Asian Plant Research Journal

Volume 12, Issue 3, Page 72-91, 2024; Article no.APRJ.117022
ISSN: 2581-9992

Phyto-constituents of the Dichloromethane Extracts of the Bulbs of Selected Genera in the Family *Amaryllidaceae*

Margaret Emmanuel Bassey [a*], Imoh Imeh Johnny [b], Ogechi Queeneth Iwu [a], Omodot Timothy Umoh [a] and Augustine Ogenekevwe Ochuko [a]

[a] Department of Botany and Ecological Studies, Faculty of Biological Sciences, University of Uyo, Akwa Ibom State, Nigeria.
[b] Department of Pharmaacognosy and Natural Medicine, Faculty of Pharmacy, University of Uyo, Akwa Ibom State, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/APRJ/2024/v12i3255

Open Peer Review History:
This journal follows the Advanced Open Peer Review policy. Identity of the Reviewers, Editor(s) and additional Reviewers, peer review comments, different versions of the manuscript, comments of the editors, etc are available here: https://www.sdiarticle5.com/review-history/117022

Original Research Article

Received: 03/03/2024
Accepted: 07/05/2024
Published: 08/05/2024

ABSTRACT

The analysis of phytoconstituents present in the dichloromethane extract of the bulb of *Hippeastrum vittatum* (L'Her.) Herb., *Proiphys amboinensis* (L.) Herb., *Urceolina amazonica* (Linden) Christenh. & Byng., *Hymenocallis littoralis* (Jacq.) Salisb., *Crinum jagus* (J. Thomps.) Dandy and *Zephyranthes carinata* Herb. by Gas Chromatography-Mass Spectometry (GC-MS) analysis was carried out using standard methods. The Results of the GC-MS analysis of

**Corresponding author: E-mail: megenbassey@gmail.com;*

Hippeastrum vittatum, Proiphys amboinensis, Urceolina amazonica, Hymenocallis littoralis, Crinum jagus and *Zephyranthes carinata* revealed the presence of 50, 66, 61, 57, 56 and 61 peaks indicating the presence of the number of phytochemical constituents respectively. Phytol was present in *Hymennocallis littoralis* (0.41%) and *Urceolina amazonica* (0.79%) only. N-hexadecanoic acid, Di mevalonic acid lactone, Hexadecanoic acid methyl ester and Stigmasterol were present in all. Apiol and Xanthoxylin were absent in *H. littoralis* and *P. amboniensis* respectively. Oleic acid was present in *Z. carinata* (2.01%), *P*. *amboniensis* (1.85%) and *U. amazonica* (2.03%). Sakuranin was found in *H. littoralis* (3.42%), *C. jagus* (1.38%) and *U. amazonica* (4.43%). Linoleic acid ethyl ester was present in *P. amboniensis* (1.49%), *U. amazonica* (0.16%), *H. littoralis* (11.91%) and *Z. carinata* (0. 8 8%). The major components that delimited the species were as follows; In *Hymenocallis littoralis* was Liriodendromin (14.03%), Linoleic acid ethyl ester (11.91%) and Ethyl oleate (9.38%); in *Zephranthes carinata*; Phthalic acid, 4-methoxybenzyl methyl ester (15.34%) Gatanthamine, 3-O-acetyl-1, 2, dihydro (8.87%) Stigmasterol (5.87%); in *Hippeastrum vittatum;* N-benzyl-2-[1-(4-methoxyl-phenyl 1) – 1 H-tetrazo (14.94%), Benzaminde, 2-amino-N-(4-ethoxyphenyl) (12.65%) and 1-(5-methyl-2-hydroxyphenyl)-3-phenyl propane (10.49%); in *Crinum jagus;* 2H-1-Benzopyran-7-ol, 3,4-dihydro-3-(2-hyrdo) (19.87%), Benzamide, 2-amino-N- (4-ethoxyphenyl) (9.92%) and Stigmasterol (4.04%); in *Proiphys amboniensis;* Gamma-sitosterol (16.98%), Stigmasterol (11.49%) and N-Hexadecanoic acid(5.05%); in *U. amazonica;* 3-Furanacetic acid, 4-hexyl-2, 5-dihydro-2, 5 (12.73%), Benzamide, 2-amino-N- (4-ethoxyphenyl) (8.18%) and Phenyl, 2-(3,4-dihydro 2-methoxyl-2H-1-benzopy) (6.40%). The presence of various bioactive compounds may be responsible for the application of these species in the treatment and management of various ailments in folklore medicine. However, in vitro and in vivo studies, isolation of individual phytoconstituents and their mechanism of action may proceed to find a novel drug or lead compound for use as medicine.

Keywords: GC-MS analysis; phytochemical constituents; phytol; apiol; n-hexadecanoic acid; stigmasterol; oleic acid.

1. INTRODUCTION

Amaryllidaceae is a cosmopolitan family of geophytic herbs [1], comprised of three sub-families: *Agapanthoidea* Endl*., Allioideae* Herb and *Amaryllidoideae* Herb [2], with the largest number of genera placed in *Amaryllidoideae*. The sub family *Allioideae* (formerly known as Alliaceae) contains a number of food crops including Onion (*Allium cepa* L.), garlic (*Allium sativum* L.), leek *(Allium porrum* L.) and Chive (*Allium schoenoprasum* L.). It is considered as valuable medicinal herb in folklore medicine. *Crinum glaucum* A. Chev.*;* a species belonging to this family is used together with *Treculia Africana* Decne. ex Trecul*, Erythrina mildbraedii* Harms*, Ficus thonningii* Blume and *Xylopia aethioica* A. Rich*,* for the management of cough [3]. *Hymenocallis littoralis, Narcissus pseudonarcissus* L. *and Narcissus tazetta* L. had active effects against *E. coli, P. vulgaris, P. aeruginosa and S. aureus* [4]*.* Plants produce mechanisms of action of herbal medicines do not vary greatly from those of the orthodox drugs because the chemical compounds present in plants causes their effect on human body via processes that are similar to those that are already understood for the chemical compounds in orthodox drugs [5,6]. These chemical compounds are a product of the plant's secondary metabolism (secondary metabolites) that can only be obtained from plants and are found in a range of plants that are employed as essential components of both human and animal diets including fruits, seeds, herbs and vegetables [7]. The study of these phytochemicals is important to understanding their essential roles in the human system such as protection and treatment of diseases and their possible adverse effects [8,9]. Very few studies have been reported on the analysis of the chemical constituents of the bulbs of the Genera in the family *Amaryllidaceae* by gas chromatography-mass spectrometry (GC-MS). This work serves as one of the few reports on the phytochemicals on the dichloromethane bulb extract of *Amarylldaceae* genera.

2. METHODS

2.1 Collection and Identification

The fresh samples of studied genera were collected from the wild and ornamental plant shops in Uyo metropolis, Uyo Local Government Area in Akwa Ibom State, Nigeria and preserved in Formalin Acetic Acid. The collected sample was authenticated by Prof. Margaret E. Bassey of the department of Botany and Ecological

Studies, Faculty of Science, University of Uyo and the herbarium number Iwu,UUH4472(Uyo), Iwu, UUH4473(Uyo), Iwu,UUH4474(Uyo), Iwu, UUH4475(Uyo), Iwu, UUH4476(Uyo), Iwu, UUH4477(Uyo) was allocated to the sample and the voucher specimen was deposited in the herbarium for reference purpose.

2.2 Preparation of Plant Material

The bulbs of the samples were washed under running tap water to remove soil particles and adhered debris and finally washed with sterile distilled water. The samples were chopped into pieces, dried under shade at room temperature. The dried samples were ground into powder. The powdered materials were stored in airtight containers until use. The bulb powders of studied samples were extracted with 70% ethanol for 72 hours. It was filtered and the filtrate concentrated using the rotary evaporator.

2.3 GC-MS Analysis

GC-MS analysis of dichloromethane extract of the bulb of *Hippeastrum vittatum* (L'Her.) Herb. *(*harmattan lily), *Proiphys amboinensis* (L.) Herb. (Cardwell lily)*, Urceolina amazonica* (Linden) Christenh. & Byng (Amazon lily)*, Hymenocallis littoralis* (Jacq.) Salisb. (spider lily)*, Crinum jagus* (J. Thomps.) Dandy (Christopher lily) and *Zephyranthes carinata* Herb. was performed using QP2010SE Shimazu, Japan System and GCMS employed a fused silica capillary column packed with Elite-1(100% dimethyl polysiloxane, 30nm × 0.25nm ID × 1µm df). For GC/MS detection, an electron ionization system with ionizing energy of 70 ev was used. Helium gas (99.999%) was used as the carrier gas at constant flow rate 1mL/minute and an injection volume of 2 µL was employed [split ratio of 10.1) injector temperature was set at 250^{o} C; ion-sourced temperature was set at 230^{o}C. The oven temperature was programmed from 60^{o}C (isothermal for 2 minutes) with an increase at 10^{o}C/minutes to 240^{o}C, then 5^{o}C/minutes to 290^{o}C. Mass spectra were taken at 70 ev; a scan interval of 0.5seconds and fragments from 45 to 450Da. Total GC detection time was completed in 23 minutes. The relative percentage amount of each component was calculated by comparing its average peak area to the total areas.

2.4 Identification of Components

The interpretation of mass spectra of GC-MS was conducted using the database of National Institute of Standard and Technology (NIST) having more than 62, 000 patterns. The spectrum of the unknown component was compared with the spectrum of the known components stored in the NIST library. The name, molecular weight, molecular formular, % area and retention time were ascertained.

3. RESULTS AND DISCUSSION

Mass spectrometry becomes a vital tool in the hands of the organic chemists and biochemists because of its potential to supply the definitive, qualitative and quantitative information on molecules based on their structural compositions.

Spectrometer (GC-MS), enables mixture of small molecules mainly organic compounds of low molecular weight (<600) which can be analysed.

GC-MS chromatogram analysis of *Hippeastrum vittatum, Proiphys amboinensis, Urceolina amazonica, Hymenocallis littoralis, Crinum jagus* and *Zephyranthes carinata* predicted 50, 66, 61, 57, 56 and 61 peaks respectively, indicating the presence of 50, 66, 61, 57, 56 and 61 phytochemical constituents respectively. On comparison of the mass spectra of the constituents with the NIST library, the phytocompounds were characterized and identified (Tables 1–6). The various phytochemicals which contribute to the medicinal activities of the plant were shown in Table 3. The chemical structures of the most abundant phytochemicals were presented in Fig. 1.

Of all the suggested phytochemical constituents identified, the most prevailing constituent were Phytol, n-Hexadecanoic acid, Apiol Hexadecanoic ethyl ester, Dimevalonic acid lactone, Sakuranin, Xanthoxylin, Stigmasterol, Oleic acid and Linoleic acid ethyl ester were recorded for the bulb of the studied genera of Amaryllidaceae.

Phytol was present in *Hymennocallis littoralis* (0.41%) and *Urceolina amazonica* (0.79%) only. N-hexadecanoic acid*,* Di mevalonic acid lactone*,* Hexadecanoic acid methyl ester and Stigmasterol were present in all. Apiol was present in all except *H. littoralis*. Xanthoxylin was also present in all except *Proiphys amboniensis.* Oleic acid was present in *Z. carinata* (2.01%), *P. amboniensis* (1. 85%) and *U*. amazonica (2.03%). Sakuranin was found in *H. littoralis* (3.48)*, C. jagus* (1.38%) and *U. amazonica* (4.43%)*.* Linoleic acid ethyl ester was present in *P. amboniensis* (1.49%)*, U. amazonica* (0.16%)*, H. littoralis* (11.91%) and *Z. carinata* (0. 8 8%).

Table 1. Phytochemical composition of dichloromethane bulb extract of *Crinum jagus*

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
1	8.402	Divinyl sulfide	C_4H_6S	86	0.2O
2	8.502	5-Methoxy-4,4,7-trimethyl-4,5-dihydro-3H-oxe	$C_{10}H_{16}O_3$	184	0.36
3	8.783	dl-Mevalonic acid lactone	$C_6H_{10}O_3$	130	0.19
4	9.756	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	150	0.52
5	10.235	2-Nonen-1-ol, 2-methyl-	$C_{10}H_{20}O$	156	0.36
6	10.638	Methyleugenol	$C_{11}H_{14}O_2$	178	0.24
7	10.694	Benzene, 1,3,5-trimethoxy-	$C_9H_{12}O_3$	168	0.18
8	11.282	Phenol, 3,5-dimethoxy-	$C_8H_{10}O_3$	154	0.78
9	11.628	2-Cyclohexen-1-one,2-hydroxy-3-methyl-6-(1	$C_{10}H_{16}O_2$	168	0.66
10	11.971	Benzenemethanol,3,4-dimethoxy-	$C_9H_{12}O_3$	168	0.13
11	12.535	3',5'-Dimethoxyacetophenone	$C_{10}H_{12}O_3$	180	0.20
12	12.854	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	0.51
13	13.344	Apiol	$C_{12}H_{14}O_4$	222	0.17
14	13.835	Xanthoxylin	$C_{10}H_{12}O_4$	196	2.37
15	14.068	2,4,6-Trimethoxyacetophenone	$C_{11}H_{14}O_4$	210	3.26
16	14.170	10,11-Epoxy-n-undecan-1-ol	$C_{11}H_{22}O_2$	186	0.89
17	14.259	Oxirane, tridecyl-	$C_{15}H_{30}O$	226	1.27
18	14.357	2-Propenal, 3-(4-hydroxy-3-methoxyphenyl)	$C_{10}H_{10}O_3$	178	0.85
19	14.427	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphe	$C_{10}H_{12}O_3$	180	3.88
20	14.708	Ethanone, 1-(2,6-dihydroxy-4-methoxyphenyl)	$C_9H_{10}O_4$	182	0.50
21	14.936	Xanthoxylin	$C_{10}H_{12}O_4$	196	0.37
22	14.996	Ethanone, 1-(4-hydroxy-3,5-dimethoxyphenyl)-	$C_{10}H_{12}O_4$	196	0.96
23	15.369	Benzene, 4-butyl-1,2-dimethoxy	$C_{12}H_{18}O_2$	194	1.19
24	16.535	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.50
25	16.780	Benzenemethanol, 2,5-dimethoxy-, acetate	$C_{11}H_{14}O_4$	210	1.36
26	16.824	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	2.98
27	17.127	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	2.73
28	17.905	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	$C_{19}H_{34}O_2$	294	0.64
29	17.968	9-Octadecenoic acid, methyl ester, (E)-	$C_{19}H_{36}O_2$	296	0.27
30	18.175	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	0.66
31	18.216	1-(5-Methyl-2-hydroxyphenyl)-3-phenylpropan	$C_{16}H_{18}O$	226	1.04
32	18.141	9,12-Octadecadienoic acid, ethyl ester	$C_{20}H_{36}O_2$	308	3.71

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
33	18.471	Ethyl Oleate	$C_{20}H_{38}O_2$	310	1.96
34	18.514	Ethyl 9-hexadecenoate	$C_{18}H_{34}O_2$	282	0.23
35	18.610	3-Heptadec-8-enyl-2,4,10-trioxa-adamantane	$C_{24}H_{42}O_3$	378	0.32
36	18.666	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	312	0.29
37	19.494	Heneicosane	$C_{21}H_{44}$	296	0.62
38	19.665	Stigmasterol	$C_{29}H_{48}O$	412	4.04
39	20.661	Hexadecanoic acid, 2-hydroxy-1-(hydroxymeth	$C_{19}H_{38}O_4$	330	1.90
40	20.738	Benzamide, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	256	9.92
41	20.987	N-Benzyl-2-[1-(4-methoxy-phenyl)-1H-tetrazol	$C_{17}H_{17}N_5O2S$	355	3.48
42	21.249	7-Hydroxy-3-(3,4-methylenedioxyphenyl)-4-ch	$C_{16}H_{12}O_5$	284	0.75
43	21.397	Phenol, 3-methyl-6-propyl	$C_{10}H_{14}O$	150	2.53
44	21.588	2H-1-Benzopyran-7-ol, 3,4-dihydro-3-(2-hydro	$C_{16}H_{16}O_4$	272	19.87
45	21.691	Phthalic acid, di(3-methoxybenzyl) ester	$C_{24}H_{22}O_6$	406	3.29
46	21.829	Phenol, 2-(3,4-dihydro-7-methoxy-2H-1-benzo	$C_{17}H_{18}O_4$	286	3.94
47	21.982	9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydrox	$C_{21}H_{38}O_4$	354	2.13
48	222.031	9-Octadecenoic acid (Z)-, 2,3-dihydroxypropy	$C_{21}H_{40}O_4$	356	1.09
49	22.243	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	0.44
50	22.430	3,4-Methylenedioxy-N-methylbenzylamine	$C_9H_{11}NO_2$	165	0.63
51	22.473	Sakuranin	$C_{22}H_{24}O_{10}$	448	1.38
52	22.752	4,22-Stigmastadiene-3-one	$C_{29}H_{46}O$	410	1.74
53	23.176	Decanedioic acid, bis(2-ethylhexyl) ester	$C_{26}H_{50}O_4$	426	1.33
54	23.538	Squalene	$C_{30}H_{50}$	410	0.62
55	24.065	2-Amino-4-morpholino-6-phenylcarbamoyl-1,3	$C_{14}H_{16}N_6O_2$	300	2.91
56	25.113	trans-4-Ethoxy-4'-methoxychalcone	$C_{18}H_{18}O_3$	282	0.69

Table 2. Phytochemical composition of dichloromethane bulb extract of *Urceolina amazonica*

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
1	8.779	Di-Mevalonic acid lactone	$C_6H_{10}O_3$	130	0.47
2	9.116	2H-Pyran-2-one,5,6-dihydro-6-pentyl-	$C_{10}H_{16}O_2$	168	0.22
3	10.807	Benzene ethanol, 4-hydroxy	$C_{17}H_{24}O_3$	276	0.32
4	11.498	2H-Pyran-2-one, tetrahydro-4-hydroxy-6-penty	$C_{10}H_{18}O_3$	186	0.36
5	11.650	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-di	$C_{12}H_{16}O_5$	240	12.73
6	11.916	2-Undecanone, 6,10-dimethyl-	$C_{13}H_{26}O$	198	0.10
7	12.077	Phenol, 3,5-bis(1,1-dimethylethyl)-	$C_{14}H_{22}O$	206	0.07
8	12.240	Dodecane, 4,6-dimethyl	$C_{14}H_{30}$	198	0.11
9	12.878	3-(3,6-Dimethyl-tetrahydropyran-2-yl)-3-hydro	$C_{15}H_{18}O_4$	262	0.46
10	13.345	Apiol	$C_{12}H_{14}O_4$	222	0.07
11	13.676	3-Ethenylheptan-2,6-dione	$C_9H_{14}O_2$	154	0.13
12	13.840	Xanthoxylin	$C_{10}H_{12}O_4$	196	3.39
13	13.970	.delta.1,.alpha.-Cyclohexaneacetic acid	$C_8H_{12}O_2$	140	0.61
14	14.140	Cyclohexanone, 2-butyl-	$C_{10}H_{18}O$	154	0.35
15	14.260	Oxirane, decyl-	$C_{12}H_{24}O$	184	0.60
16	14.433	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphen	$C_{10}H_{12}O_3$	180	0.39
17	14.716	Triacontane, 11,20-didecyl-	$C_{50}H_{102}$	702	0.52
18	14.841	Cyclohexanecarboxaldehyde, 3,3-dimethyl-5-o	$C_9H_{14}O_2$	154	0.43
19	14.998	Xanthoxylin	$C_{10}H_{12}O_4$	196	0,79
20	15.515	Eicosane	$C_{20}H_{42}$	282	0,28
21	15.958	4H-1-Benzopyran-4-one, 5-hydroxy-7-methox	$C_{11}H_{10}O_4$	206	0.81
22	16.535	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.55
23	16.845	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	4.93
24	17.127	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	1.66
25	17.905	9,12-Octadecadienoic acid	$C_{19}H_{34}O_2$	294	0.92
26	17.968	9-Octadecenoic acid, methyl ester	$C_{19}H_{36}O_2$	296	0.30
27	18.099	Heneicosane	$C_{21}H_{44}$	296	0.29
28	18.219	9,12-Octadecadienoic acid (Z,Z)	$C_{18}H_{32}O_2$	280	3.74
29	18.265	Oleic Acid	$C_{18}H_{34}O_2$	282	2.03
30	18.416	9,12-Octadecadienoic acid, ethyl ester	$C_{20}H_{36}O_2$	308	4.67
31	18.473	Ethyl Oleate	$C_{20}H_{38}O_2$	310	1.49
32	18.515	Tetrapentacontane, 1,54-dibromo-	$C_{54}H_{108}Br_2$	914	0.41

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
33	18.611	5-Oxohexanethioic acid, S-t-butyl ester	$C_{10}H_{18}O_2S$	202	0.62
34	18.667	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	312	0.33
35	19.478	12-Methyl-E,E-2,13-octadecadien-1-ol	$C_{19}H_{36}O$	280	0.39
36	19.569	4-Ethylbenzoic acid, 2,6-dimethylnon-1-en-3-y	$C_{20}H_{26}O_2$	298	0.25
37	19.895	Galantamin	$C_{17}H_{21}NO_3$	287	2.45
38	20.185	Phytol	$C_{20}H_{40}O$	296	0.79
39	20.286	1,3-Benzenediamine, N,N'-dihydroxy-4,6-dime	$C_{16}H_{28}N_2O_2$	280	3.12
40	20.467	Benzamide, 2-amino-N-(4-methoxyphenyl)-	$C_{14}H_{14}N_2O_2$	242	1.82
41	20.570	1,3,5-Trisilacyclohexane	$C_3H_{12}Si_3$	132	0.16
42	20.665	Hexadecanoic acid, 2-hydroxy-1-(hydroxymethyl	$C_{19}H_{38}O_4$	330	5.20
43	20.744	Benzamide, 2-amino-N-(4-ethoxyphenyl)-	$C_{15}H_{16}N_2O_2$	256	8.18
44	21.088	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	0.16
45	21.403	Phenol, 3-methyl-6-propyl-	$C_{10}H_{14}O$	150	0.50
46	21.487	1,9-Diphenyl-1,3,5,7-nonatetraene	$C_{21}H_{20}$	272	1.44
47	21.579	Acetamide, 2-phenoxy-N-(3,4-methylenedioxyp	$C_{15}H_{13}NO_4$	271	1.27
48	21.695	Phthalic acid, di(3-methoxybenzyl) ester	$C_{24}H_{22}O_6$	406	4.10
49	21.836	Phenol, 2-(3,4-dihydro-7-methoxy-2H-1-benzo	$C_{17}H_{18}O_4$	286	6.40
50	21.984	9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydrox	$C_{21}H_{38}O_4$	354	3.09
51	22.033	Oleoyl chloride	$C_{18}H_{33}ClO$	300	2.18
52	22.150	1-Benzenol,2-methoxy-4-[[[2-(4-hydroxypheny	$C_{16}H_{19}NO_3$	273	0.83
53	22.247	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	1.80
54	22.435	Lycorenan-7-one, 1-methyl-9,10-[methylenebis	$C_{18}H_{23}NO_3$	301	1.49
55	22.479	Sakuranin	$C_{22}H_{24}O_{10}$	448	4.43
56	22.661	1,3-Benzenedicarboxylic acid, bis(2-ethylhexy	$C_{24}H_{38}O_4$	390	0.18
57	23.003	3-Epimacronine	$C_{18}H_{19}NO_5$	329	0.44
58	23.172	Decanedioic acid, bis(2-ethylhexyl) ester	$C_{26}H_{50}O_4$	426	0.87
59	23.879	Bicyclo[4.1.0]heptane, 1-(3-oxo-2-phenylthiob	$C_{20}H_{28}OS$	316	0.82
60	24.061	2-Amino-4-morpholino-6-phenylcarbamoyl-1,3	$C_{14}H_{16}N_6O_2$	300	2.28
61	27.100	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_42O_4$	358	0.21

Table 3. Phytochemical composition of dichloromethane bulb extract of *Hippeastrum vittatum*

S\No	R. Time	Name	Molecular Formula	Molecular Weight	Area%
1	4.826	3,3-Dimethoxy-2-butanone	$C_7H_{16}O_3$	148	0.03
2	4.900	1,3-Dioxolane-4-methanol, 2-ethyl-	$C_6H_{12}O_3$	132	0.02
3	7.607	Phenylethyl Alcohol	$C_8H_{10}O$	122	0.07
4	9.136	Acetic acid, 2-phenylethyl ester	$C_{10}H_{12}O_2$	164	0.05
5	9.757	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	150	0.17
6	10.130	2(3H)-Furanone, dihydro-5-pentyl-	$C_9H_{16}O_2$	156	0.09
7	10.231	2,7-Octadiene-1,6-diol, 2,6-dimethyl-	$C_{10}H_{18}O_2$	170	0.13
8	10.639	Methyleugenol	$C_{11}H_{14}O_2$	178	0.95
9	11.122	3-Hydroxy-4-methoxybenzyl alcohol	$C_8H_{10}O_3$	154	0.05
10	11.629	2-Cyclohexen-1-one, 2-hydroxy-3-methyl-6-(1	$C_{10}H_{16}O_2$	168	0.10
11	11.973	Benzenemethanol, 3,4-dimethoxy-	$C_9H_{12}O_3$	168	0.07
12	12.346	(-)-Mellein	$C_{10}H_{10}O_3$	178	0.06
13	12.854	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	0.20
14	13.345	Apiol	$C_{12}H_{14}O_4$	222	0.20
15	13.834	Xanthoxylin	$C_{10}H_{12}O_4$	196	0.24
16	14.069	2,4,6-Trimethoxyacetophenone	$C_{11}H_{14}O_4$	210	1.96
17	14.357	2-Propenal, 3-(4-hydroxy-3-methoxyphenyl)	$C_{10}H_{10}O_3$	178	0.71
18	14.429	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphen	$C_{10}H_{12}O_3$	180	1.26
19	14.997	Xanthoxylin	$C_{10}H_{12}O_4$	196	2.25
20	15.377	Benzene, 4-butyl-1,2-dimethoxy-	$C_{12}H_{18}O_2$	194	0.27
21	16.535	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.33
22	16.820	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	1.75
23	16.940	Ethyl 9-hexadecenoate	$C_{18}H_{34}O_2$	282	0.17
24	17.126	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	0.90
25	17.907	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	$C_{19}H_{34}O_2$	294	0.46
26	18.221	1-(5-Methyl-2-hydroxyphenyl)-3-phenylpropan	$C_{16}H_{18}O$	226	10.49
27	18.412	9,12-Octadecadienoic acid, ethyl ester	$C_{20}H_{36}O_2$	308	1.20
28	18.469	Ethyl Oleate	$C_{20}H_{38}O_2$	310	0.41
29	18.524	5-Hydroxy-2-phenyl-4-chromanone	$C_{15}H_{12}O_3$	240	0.88
30	18.906	Ergost-5-en-3-ol, (3.beta.)-	$C_{28}H_{48}O$	400	0.63
31	19.095	N-Phenyl-2-(pyridin-2-ylamino)-2-thioxo-aceta	$C_{13}H_{11}N_{3O}S$	257	0.16
32	19.459	Benzamide, 3-fluoro-N-benzyl-N-phenethyl	$C_{22}H_{20}FNO$	333	7.62

S\No	R. Time	Name	Molecular Formula	Molecular Weight	Area%
33	19.660	Stigmasterol	$C_{29}H_{48}O$	412	1.93
34	19.750	6-Methylnicotinic acid	$C_7H_7NO_2$	137	0.17
35	20.378	4H-1-Benzopyran-4-one, 2,3-dihydro-5,7-dihyd	$C_{15}H_{12}O_4$	256	1.95
36	20.469	Benzamide, 2-amino-N-(4-methoxyphenyl)-	$C_{14}H_{14}N_2O_2$	242	0.61
37	20.665	Hexadecanoic acid, 2-hydroxy-1-(hydroxymeth	$C_{19}H_{38}O_4$	330	0.97
38	20.749	Benzamide, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	256	12.65
39	20.825	2-Propen-1-one, 1-(2,4-dihydroxy-5-methoxyp	$C_{16}H_{14}O_4$	270	0.36
40	20.999	N-Benzyl-2-[1-(4-methoxy-phenyl)-1H-tetrazo	$C_{17}H_{17}N_{502}S$	355	14.94
41	21.253	7-Hydroxy-3-(3,4-methylenedioxyphenyl)-4-ch	$C_{16}H_{12}O_5$	284	4.09
42	21.401	Phenol, 3-methyl-6-propyl	$C_{10}H_{14}O$	150	2.30
43	21.587	2H-1-Benzopyran-7-ol, 3,4-dihydro-3-(2-hydro	$C_{16}H_{16}O_4$	272	8.22
44	21.696	Phthalic acid, di(3-methoxybenzyl) ester	$C_{24}H_{22}O_6$	406	3.64
45	21.829	Phenol, 2-(3,4-dihydro-7-methoxy-2H-1-benzo	$C_{17}H_{18}O_4$	286	2.89
46	21.981	9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydroxy	$C_{21}H_{38}O_4$	354	1.74
47	22.031	Oleoyl chloride	$C_{18}H_{33}ClO$	300	1.04
48	22.240	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	0.22
49	22.436	3,4-Dihydrocoumarin-7-ol	$C_9H_8O_3$	164	3.21
50	22.660	1,3-Benzenedicarboxylic acid, bis(2-ethylhexy	$C_{24}H_{38}O_4$	390	0.13
51	22.759	Phthalic acid, 4-methoxybenzyl methyl ester	$C_{17}H_{16}O_5$	300	0.82
52	23.007	3-Epimacronine	$C_{18}H_{19}NO_5$	329	1.68
53	23.179	Decanedioic acid, bis(2-ethylhexyl) ester	$C_{26}H_{50}O_4$	426	0.17
54	23.600	Lycorenan-7-one, 5-hydroxy-1-methyl-9,10-[me	$C_{17}H_{17}NO_5$	315	0.21
55	24.061	2-Amino-4-morpholino-6-phenylcarbamoyl-1,3	$C_{14}H_{16}N_6O_2$	300	1.05
56	24.411	Stigmast-4-en-3-one	$C_{29}H_{48}O$	412	0.56

Table 4. Phytochemical composition of dichloromethane bulb extract of *Hymenocallis littoralis*

S/No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area %
1	8.776	Di-Mevalonic acid lactone	$C_6H_{10}O_3$	130	0.72
2	9.115	2H-Pyran-2-one, 5,6-dihydro-6-pentyl	$C_{10}H_{16}O_2$	168	0.43
3	9.387	1,2,4-Cyclopentanetrione, 3-butyl-	$C_9H_{12}O_3$	168	0.19
4	9.425	Phenol, 4-ethyl-2-methoxy-	$C_9H_{12}O_2$	152	0.07
5	9.757	2-Methoxy-4-vinylphenol	$C_9H_{10}O_2$	150	0.15
6	11.494	2H-Pyran-2-one, tetrahydro-4-hydroxy-6-penty	$C_{10}H_{18}O_3$	186	0.49
7	11.633	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-d	$C_{12}H_{16}O_5$	:240	3.45
8	11.695	Cyclooctane, methyl-	C_9H_{18}	126	0.28
9	12.262	Cyclopentanecarboxylic acid, 1-methyl-2-oxo-,	$C_9H_{14}O_3$	170	0.64
10	12.854	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	0.32
11	13.971	.delta.1,.alpha.-Cyclohexaneacetic acid	$C_8H_{12}O_2$	140	0.44
12	14.430	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphen	$C_{10}H_{12}O_3$	180	0.95
13	14.717	Furan-2-carboxylic acid, 5-(1-hexynyl)-	$C_{11}H_{12}O_3$	192	0.30
14	14.841	Cyclohexanecarboxaldehyde, 3,3-dimethyl-5-o	$C_9H_{14}O_2$	154	0.28
15	15.287	Tetradecanoic acid, ethyl ester	$C_{16}H_{32}O_2$	256	0.11
16	15.502	4-Methylcarbazole	$C_{13}H_{11}N$	181	0.17
17	15.825	2-Pentadecanone, 6,10,14-trimethyl-	$C_{18}H_{36}O$	268	0.18
18	16.249	Pentadecanoic acid, ethyl ester	$C_{17}H_{34}O_2$	270	0.19
19	16.535	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.62
20	16.775	Benzenemethanol, 2,5-dimethoxy-, acetate	$C_{11}H_{14}O_4$	210	0.95
21	16.822	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	2.00
22	16.935	Ethyl 9-hexadecenoate	$C_{18}H_{34}O_2$	:282	0.32
23	17.128	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	8.27
24	17.903	9,12-Octadecadienoic acid (Z,Z)-, methyl ester	$C_{19}H_{34}O_2$	294	1.06
25	17.967	9-Octadecenoic acid, methyl ester, (E)	$C_{19}H_{36}O_2$	296	0.55
26	18.177	13-Tetradecynoic acid, methyl ester	$C_{15}H_{26}O_2$	238	0.65
27	18.215	1-(5-Methyl-2-hydroxyphenyl)-3-phenylpropan	$C_{16}H_{18}O$	226	0.98
28	18.332	Hexadecanoic acid, 2-methylpropyl ester	$C_{20}H_{40}O_2$	312	0.40
29	18.416	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	11.91
30	18.473	Ethyl Oleate	$C_{20}H_{38}O_2$	310	9.38
31	18.665	Octadecanoic acid, ethyl ester	$C_{20}H_{40}O_2$	312	2.29
32	19.036	Isoamyl laurate	$C_{17}H_{34}O_2$	270	0.28

S/No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area %
33	19.475	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	0.79
34	19.652	Stigmasterol	$C_{29}H_{48}O$	412	1.72
35	20.123	2-Methoxy-4-[(2-pyridin-4-yl-ethylimino)-met	$C_{15}H_{16}N_2O_2$	256	4.53
36	20.188	Phytol	$C_{20}H_{40}O$	296	0.41
37	20.280	Zeranol	$C_{18}H_{26}O_5$	322	3.74
38	20.467	Benzamide, 2-amino-N-(4-methoxyphenyl)-	$C_{14}H_{14}N_2O_2$	242	0.79
39	20.656	Hexadecanoic acid, 2-hydroxy-1-(hydroxymeth	$C_{19}H_{38}O_4$	:330	1.33
40	20.740	Benzamide, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	:256	0.70
41	20.985	N-Benzyl-2-[1-(4-methoxy-phenyl)-1H-tetrazol	$C_{17}H_{17}N_5O_2S$	355	1.22
42	21.035	.gamma.-Sitosterol	$C_{29}H_{50}O$	414	1.57
43	21.580	Acetamide, 2-phenoxy-N-(3,4-methylenedioxyp	$C_{15}H_{13}NO_4$	271	0.66
44	21.690	Sakuranin	$C_{22}H_{24}O_{10}$	448	3.42
45	21.760	Powelline	$C_{17}H_{19}NO_4$	301	2.30
46	21.978	9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydrox	$C_{21}H_{38}O_4$	354	1.35
47	22.030	Oleoyl chloride	$C_{18}H_{33}ClO$	300	1.09
48	22.237	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	0.40
49	22.444	Liriodendromine	$C_{17}H_{17}N_3$	263	14.03
50	22.659	Furo[2,3-c]acridin-6(11H)-one, 5-hydroxy-11-m	$C_{16}H_{11}NO_3$	265	1.12
51	22.745	Cephalotaxine, 2,11-epoxy-1,2-dihydro-, aceta	$C_{20}H_{23}NO_6$	373	0.64
52	22.913	2,4-Hexadienedioic acid, 3,4-diethyl-, dimethyl	$C_{12}H_{18}O_4$	226	0.50
53	23.169	Decanedioic acid, bis (2-ethylhexyl) ester	$C_{26}H_{50}O_4$	426	0.36
54	23.570	Furo[2,3-c]acridin-6(11H)-one, 5-hydroxy-11-	$C_{16}H_{11}NO_3$	265	3.86
55	24.398	Nerbowdin, 3-acetyl	$C_{19}H_{23}NO_6$	361	0.48
56	24.627	Bowdensine	$C_{21}H_{25}NO_7$	403	3.65
57	25.417	Anthraergostatetraenol benzoate	$C_{35}H_{46}O_2$	498	0.32

Table 5. Phytochemical composition of dichloromethane bulb extract of *Proiphys amboinensis*

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
1	4.950	1-Hexanol	$C_6H_{14}O$	102	0.03
2	5.825	2-Heptenal, (Z)-	$C_7H_{12}O$	112	0.07
3	5.984	Glycerin	$C_3H_8O_3$	92	0.22
4	6.094	Hexanoic acid	$C_6H_{12}O_2$	116	0.05
5	7.243	1,2,3-Propanetriol, 1-acetate	$C_5H_{10}O_4$	134	0.08
6	7.551	Nonanal	$C_9H_{18}O$	142	0.03
7	8.405	4H-Pyran-4-one, 3,5-dihydroxy-2-methyl-	$C_6H_6O_4$	142	0.09
8	8.830	Di-Mevalonic acid lactone	$C_6H_{10}O_3$	130	0.51
9	9.114	2H-Pyran-2-one, 5,6-dihydro-6-pentyl-	$C_{10}H_{16}O_2$	168	0.15
10	9.386	1,2,4-Cyclopentanetrione, 3-butyl-	$C_9H_{12}O_3$	168	0.29
11	9.995	2-Decen-1-ol, (E)-	$C_{10}H_{20}O$	156	0.12
12	10.927	4H-Pyran-4-one, 5-hydroxy-2-(hydroxymethyl	C_6H_6O4	142	0.65
13	11.031	2H-Oxecin-2-one, 3,4,7,8,9,10-hexahydro-4-hy	$C_{10}H_{16}O_3$	184	0.07
14	11.253	Cyclohexanol, 2-methyl-5-(1-methylethyl)-	$C_{10}H_{20}O$	156	0.36
15	11.529	2H-Pyran-2-one, tetrahydro-4-hydroxy-6-pentyl	$C_{10}H_{18}O_3$	186	0.20
16	11.644	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-dioxo	$C_{12}H_{16}O_5$	240	2.06
17	11.914	2-Tridecanone	$C_{13}H_{26}O$	198	0.48
18	12.044	2-Tridecanol	$C_{13}H_{28}O$	200	0.18
19	12.240	Dodecane, 4,6-dimethyl-	$C_{14}H_{30}$	198	0.14
20	12.335	Cyclopentanecarboxylic acid, 1-methyl-2-oxo-,	$C_9H_{14}O_3$	170	1.00
21	12.522	Cyclopentanecarboxylic acid, pentyl ester	$C_{11}H_{20}O_2$	184	0.22
22	12.764	Hexadecane, 2,6,10,14-tetramethyl	$C_{20}H_{42}$	282	0.14
23	12.796	9-Oxabicyclo[4.2.1]nonan-2-ol, acetate	$C_{10}H_{16}O_3$	184	0.19
24	12.861	Diethyl Phthalate	$C_{12}H_{14}O_4$	222	0.17
25	13.272	Diethyl Phthalate	$C_8H_{16}O$	128	0.12
26	13.346	Apiol	$C_{12}H_{14}O_4$	222	0.13
27	13.762	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphen	$C_{10}H_{12}O_3$	180	0.25
28	13.827	2-Decanone, 5,9-dimethyl	$C_{12}H_{24}O$	184	0.50
29	14.005	Tridecane-2,11-dione	$C_{13}H_{24}O_2$	212	4.06
30	14.056	2,15-Hexadecanedione	$C_{16}H_{30}O_2$	254	0.49
31	14.119	Dodecanoic acid, 10-oxo-	$C_{12}H_{22}O_3$	214	0.66
32	14.154	11-Dodecen-2-one	$C_{12}H_{22}O$	182	0.72

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
33	14.283	2-Pentadecanone, 6,10,14-trimethyl	$C_{18}H_{36}O$	268	0.771
34	14.461	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphenol	$C_{10}H_{12}O_3$	180	1.26
35	14.720	Eicosane	$C_{20}H_{42}$	282	0.32
36	14.867	Cyclohexanecarboxaldehyde, 3,3-dimethyl-5-o	$C_9H_{14}O_2$	154	0.40
37	14.906	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	0.29
38	15.515	Eicosane	$C_{20}H_{42}$	282	0.29
39	15.402	Benzene, 4-butyl-1,2-dimethoxy-	$C_{12}H_{18}O_2$	194	0.79
40	115.971	2,15-Hexadecanedione	$C_{16}H_{30}O_2$	254	1.38
41	16.109	Myristic acid vinyl ester	$C_{16}H_{30}O_2$	254	0.69
42	16.195	12-Methyl-E,E-2,13-octadecadien-1-ol	$C_{19}H_{36}O$	280	0.51
43	16.874	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	5.05
44	17.132	Hexadecanoic acid, ethyl ester	$C_{18}H_{36}O_2$	284	0.54
45	18.248	9,12-Octadecadienoic acid (Z,Z)-	$C_{18}H_{32}O_2$	280	2.87
46	18.249	Oleic Acid	$C_{18}H_{34}O_2$	282	1.85
47	18.419	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	1.49
48	19.041	Ergost-5-en-3-ol, (3.beta.)-	$C_{28}H_{48}O$	400	4.79
49	19.730	Stigmasterol	$C_{29}H_{48}O$	412	2.75
50	19.854	Stigmasterol	$C_{29}H_{48}O$	412	11.49
51	20.138	2-Methoxy-4-[(2-pyridin-4-yl-ethylimino)-methyl]	$C_{15}H_{16}N_2O_2$	256	0.88
52	20,293	Zeranol	$C_{18}H_{26}O_5$	322	0.41
53	20.536	Propan-1-one, 3-(3,4-dimethoxyphenyl)-1-pheny	$C_{17}H_{18}O_3$	270	0.83
54	20.684	Hexadecanoic acid, 2-hydroxy-1-(hydroxymeth	$C_{19}H_{38}O_4$	330	6.11
55	20.774	Benzamide, 2-amino-N-(4-ethoxyphenyl)-	$C_{15}H_{16}N_2O_2$	256	2.52
56	21.279	.gamma.-Sitosterol	$C_{29}H_{50}O$	414	16.98
57	21.503	1,1'-Biphenyl, 2-formyl-4',5',6'-trimethoxy-	$C_{16}H_{16}O$	272	0.66
58	22.002	9,12-Octadecadienoic acid (Z,Z)-, 2,3-dihydrox	$C_{21}H_{38}O_4$	354	5.16
59	22.050	9-Octadecenoic acid (Z)-, 2,3-dihydroxypropyl	$C_{21}H_{40}O_4$	356	2.81
60	22.260	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	2.10
61	22.457	Liriodendromine	$C_{16}H_9NO_3$	263	2.72
62	22.832	4,22-Cholestadien-3-one	$C_{27}H_{42}O$	382	2.08
63	23.010	Lycorenan-7-one, 1-methyl-9,10-[methylenebis	$C_{17}H_{17}NO_4$	299	2.02
64	23.175	Decanedioic acid, bis(2-ethylhexyl) ester	$C_{26}H_{50}O_4$	426	0.47
65	24.560	Stigmast-4-en-3-one	$C_{29}H_{48}O$	412	1.98
66	27.107	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	0.37

Table 6. Phytochemical composition of dichloromethane bulb extract of *Zephyranthes carinata*

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
1	6.094	Hexanoic acid	$C_6H_{12}O_2$	116	0.09
2	6.701	Butanoic acid, 2-hydroxy-3-methyl-	$C_5H_{10}O_3$	118	0,04
3	7.121	1-Butanol, 3-methyl-, acetate	$C_7H_{14}O_2$	130	0.06
4	7.192	Heptanoic acid	$C_7H_{14}O_2$	130	0.07
5	7.670	.alpha.-Hydroxyisocaproic acid	$C_6H_{12}O_3$	132	0.16
6	8.293	Octanoic acid	$C_8H_{15}AgO_2$	250	0.25
7	8.790	dl-Mevalonic acid lactone	$C_6H_{10}O_3$	130	0.22
8	9.325	Nonanoic acid	$C_9H_{18}O_2$	158	0.36
9	9.910	Cyclohexanone, 2-(1-methyl-2-oxopropyl)	$C_{10}H_{16}O_2$	168	0.07
10	10.232	2,7-Octadiene-1,6-diol, 2,6-dimethyl-	$C_{10}H_{18}O_2$	170	0.11
11	10.638	Methyleugenol	$C_{11}H_{14}O_2$	178	0.13
12	10.814	2-Ethyl-n-butyric acid ethyl ester	$C_8H_{16}O_2$	144	0.13
13	11.117	3-Hydroxy-4-methoxybenzyl alcohol	$C_8H_{10}O_3$	154	0.14
14	11.483	Acetic acid, [4-(1-hydroxy-1-methylethyl)cyclo	$C_{12}H_{20}O_3$	212	0.17
15	11.631	3-Furanacetic acid, 4-hexyl-2,5-dihydro-2,5-dioxo	$C_{12}H_{16}O_5$	240	0.63
16	12.238	Eicosane	$C_{20}H_{42}$	282	0.20
17	12.509	3-Hydroxy-4-methoxybenzoic acid	$C_8H_8O_4$	168	0.78
18	12.668	Dodecanoic acid	$C_{12}H_{24}O_2$	200	0.09
19	12.763	Hexadecane	$C_{16}H_{34}$	226	0.14
20	13.345	Apiol	$C_{12}H_{14}O_4$	222	0.13
21	13.835	Xanthoxylin	$C_{10}H_{12}O_4$	196	0.13
21	14.261	Oxirane, tridecyl-	$C_{15}H_{30}O$	226	0.13
23	14.436	4-((1E)-3-Hydroxy-1-propenyl)-2-methoxyphen	$C_{10}H_{12}O_3$	180	1.04
24	14.719	Eicosane	$C_{20}H_{42}$	282	0.27
25	15.006	Ethanone, 1-(4-hydroxy-3,5-dimethoxyphenyl)-	$C_{10}H_{12}O_4$	196	0.28
26	15.151	Eicosane	$C_{20}H_{42}$	282	0.35
27	16.535	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	0.14
28	16.886	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	5.57
29	17.143	Eicosane	$C_{20}H_{42}$	282	0.41
30	17.879	5-Hydroxy-2-phenyl-4-chromanone	$C_{15}H_{12}O_3$	240	1.94
31	18.224	9-Borabicyclo[3.3.1]nonane, 9-(2-phenylethyl)	$C_{16}H_{23}B$	226	4.43
32	18.294	Oleic Acid	$C_{18}H_{34}O_2$	282	2.01

S\No	R. Time	Compound Name	Molecular Formula	Molecular Weight	Area%
33	18.417	Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	0.88
34	18.453	Octadecanoic acid	$C_{18}H_{36}O2$	284	0.79
35	18.520	Tetracosane	$C_{24}H_{50}$	338	0.38
36	18.615	3-Heptadec-8-enyl-2,4,10-trioxa-adamantane	$C_{24}H_{42}O_3$	378	0.38
37	19.124	N-Methyl-N-(3-methoxyphenyl)-N'-phenyl-ure	$C_{15}H_{16}N_2O_2$	256	6.44
38	19.320	Z,Z-8,10-Hexadecadien-1-ol	$C_{16}H_{30}O$	238	4.65
39	19.475	1,3-Benzenediol, 4-propyl-	$C_9H_{12}O_2$	152	2.20
40	19.680	Stigmasterol	$C_{29}H_{48}O$	412	5.87
41	19.843	Benzene, 1-methoxy-4-(4-methyl-4-pentenyl)-	$C_{13}H_{18}O$	190	0.94
42	19.918	Galantamin	$C_{17}H_{21}NO_3$	287	2.56
43	20.142	2-Methoxy-4-[(2-pyridin-4-yl-ethylimino)-meth	$C_{15}H_{16}N_2O_2$	256	2.39
44	20.510	Pentacyclo[19.3.1.1(3,7).1(9,13).1(15,19)]octa	$C_{44}H_{56}O_4$	648	11.63
45	20,661	Phenol, 4,4'-methylenebis[2,3,5-trimethyl-	$C_{19}H_{24}O_2$	284	7.34
46	20.879	1,3-cis-Dihydroxycrinane	$C_{16}H_{19}NO_4$	289	0.37
47	21.015	N-Benzyl-2-[1-(4-methoxy-phenyl)-1H-tetrazol	$C_{17}H_{17}N_5O_2S$	355	4.89
48	21.075	.gamma.-Sitosterol	$C_{29}H_{50}O$	414	1.56
49	21.137	Naphthalene, decahydro-1-undecyl	$C_{21}H_{40}$	292	0.73
50	21.228	Phenol, 2-(3,4-dihydro-7-methoxy-2H-1-benzo	$C_{17}H_{18}O_4$	286	1.38
51	21.611	Acetamide, 2-phenoxy-N-(3,4-methylenedioxyp	$C_{15}H_{13}NO_4$	271	1.00
52	21.858	Galanthamine, 3-O-acetyl-1,2-dihydro-	$C_{19}H_{25}NO_4$	331	8.87
53	22.0115	Phthalic acid, 4-methoxybenzyl methyl ester	$C_{17}H_{16}O_5$	300	15.34
54	22.094	Crinamine, 1,2-dihydro-6-hydroxy-11-oxo-	$C_{17}H_{19}NO_5$	317	0.93
55	22.248	Octadecanoic acid, 2,3-dihydroxypropyl ester	$C_{21}H_{42}O_4$	358	0.33
56	22.457	3,4-Dihydrocoumarin-7-ol	$C_9H_8O_3$	164	0.31
57	22.666	1,3-Benzenedicarboxylic acid, bis(2-ethylhexyl	$C_{24}H_{38}O_4$	390	0.44
58	23.181	Decanedioic acid, bis(2-ethylhexyl) este	$C_{26}H_{50}O_4$	426	2.14
59	23.537	Squalene	$C_{30}H_{50}$	410	0.93
60	24.084	9-Ethoxy-10-oxatricyclo[7.2.1.0(1,6)]dodecan-1	$C_{13}H_{20}O_3$	224	0.55
61	24.300	4-Azaphenanthrene, 1-methyl-3-(2-phenylethenyl)	$C_{22}H_{17}N$	295	1.11

Table 7. Biological activities of phyto components identified in the dichloromethane extract of *C. jagus, H. littoralis, U. amazonica, Z. carinata, H. vittatum, P. ambioniensis*

S/N	Sample	Compund Name	Molecular Formula	Molecular Weght	Area%	Retenton Tme	Activity
1	*Hymenocallis littoralis*	a)Liriodendromine	$C_{17}H_{17}N_3$	263	14.03	22.444	
		b) Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	11.91	18.416	
		c).Ethyl oleate	$C_{20}H_{38}O_2$	310	9.38	18.473	
2	*Zephyranthes carinata*	a. Phthalic acid, 4-methoxybenzyl methyl ester	$C_{17}H_{16}O_5$	300	15.34	22.0115	
		b. Gatanthamine, 3-O-acetyl-1, 2, dihydro	$C_{19}H_{25}NO_4$	331	8.87	21.858	Anti-diabetic effects. Involved in the synthesis of many hormones like progesterone androgens, estrogen and corticoids [10]
		c. Stigmasterol	$C_{29}H_{48}O$	412	5.87	19.680	
		d. Apiol	C12H14O4	222	0.13	13.345	
3.	*Hippeastrum vittatum*	A. n-benzyl-2-[1-(4-methoxyl-phenyl 1) – 1 H-tetrazo	$C_{17}H_{17}N_{502}S$	355	14.94	20.999	It is an abortifacient and causes liver and kidney damage [11]
		B. Benzaminde, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	256	12.65	20.749	
		C. 1-(5-methyl-2-hydroxyphenyl)-3-phenyl propan	$C_{16}H_{18}O$	226	10.49	18.221	Induces analgesia and used in traditional medicine for relieving pain [10]
		D. Xanthoxylin	C10H12O4	196	0.24	13.834	
4.	*Crinum jagus*	a. 2H-1-Benzopyran-7-ol, 3,4-dihydro-3-(2-hyrdo)	$C_{16}H_{16}O_4$	272	19.87	21.588	Anti-diabetic effects. Involved in the synthesis of many hormones like progesterone androgens, estrogen and corticoids [11]
		b. Benzamide, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	256	9.92	20.738	
		c. Stigmasterol	$C_{29}H_{48}O$	412	4.04	19.665	
5.	*Proiphys*	a. Gamma-sitosterol	$C_{29}H_{50}O$	414	16.98	21.279	Antioxidant, Anti-microbial

	*ambon**i**ens**i**s*	b. Stigmasterol	$C_{29}H_{48}O$	412	11.49	19.854	and anti-inflammatory
		c. N-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	5.05	16.874	effect [10]
6.	*Urceolina amazon**i**ca*	a. 3-Furanacetic acid, 4-hexyl-2, 5-dihydro-2, 5	$C_{12}H_{16}O_5$	240	12.73	11.650	Anti-cancerous properties, prevents Alzheimer's
		b. Benzamide, 2-amino-N-(4-ethoxyphenyl)	$C_{15}H_{16}N_2O_2$	256	8.18	20.744	disease and help to lower cholesterol [10].
		c. Phenol, 2-(3,4-dihydro 2-methoxyl-2H-1-benzopy)	$C_{17}H_{18}O_4$	286	6.40	21.836	Used in cosmetic for treating UV sun damage
		d. Oleic acid	$C_{18}H_{34}O_2$	282	2.03	18.265	or symptoms of skin –
		e. Dimevalonic acid lactone	$C_6H_{10}O_3$	130	0.47	8.779	ageing [11]
		f. Linoleic acid ethyl ester	$C_{20}H_{36}O_2$	308	0.16	21.008	Has anti-inflammatory
		g. Phytol	$C_{20}H_{40}O$	296	0.79	20.185	effects [11]
		h. Sakuranin	$C_{22}H_{24}O_{10}$	448	4.43	22.479	Anxiolytic, antophagy, apoptosis-inducing, anti-inflammation immue-modulating and treatment of wound [11]. A flavanone used for the treatment of joint pain and rheumatoid anthritis [10]

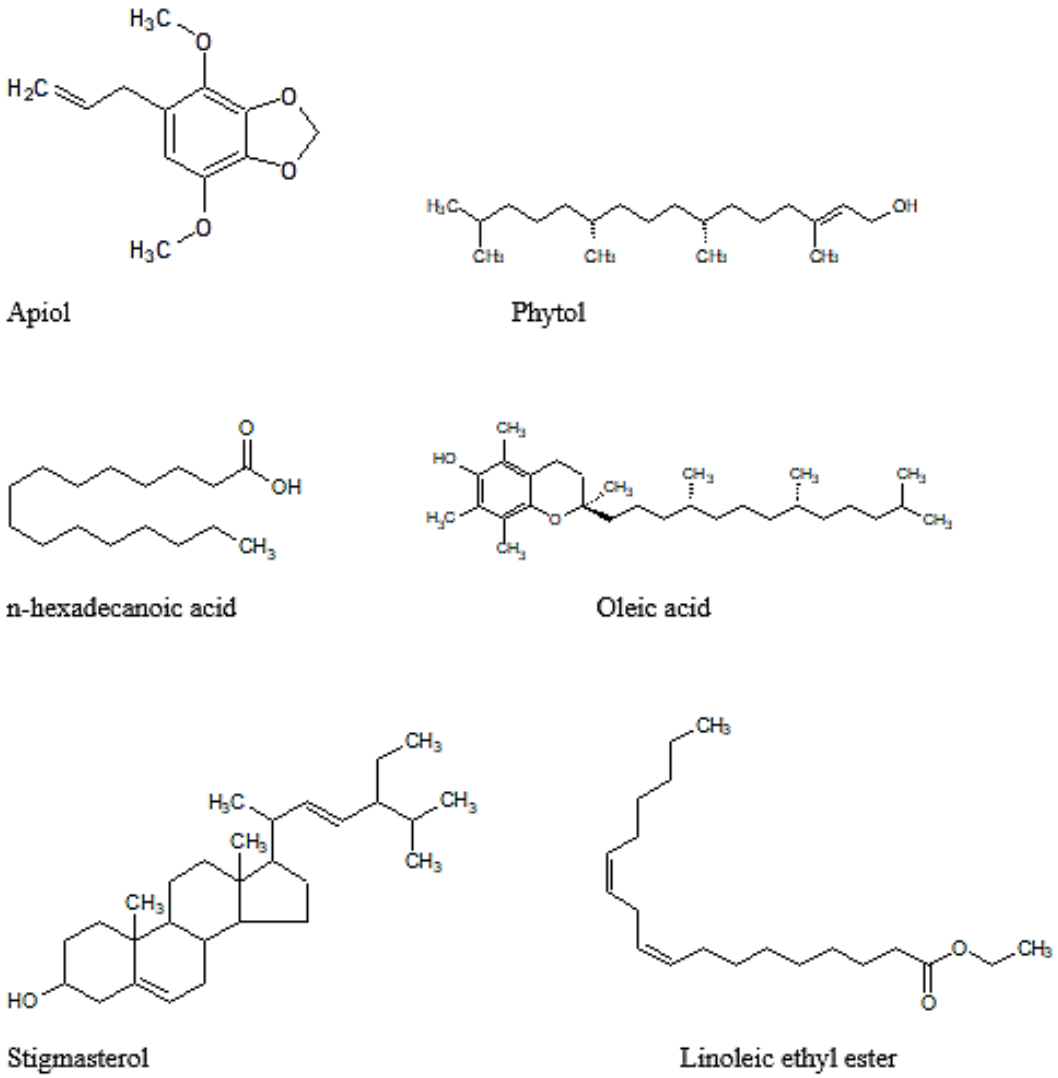

Fig. 1. Some Chemical Structures of Compounds in the Dichloromethane Bulb extract

The major components that delimited the species were as follows; In *Hymenocallis littoralis* bulb was Liriodendromin (14.03%), Linoleic acid ethyl ester(11.91%) and Ethyl oleate (9.38%); in *Zephranthes carinata*; Phthalic acid, 4-methoxybenzyl methyl ester(15.34%) Gatanthamine, 3-O-acetyl-1, 2, dihydro(8.87%) Stigmasterol(5.87%); in *Hippeastrum vittatum;* N-benzyl-2-[1-(4-methoxyl-phenyl 1) – 1 H-tetrazo(14.94%), Benzaminde, 2-amino-N-(4-ethoxyphenyl)(12.65%)and 1-(5-methyl-2-hydroxyphenyl)-3-phenyl propan(10.49%); in *Crinum jagus;* 2H-1-Benzopyran-7-ol, 3,4-dihydro-3-(2-hyrdo) (19.87%), Benzamide, 2-amino-N- (4-ethoxyphenyl) (9.92%) and Stigmasterol(4.04%); in *Proiphys amboniensis;* Gamma-sitosterol (16.98%), Stigmasterol (11.49%) and N-Hexadecanoic acid(5.05%); in *Urceolina amazonica;* 3-Furanacetic acid, 4-hexyl-2, 5-dihydro-2, 5(12.73%), Benzamide, 2-amino-N- (4-ethoxyphenyl)(8.18%) and Phenyl, 2-(3,4-dihydro 2-methoxyl-2H-1-benzopy)(6.40%). These were the most abundant phytoconstituents in the bulbs of the studied taxa.

Among the suggested phytochemicals, Oleic acid. has anti-cancerous properties, prevents Alzheimer's disease and help to lower cholesterol [12]. Stigmasterol is involved in the synthesis of many hormones like progesterone androgens, estrogen and corticoids [13]. Di mevalonic acid lactone is used in cosmetic for treating UV sun damage or symptoms of skin –

ageing [14]. Linoleic acid ethylester has anti-inflammatory effects [15]. n-Hexadecanoic acid (fatty acid) may act as antioxidant and anti-inflammatory. Phytol being most dorminant may act as an antioxidant. Hexadecanoic acid (fatty acid) may act as antimicrobial and chemopreventive [15].

4. CONCLUSION

The phytochemical results of the study clearly indicate the presence of bioactive phytochemicals in the dichloromethane bulb extract of *Hippeastrum vittatum , Proiphys amboinensis, Urceolina amazonica, Hymenocallis littoralis, Crinum jagus* and *Zephyranthes carinata*. This may justify their uses in the treatment and management of ailments like cancer, arthritis and inflammation in folkore medicine. The identification of these bioactive phytochemicals is just the initial step. Further studies on *in vitro* and *in vivo* studies should be carried out on various partition fractions and the isolates obtained from these important medicinal plants may be studied further using clinical trials, to assess the efficacy and safety of the extract for specific diseases.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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