ailments.

### References

- Adam RP. Identification of essential oil compounds by gas chromatography and mass spectrometry. 4<sup>th</sup> Edn. Allured publishing corporation. Coral Stream II, 2009.
- Ajayi MJ, Ansuategui M, Bermejo P. Active antifungal substance from natural sources. *Achieve for organic chemistry*. 2007; 7:116-145.
- Anthony BO, Oladipupo AL, Malik OL. *Cyathula prostrata*, a potential herbal hope for hypertensive, an Animal Model Study and its secondary metabolites assessment via GC-MS. *European Journal of medical plants*. 2016; 14(2):1-10
- Bharathy V, Maria S, Uthayakumari F. Determination of Phyto components by GC-MS in leaves of *Jathrophagossypifolia*, 2012.
- Burkill. The useful plants of West Africa, Global Plant Partner Resources, 1985, (1).
- Dalziel, Bougnet A. Witch Doctors and Traditional Medicine in Congo (Brazzaville) Mem, work and document of the office, 1969.
- Dauda KR. Phytochemical Screening, Antioxidant and Anti-peptic Ulcer Activity of Crude Extracts from whole Plant of *Cyathula prostrata*. Unpublished master's thesis, Abubakar Tafawas Balewa University Bauchi, 2017.
- Kannappan P, Sundaram KS. Toxicity assessment of the *Cyathula prostrata*. *Journal of Applied Biosciences*. 2009; 13:681-687.
- Mohammed SA, Abdul MJ, Adiba A. Prostaglandin, Analogous and antioxidant activity mediated Gastro protective action of *Tabernaemontana divaricate* methanolic extract against chemical induced gastric ulcer is rat. *Biomedical Research Journal*. Article ID 185476, 2013, 18.
- Mustapha A, Runner M. GC-MS Analysis and Preliminary Antimicrobial Activity of *Albizia adianthifolia* and *Pterocarpus angolensis*. *Journal of medicine*. 2016; 3:1-9.
- Nahar L, Wendy RR, Mora M, Mohammed S. Antioxidant of phenyl acetic acid and its derivatives from seed of *Ilexaquifolium*. *Actapharm*. 2005; 55:187-193.
- Nawar WF. Lipids in Tennenma food chemistry 3<sup>rd</sup> edition New York marcel decker inc, 1996, 225-320
- Olawale HO, Oladimeji, Cyril OU. Two oil from ethyl acetate fraction of *Cyathula prostrate*. *Bulletin of Environmental Pharmacology and Life Science*. 2012; 1:59-63.
- Venkatesh R, Vidya R, Kalcaivani K. Gas chromatography and mass spectrometry analysis of *Solanavillosum*, *Solanacene*. *International Journal of Pharmaceutical Science and Research*. 2014; 5(12):5283-5287.
- WHO. World Health Organization Geneva Report. WHO/EDM/TRM- 2002, 19-21.
- Yeoung LH, Nancy KG, Michael WP. Newly recognized anticarcinogenic fatty acid: Identification and Quantifications in Natural and Processed Cheeses. *Journal of Agricultural Food Chemistry*. 1989; 37:57-81.